

Ordinary Council Meeting

10 July 2019

Minutes



Agendas and Minutes are available on the City's website www.kwinana.wa.gov.au

Vision Statement

Kwinana 2030

Rich in spirit, alive with opportunities, surrounded by nature – it's all here!



Mission

Strengthen community spirit, lead exciting growth, respect the environment - create great places to live.

We will do this by -

- providing strong leadership in the community;
- promoting an innovative and integrated approach;
- being accountable and transparent in our actions;
- being efficient and effective with our resources;
- using industry leading methods and technology wherever possible;
- making informed decisions, after considering all available information; and
- providing the best possible customer service.

Values

We will demonstrate and be defined by our core values, which are:

Lead from where you stand – Leadership is within us all. | Act with compassion – Show that you care. | Make it fun – Seize the opportunity to have fun. | Stand Strong, stand true – Have the courage to do what is right. | Trust and be trusted – Value the message, value the message. | Why not yes? – Ideas can grow with a yes.









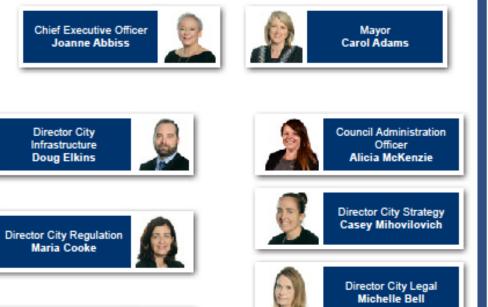






Council Chambers

Seating Layout

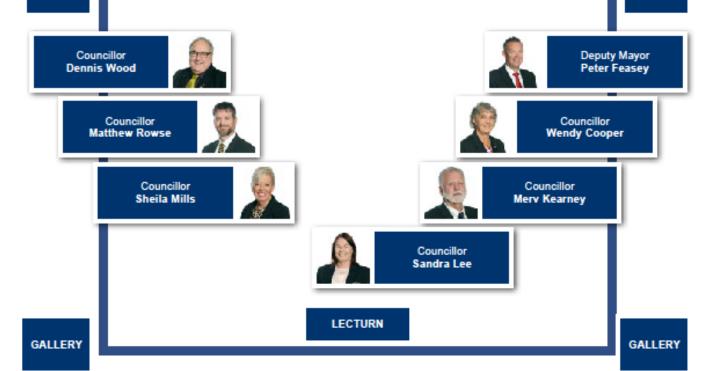


PRESS

Director City Engagement Barbara Powell

PRESS

Lawyer Travis Hossen



EMERGENCY GUIDE

Council Chambers

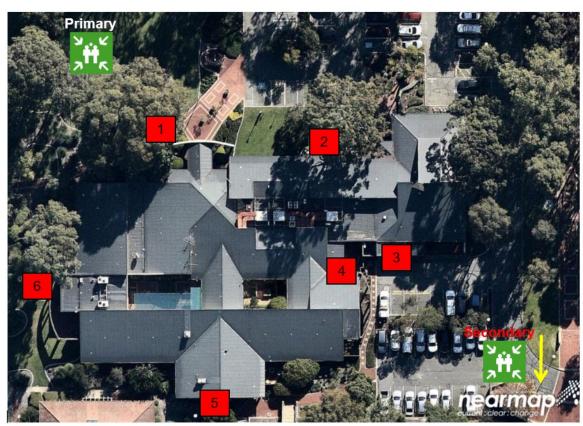


The City of Kwinana values the health and safety of its employees, contractors and visitors. Please ensure you are familiar with the emergency procedures in place at the City of Kwinana to ensure your safe evacuation.

Fire Alarm

On hearing the fire alarm, if you are instructed to evacuate, all individuals must:

- remain calm;
- pay attention to the responsible officer (in charge);
- when instructed to evacuate, leave via the appropriate emergency exit as directed;
- assemble at the designated Muster Point; and
- await the arrival Emergency Services. You must not re-enter the building until the all clear has been given by Emergency Services.



Administration Centre - Access, Egress (Red) and Assembly Points (Green)

Assembly Points:

- Primary North-west of the main entrance near Gilmore Avenue.
- Secondary South-east of the facility on grass area near Koorliny Arts Centre.

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Present:

MAYOR CAROL ADAMS
DEPUTY MAYOR PETER FEASEY
CR W COOPER
CR M KEARNEY
CR S LEE
CR S MILLS
CR M ROWSE
CR D WOOD

MS J ABBISS - Chief Executive Officer
MRS M COOKE - Director City Regulation
MS C MIHOVILOVICH - Director City Strategy

MR R NAJAFZADEH - Acting Director City Infrastructure

MRS B POWELL - Director City Engagement
MR T HOSSEN - Acting Director City Legal
MS A MCKENZIE - Council Administration Officer

Members of the Press 1
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1 Declaration of Opening:

Presiding Member declared the meeting open at 7:00pm and welcomed Councillors, City Officers and gallery in attendance and read the Welcome.

"IT GIVES ME GREAT PLEASURE TO WELCOME YOU ALL HERE AND BEFORE COMMENCING THE PROCEEDINGS, I WOULD LIKE TO ACKNOWLEDGE THAT WE COME TOGETHER TONIGHT ON THE TRADITIONAL LAND OF THE NOONGAR PEOPLE"

2 Prayer:

Councillor Sandra Lee read the Prayer

"OH LORD WE PRAY FOR GUIDANCE IN OUR MEETING. PLEASE GRANT US WISDOM AND TOLERANCE IN DEBATE THAT WE MAY WORK TO THE BEST INTERESTS OF OUR PEOPLE AND TO THY WILL. AMEN"

3 Apologies/Leave(s) of absence (previously approved)

Apologies

Nil

Leave(s) of Absence (previously approved):

Nil

4 Public Question Time:

4.1 Carlo Galati, Bertram

Question 1

My kids live in Wandi, if they are to play footy on this proposed oval, as per Amendment 5, whats to stop them getting killed when they chase after a football or try and cross Anketell Road when parking is under pressure. Like for instance if there is a lightning carnival for a junior football team?

Why would Council want to re-create a situation that exists in Fremantle on Leach Highway/High Street next to the netball courts?

Response

The Mayor referred the question to the Chief Executive Officer.

The Chief Executive Officer advised that the exact design of the playing fields and any fencing is not in question or debate at this point in time, it is really the location of the sporting field.

4.2 Chen Chee Ting, Applecross

Question 1

I am a co-owner of Lot 89 on Anketell Road and my question is specifically on Amendment 4 of the Anketell North Local Structure Plan, if the proposed placement of the oval is to be on the front of Lot 7, Lot 89 and Lot 90, my understanding is that there will be no sewer access to the back of those lots, effectively rendering future development useless, or there will be significant fill for the oval required to be able to have some sort of sewerage access to the back of the lots, has that been taken into consideration in the submission of Amendment 4?

Response

The Mayor referred the question to the Chief Executive Officer.

The Chief Executive Officer advised that generally the specific detail of servicing in that regard is something that is considered at the subdivision stage.

The Chief Executive Officer referred the question to the Director City Regulation for additional comment.

The Director City Regulation confirmed that at this point in time the Structure Plan is looking at where the land use configuration would be best suited for the uses, the process around sewerage would be part of the detailed design at subdivision stage.

4.3 Ashley Ting, Perth

Question 1

I am a co-owner of Lot 89 on Anketell Road, my question relates to Amendment 4 and 5 of the Anketell North Local Structure Plans, why did Council Officers refuse to meet with the proponent of Amendment 5 until after the agenda was closed on Friday last week, thereby missing an opportunity to fully understand the submissions made on Amendment 4 and 5? Elton Consulting asked to have the opportunity to address any submission made during consultation time on Amendment 5 to explain our position on Amendment 4 but the meeting request was refused.

4 PUBLIC QUESTION TIME

Response

The Mayor referred the question to the Director City Regulation.

The Director City Regulation confirmed that a request was made to the City Officers to meet with the proponents of Amendment 5. City Officers were not in a position to meet with the proponents until the assessments were actually completed, and the meeting occurred yesterday.

5 Applications for Leave of Absence:

COUNCIL DECISION

486

MOVED CR W COOPER

SECONDED CR M ROWSE

That Councillor Merv Kearney be granted a leave of absence from 14 September 2019 to 10 October 2019 inclusive.

That Councillor Sandra Lee be granted a leave of absence from 25 July 2019 to 2 August 2019 inclusive.

CARRIED 8/0

6 Declarations of Interest by Members and City Officers:

Nil

7 Community Submissions:

7.1 Bill Burrell, The Office of William Burrell – Consultant in Town Planning and Civic Design regarding item 15.1, Amendment 4 to the Anketell North Local Structure Plan (multiple landholdings under separate ownership) – Consideration of submissions and recommendation to the Western Australian Planning Commission

This submission is in support of Amendment No. 4 which provides for, among other things, for Mr and Mrs Volpi to remain living in their family home.

The major portion of Lot 30 has been sold to a developer, retaining 4,000m2 around their house. Mr and Mrs Volpi wish to remain living in their house which is in good condition and well appointed. The couple are in their 70's and enjoy living in this locality.

It should be noted that the contract of sale for Lot 30 and the caveat to retain the 4,000m2 around the house is dated 31 October 2006 and pre-dates the Anketell North LSP. The Volpi's ownership rights should have been taken into account and to this extent the LSP is fatally flawed.

It is our submission that the LSP should be amended to retain Treeby Road adjacent to Mr and Mrs Volpi's residence.

From a broader planning perspective, the open space area shown on the LSP would be better located on more level landform to avoid large cut/fill earthworks. There would also be a clear advantage to future residents if the open space could be located closer to compatible land uses and on more level ground.

The Amendment No 5 shows Treeby Road re-aligned and passing through Mr and Mrs Volpi's house. This produces a stale-mate for the developers as well as an untenable situation for the Volpi family. It also provides a point of frustration for Council in its desire to guide orderly and proper planning for the locality.

In conclusion, Mr and Mrs Volpi wish to remain in their home of some 20 years and hence have been careful to place the legal caveat on the title of Lot 30. The Anketell North LSP was prepared without due regard for this constraint and should therefore be amended.

Clearly Amendment 4 (either option) is preferred because of the clear planning benefits.

7.2 Rachel Chapman, Taylor Burrell Barnett regarding item 15.1,
Amendment 4 to the Anketell North Local Structure Plan (multiple
landholdings under separate ownership) – Consideration of
submissions and recommendation to the Western Australian Planning
Commission and item 15.2, Amendment 5 to the Anketell North Local
Structure Plan (Lots 7 and 89 Anketell Road) – Consideration of
submissions and recommendation to the Western Australian Planning
Commission

Good evening Mayor, Councillors and Staff. My name is Rachel Chapman and I am a Director at Taylor Burrell Barnett (TBB) at Level 7, 160 St Georges Tce Perth. TBB has been responsible for preparing Amendment 4 for Acumen Development Solutions on behalf of RPoint Land and Sanpoint. As the proponents for Amendment 4 we were charged with the responsibility to undertake a holistic review of the approved structure plan with a view to ensuring it was implementable. Our comprehensive amendment replaces the entire existing approved structure plan and was lodged in December 2018 only after extensive consultation with the City and Department of Planning, Lands and Heritage, thorough background investigations and analysis of opportunities and constraints all of which took place throughout 2018, way before Amendment 5 surfaced.

The primary purpose of our Amendment 4 is to provide for the District Open Space to be located further north, in a more suitable location adjacent to Anketell Road which enables the City's future local sporting ground and building to be constructed with minimal earthworks and co-located with the future district dry recreation centre, whilst also removing the unfortunate and unnecessary consequence of the previously planned location - being the realignment of Treeby Road and demolition of the home on Lot 30.

To reiterate, our Amendment 4 addresses a fatal flaw in the preparation and approval of the existing structure plan, being the ability to deliver local sporting fields due to the significant site constraints at the location depicted in the approved structure plan as well as the impediments to realignment of Treeby Road due to the legal agreement requiring the retention of the home on Lot 30.

Amendment 5 is inconsistent with our Amendment 4 and must be refused if the City has any hope of delivering local playing fields to this community. This piece meal Amendment, along with other amendments over individual lots most recently considered and approved, have not attempted to address the fatal flaw in the approved structure plan. We have. It has been a long and difficult, but necessary task if any further development is to take place in this area.

We have explored many options for the location of the playing fields and reached the same conclusion as the City Officers, that the location adjacent to Anketell Road significantly reduces earth works to create the appropriate grades for the playing fields, creates a strong presence and visual impact in the urban landscape and is the best long term location allowing for integration with the proposed dry recreation centre identified in the City's adopted Community Infrastructure Plan. Other locations cannot achieve all of these outcomes as well as provide for the retention of significant trees on the hill. Other locations might allow the Treeby Road alignment to be retained, but that is all and that is not a suitable compromise.

Recommendation to Council

We therefore commend the Officer's recommendation for Item 15.1 supporting Amendment 4, Version 4B in particular. We are confident we can work with the City officers and the Department of Planning, Lands and Heritage to address the matters listed as actions and modifications in the recommendation for this item.

We further commend the Officer's recommendation for Item 15.2 which does not support Amendment 5 and reiterate that Council must make its position clear to the WAPC that Amendment 5 must be refused as it is inconsistent with orderly and proper planning, proposes sensitive land uses within an unacceptable distance to a noise generating land use (being Anketell Road), would jeopardise the delivery of essential community facilities to support residential development in this area, and ultimately render the structure plan unimplementable beyond the current subdivision approvals or beyond the lots fronting Anketell Road.

Thank you for your time.

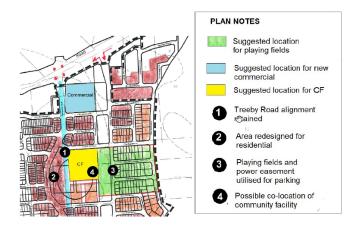
7.3 Justin Page, Elton Consulting regarding item 15.1, Amendment 4 to the Anketell North Local Structure Plan (multiple landholdings under separate ownership) – Consideration of submissions and recommendation to the Western Australian Planning Commission and item 15.2, Amendment 5 to the Anketell North Local Structure Plan (Lots 7 and 89 Anketell Road) – Consideration of submissions and recommendation to the Western Australian Planning Commission

Why was the original ANLSP approved by City of Kwinana knowing that Treeby Road realignment was going to require removal of the house? In answer to this the City must have known and weighed the pros and cons and determined that the central playing field location held the higher weighting than retaining the house, therefore Council approved the realignment of Treeby Road. Now it seems Council is reneging on its original decision.

Unfortunately the existing house is required to be removed, however appropriate compensation would need to be paid from DCA4 to the affected landowner, which currently has not been included in DCA4, but could be.

Amendment 5 has proceeded in 'good faith' based on the current approved ANLSP, of which the landowner has already spent substantial costs in progressing Amendment 5. No warning of Amendment 4 was formally given to Amendment 5 Proponent even in prelodgement meetings/discussions, and Amendment 5 Proponent was caught unaware of the relocation of the playing fields and given no opportunity to participate in early discussions with Amendment 4 Applicant and the City officers.

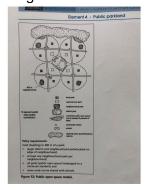
Another alternative option (provided in our advertising submission) was to relocate the playing fields (still in a central location) but more to the east. This should be explored further, rather than relocate the playing fields to a less desirable location in the North East corner of ANLSP. We indicated to Councillors that we requested a meeting with City officers before they finalised their agenda report as we had information that we did not include in our advertising submission that was very important to the assessment process, namely the issues of sewering of Lots 7 and 89, the need to amend DCA4 and that the new location of the playing fields would likely cost more than the central location as substantial fill would be required and DCA4 would have to be amended to make the new design work. City officers agreed to meet with us a day before the Council meeting, after the agenda had been put on the website for public inspection. This was completely insufficient time as the City officer indicated it was too late to alter the report. Hence City officers did not have a full appreciation or understanding of the issues in formulating their recommendation.



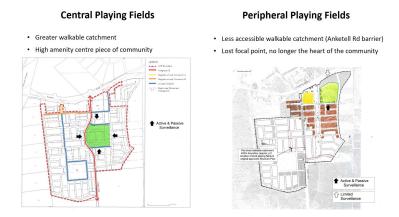
Relocating the playing fields is a radical change which needs more investigation. At the moment there are a lot of outstanding issues which is why agencies like Main Roads and Department of Environment do not support Amendment 4b. We urge the Council to not rush into a decision it may later regret.

Liveable Neighbourhoods Siting Criteria for Larger Public Parkland

- Should be <u>centrally</u> located
- Within convenient walkable distance to most residences



In the first instance, where is an ideal location for a playing field? Liveable Neighbourhoods tells us that it should be located in the centre of a neighbourhood.



The original decision makers had good reason to put the playing fields in its central location. Which is why Development Contribution Area 4 (DCA4) needs to be amended so that the realignment of Treeby Road can be implemented.

This is one option. That DCA4 be amended to empower the implementation of the current structure plan by:

- adequately funding the realignment and construction of Treeby Road as an internal collector road, much like DCA5 Wandi to fund construction of Honeywood Avenue.

Amending DCA4 to fund the construction of Treeby Road means that the playing fields can stay where it is.

The current location of the playing fields is perfect and if you just look at it the playing fields would be the heart of this future community.

It's right in the middle and easy for everyone to access. From all directions, north, south, east and west it would be an easy walk for people living in this community.

It will be surrounded on all sides by residential houses. It won't have a busy major freight and transport route next to it, which would cause visual and noise pollution reducing its amenity. The central playing fields will be a high amenity centre piece for this community.

So amending DCA4 is a logical alternative to relocating the playing fields to an inferior location.

If the playing fields were pushed into the north east corner up against a busy freight and transport route, the idea of it being at the heart and centre of this community is lost.

Imagine as a parent watching kids playing sport whilst noisy freight trucks and continual traffic is going past. Moving the playing fields next to Anketell Road means less amenity and higher safety risks for kids and users.

The north east corner also has very poor surveillance. There's no direct surveillance from the north, west or east. Motorists along Anketell Road passing by at speed would hardly make good interactive surveillance.

Whereas a central playing field surrounded and overlooked by houses, would have good territorial surveillance and reinforcement as community space.

In the Perth Metro area you'll hardly find any playing fields fronting a major freight and transport road. That's because it's not ideal.

You don't normally take a high value amenity asset such as a playing field and de-value it by putting it against a busy road.

That's why the original decision makers put the playing fields in the centre.

If Council wants to co-locate the community centre with the playing fields, in our advertising submission we presented various options which explores this whilst keeping the playing fields central.

In conclusion, the playing field in the central location is perfect and should be retained. It would be a backward step for Council to now move the playing fields and put it into the north east corner up against Anketell Road.

We are urging Council to consider all options, before committing to move the playing fields to an inferior location. Which is why we are suggesting an Alternative Recommendation

Alternate Recommendation

"That Council recommend to the Western Australian Planning Commission workshop/s be held with the officers of the City of Kwinana, Department of Planning Lands & Heritage, respective landowners and other relevant government agencies to consider the other options for the relocation of the Anketell Local Playing Fields and that the matter then be referred back to Council for consideration."

Or

"Council recommend to the Western Australian Planning Commission that their preferred amendment is Amendment 4b but that they support a workshop/s be held with the officers of the City of Kwinana, Department of Planning Lands & Heritage, respective landowners and other relevant government agencies to consider the other options for the relocation of the Anketell Local Playing Fields."

The alternative recommendation calls for a deferment so that the issues can be properly workshopped.

If at the end of the stakeholder workshop, it becomes apparent that the only solution is to move the playing fields then so be it.

But to be prudent, we urge the Council to take a step back and say: "Hang on, let's look at all the alternatives first, to ensure its best for the community". Which is why we hope Council will adopt the Alternative Recommendation.

We indicated to Councillors that we requested a meeting with City officers before they finalised their agenda report as we had information that we did not include in our advertising submission that was very important to the assessment process, namely the sewering of Lots 7 and 89, the need to amend DCA4 and that the new location of the playing fields would likely cost more than the central location as substantial fill would be required. City officers agreed to meet with us a day before the Council meeting, after the agenda had been put on the website for public inspection. Hence City officers did not have a full appreciation of the issues in formulating their recommendation.

7.4 Warren Spencer, Terranovis Pty Ltd regarding item 15.1, Amendment 4 to the Anketell North Local Structure Plan (multiple landholdings under separate ownership) – Consideration of submissions and recommendation to the Western Australian Planning Commission and item 15.2, Amendment 5 to the Anketell North Local Structure Plan (Lots 7 and 89 Anketell Road) – Consideration of submissions and recommendation to the Western Australian Planning Commission

After reading the agenda report, it seems like the decision to relocate the playing fields is being rushed. There's lots of incomplete data that is being requested by Department agencies, before they can support Amendment 4b. In fact Government agencies are not supporting Amendment 4b due to lack of information. Yet the recommendation being put to Council is to approve the relocation of the playing fields. This also without fully exploring other options that could retain the playing fields in its central location, or whether there are other better alternative locations.

The original decision makers had good reason to put the playing fields in its central location.



The current location of the playing fields perfectly located being central and if you just look at it the playing fields would be the heart of this future community.

Remember this oval also serves Anketell South residents from Treeby Park Estate. Wandi residents already have their own football oval.

Its right in the middle and easy for everyone to access. From all directions, north, south, east and west people living in this community will be able to conveniently walk to it.

It will be surrounded on all sides by residential houses. It won't have a busy major freight and transport route next to it, which would cause visual pollution and reduce its amenity. It will be quieter and more enjoyable for residents not being next to a major regional freight and transport road.

The central playing fields will create an opportunity of a high amenity centre piece for this community.

But if the playing fields were pushed into the north east corner up against a busy freight and transport route the idea of it being a centre piece is lost. The central heart of the community is gone.

Imagine the reaction of parents watching their kids playing sports whilst in the background you have noisy freight trucks and high volume traffic constantly going past in the background. What kind of amenity would the playing fields have? What level of safety is there for the kids?



Surveillance in this north east corner would be very limited. After hours there's no direct surveillance from the north, west or east. Only a row of houses to the south would overlook the playing fields. Motorists along Anketell Road passing by at speed would hardly make for good interactive surveillance.

You'll hardly get territorial activation of surveillance from passing traffic along Anketell Road.

Whereas central playing field surrounded and overlooked by houses, would form good territorial surveillance and reinforcement as community space.

If you look around the Perth Metro area how many playing fields can you find that are abutting a major freight and transport road. When I looked, I could hardly find any. The one that comes to mind that is closest in nature to this is Fremantle Netball Courts in Leach Highway/ High Street in Fremantle – It's a Disaster.

There are so few playing fields on the edge of an urban area because planning intentionally takes a high amenity asset, such as a playing field, and makes it a focal point and high value asset in the community design. That's why the original decision makers put the playing fields in the centre - not adjoining a port access road.

The only thing wrong with the current design is its implementation. The problem lies with the deficiency of Development Contribution Area 4 (DCA4) which is too weak to implement the design.

DCA4 already has provisions in place to fund the acquisition and construction of the central playing fields.

But DCA4 should be amended to empower the implementation of the current structure plan design by:

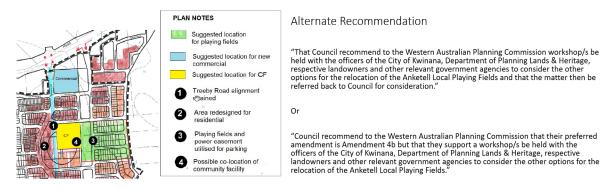
 properly funding the realignment and construction of Treeby Road, which is the main internal collector road and therefore should be made a DCA common infrastructure item.

Amending DCA4 to fund the realignment and construction of Treeby Road then means that the playing fields can stay and be the centre piece amenity attraction.

If co-location of the community dry recreation centre with the playing fields is something the Council now desires, it doesn't mean the only option is to move the playing fields north up against Anketell Road. The community centre can be shifted south next to the central playing fields. This should be looked at further in considering all options.

The reason the original decision makers put the playing field in the centre is that this location is perfect. It would be a backward step for Council to now move the playing fields and put it into the north east corner up against Anketell Road.

We are simply saying that Council should consider all the options first, before deciding to move the playing fields to an inferior location. Which is why we are suggesting an Alternative Recommendation.



If at the end of the stakeholder workshop, it becomes apparent that the only solution is to move the playing fields then so be it. But to be prudent and to aim for the best planning outcome possible for the community, Council should take more pro-active action and consider all of the options, before going down the path of moving the playing fields away from its central location. Thank you

7.5 Benedict McCarthy, Planning Horizons regarding item 15.1, Amendment 4 to the Anketell North Local Structure Plan (multiple landholdings under separate ownership) – Consideration of submissions and recommendation to the Western Australian Planning Commission

Good Evening Councillors,

Very little time and opportunity has been afforded to the owners of lot 89 to review, discuss and workshop amendment 4b. They were only made aware their land was included in the amendment earlier this year when they received a letter from the City advertising the amended proposal. As a result of this short notification, they have only had a brief opportunity to make a written submission regarding amendment no.4. Not at any stage have they had the opportunity to be involved in this process, to consider their options, workshop alternatives, or be involved in the design dialogue. Before you tonight is a proposal which has a significant negative impact upon their land, which they have had virtually no input into deciding its future.

Aside from this fact, on behalf of the landowners of Lot 89, we strenuously object to Amendment 4b of the Anketell North Local Structure Plan (ANLSP) based on the following issues. All of which are borne from their direct conflict with good planning principles and best planning practices:

- Location of the District Open Space (DOS) Ped Shed Active open space is to be accessible within 400m of all housing in accordance with Liveable neighbourhoods. Amendment 4b does not provide this.
- Use of a primary school oval does not constitute access to active public open space for residential lots outside the 400m ped shed catchment area. More often than not, primary schools are being fenced off to provide security for the school site, and school children during school term. Such fencing is neither inviting nor conducive to allowing general public access. This argument raised in the council report is not an acceptable alternative.
- We cite abundant evidence from the proposed amendment that the desire to shift the District Open Space (DOS) from its approved location in the centre of the ANLSP area to the north-eastern corner is based almost entirely on the inconvenience of earthworks.

For example, under section 3.1.1 Site Analysis it is stated that:

An opportunities and constraints analysis was undertaken to inform the design considerations over the site. Of particular note, the relocation of the District Open Space minimises earthworks, fill and retaining in comparison to the approved location. It also allows the existing Treeby Road reserve alignment to be retained and provides the opportunity to integrate the DOS with the community facility.

The desire to avoid earthworks is repeated in section 3.2 Development Concept Plan: Public Open Space – the DOS has been relocated where the natural surface area level difference requires comparatively little earthworks compared to the approved ANLSP location to create a useable space for playing fields, and is co-located with the proposed Community Purpose Site.

The earthworks issue is also prominent in section 3.4 Public Open Space:

The approved location of the DOS has a gradient of up to 6% (1 in 16) and level differences across the site of 12 metres which would require significant re-contouring across a number of existing properties in order to provide viable gradients for the DOS playing fields. The proposed DOS location sites in an area where the natural surface level difference is in the order of three metres, requiring comparatively little earthworks to create a usable space for sports fields.

We submit that the desire to minimise earthworks is poor justification for shifting the location of the DOS. The proper place for DOS is in the centre of the ANLSP – a concept stressed many times in Objective 5 of *Liveable Neighbourhoods* (Draft 2015).

Simply put, centrally located DOS is better placed to serve the neighbourhood

Centrally located DOS would also benefit from the proximity of Treeby Road, which
is scheduled to become an Integrator B category road. These roads are much more
suited to a district-scale facility than the Neighbourhood Connector category road
that would service the DOS under proposed Amendment 4. Liveable
Neighbourhoods goes so far as to suggest that some sports facilities could even be
appropriate for integrator A category roads:

Access to activity centres is more appropriate via integrator B arterials, rather than integrator A arterials particularly where lower traffic volumes exist and pedestrian-based retail (main) streets are required. The planned land use and density should be considered in relation to traffic function. In some instances, certain land use activities and densities may generate large volumes of traffic either all day or in distinct peaks. Examples could include regional sports facilities or higher order centres. Integrator B arterials may not provide sufficient capacity and therefore an integrator A arterial may be required.

The ANLSP also acknowledges the superior qualities of Treeby Road with regard to pedestrian movement and public transport:

Consistent with the approved LSP, Treeby Road is proposed as an Integrator B ... This key north-south road is being proposed as a boulevard design with shared use pathways on both sides of the verge ...

In accordance with the Transport Assessment (October 2015) prepared by Transcore, bus route 537 will run along the Treeby Road north-south connection and serve Wando and Anketell cells and provide a good connection between Aubin Grove station and Kwinana station.

Following the logic of *Liveable Neighbourhoods* and even the ANSLP itself, district-scale POS simply should not be situated on low-volume local roads away from the centre of the neighbourhood, regardless of the costs of earthworks. This simple principle needs to be observed in the long-term interests of the area. We repeat our claim that the proposed relocation of the DOS cannot be justified on planning grounds.

Other justification include:

- Sports facilities hidden in a corner of the neighbourhood will not improve the
 intended prominence of the Community Facility. DOS will serve Community Facility
 better if part of "amenity chain" connected via Treeby Road, which will be specially
 configured for pedestrian/cycling movement, and for accessibility to public transport
 networks.
- DOS located as per proposed Amendment 4 would require reciprocal parking which could compromise Community Facility patrons. Centrally located DOS would offer unique parking opportunities and ensure simpler management of Community Facility bays.
- Co-located DOS would not improve built form statement at intersection
- Merits of centrally located DOS outweigh benefits of land use buffer near Anketell Road

Traffic congestion increase:

 Amendment 4b has closed an access road from the structure plan site to Anketell Road which will redivert traffic to the 2 remaining Anketell Road intersections further intensifying congestion at these points. Particularly during peak periods with which the active DOS will be utilised.

• Anketell Road is a busy road and will only get busier. With the playing field right on Anketell Road, when there are sporting carnivals, people will most likely park on side of the roads and it will be very dangerous to cross the road. if there are any injury or fatalities, it will be because of amendment 4 and the council for recommending it. From my 25 years of experience with local sporting at grass root level, there is no sporting ground within the Perth metro area that has sufficient overflow parking for sporting events at peak periods. We see no suitable justification that puts children and pedestrians in direct conflict with fast moving traffic as being considered as acceptable planning practice.

Furthermore, there are gross shortcomings with the provided consultant reporting:

- No traffic management plan or report has been prepared to our knowledge for amendment 4b.
- No local water strategy management plan or assessment has been conducted for amendment 4b
- Not enough time was given to consider Amendment 5. We believe Amendment 5 is a more comprehensive plan as it has a local water management plan and has addressed a lot of the issues raised in the objections to amendment 4b.

In summary:

We understand there is a major landowner activating this process with considerable gain at hand, so we see it only fair that the smaller landholders be given fair accessibility to this process that major shareholders have enjoyed since the commencement of the ANLSP.

Given the shortfall of essential information and investigation into amendment 4b, the unsuitable time for my clients to be given proper and considerate knowledge and ability to provide input into the proposal, we request the Council initiate an alternative recommendation requiring further workshopping be undertaken.

Thank you

7.6 Steve Sturgeon, Casuarina Wellard Progress Association Inc regarding item 14.1, Banksia Road Rifle Range (Lots 53 and 1320 Banksia Road, Wellard) and Boomerang Road site (Lot 6 Banksia Road and Lots 300-301 Boomerang Road, Oldbury)

The Casuarina Wellard Progress Association (CWPA) would again like to thank the City of Kwinana, the Mayor, Councillors and Officers for their continued support and long-held opposition against both the Boomerang and Banksia Road sand mines.

In recent weeks there has been a significant increase in activity by the Hanson (the proponent) and government departments, all requiring a rapid response from us and Council.

It would appear that the proponent is gearing up to start mining operations on the Boomerang Road site, even though many of the approvals required are in dispute or have not been granted.

As recent as yesterday the Boomerang Road junction with Banksia Road was being surveyed and pegged presumably to start road works in the immediate future.

Current issues requiring responses include:

Boomerang Road:

- Works approval submissions
- Community Consultation issues
- WAPC approval
- Clearing Permit appeal
- Conservation covenant

Banksia Road:

- Federal Clearing permit
- Newly registered TEC (Wellard0I) Organic Tumulus Mound Spring
- Community Consultation issues

It is with these issues in mind that we ask the Council to unanimously accept the Officer Recommendations presented in the Report

That Council:

- 1. Authorise the CEO and the Director City Regulation to prepare and submit correspondence that gives effect to the Council's resolution to maintain its long standing opposition to sand mining at Boomerang Road and Banksia Road Rifle Range.
- 2. Requests City Officers to provide regular updates (as and when appropriate), on City submissions and advocacy efforts in regards to Boomerang Road and Banksia Road Rifle Range.

Thank you for your continued support.

8 Minutes to be Confirmed:

8.1 Ordinary Meeting of Council held on 26 June 2019:

COUNCIL DECISION

487

MOVED CR S MILLS

SECONDED CR M KEARNEY

That the Minutes of the Ordinary Meeting of Council held on 26 June 2019 be confirmed as a true and correct record of the meeting.

CARRIED 8/0

9	Referred Standing / Occasional / Management /Committee Meeting
	Reports:

Nil

10 Petitions:

Nil

11 Notices of Motion:

Nil

12 Reports - Community

12.1 Adoption of Disability Access and Inclusion Plan 2019-2021

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

This report seeks Council adoption of the City of Kwinana Disability Access and Inclusion Plan 2019-2021 (DAIP).

The DAIP is a two year plan that seeks to address issues related to access and inclusion for people with disability, their family and carers and ensures that the City is meeting all legislative requirements.

Under the *Disability Services Act 1993* all Local Governments are required to develop and implement a Disability Access and Inclusion Plan (DAIP) to ensure that people with disabilities have equal access to its facilities and services.

OFFICER RECOMMENDATION:

That Council adopt the *City of Kwinana Disability Access and Inclusion Plan 2019-2021* as detailed in Attachment A.

DISCUSSION:

The City of Kwinana adopted its first *Disability Service Plan* in 1995. Since then the City has delivered many improvements to help ensure all people have access to, and are included in, the City's services, facilities, programs and events.

Approximately 1,540 people, or 4.0% of the Kwinana community reported needing help in their day-to-day lives due to disability (*Australian Bureau of Statistics Census 2016*).

The City is committed to looking at ways to remove barriers to access and inclusion that may restrict a person's abilities. The City is committed to actively promoting environments and services where all people are valued and have choices to live their best lives.

A key action under the 'Rich in Spirt: Accessibility for everyone' objective of the *Strategic Community Plan 2017-2027* is to improve levels of disability access and inclusion throughout the community.

As a requirement of the DAIP the City must address seven "Outcome" areas:

- 1. People with disabilities have the same opportunities as other people to access the services of, and participate in, any events organised by the City of Kwinana;
- 2. People with disabilities have the same opportunities as other people to access the buildings and other facilities of the City of Kwinana;
- 3. People with disabilities receive information from the City of Kwinana in a format that will enable them to access the information as readily as other people are able to access it.

- 4. People with disabilities receive the same level and quality of service from staff of the City of Kwinana as other people receive;
- 5. People with disabilities have the same opportunities as other people to make complaints to the City of Kwinana;
- 6. People with disabilities have the same opportunities as other people to participate in any public consultation conducted by the City of Kwinana; and
- 7. People with disability have the same opportunities as other people to obtain and maintain employment with the City of Kwinana.

The Disability Service Act 1993 sets out the minimum consultation requirements for public authorities in relation to DAIPs. Local Governments must call for submissions (either general or specific) by notice in a newspaper, circulating in the local district of the Local Government, and on any website maintained by, or on behalf of, the Local Government. The City exceeded these requirements and took additional measures to gain community feedback.

The review of the previous *Disability Access and Inclusion Plan 2012-2017 (DAIP)* was undertaken via consultation with City Officers and the community. The community consultation included a survey. In total 86 surveys were returned and a total of 386 comments received in regard to access and inclusion for individuals living, visiting and working in the City.

The consultation identified that the City has made many notable advancements in the areas of access and inclusion including:

- New facilities built within the City now include adult change tables and audio loops.
 This includes the facilities at Thomas Kelly Pavilion, Darius Wells Library and
 Resource Centre, Fiona Harris Pavilion, John Wellard Community Centre, and the
 William Bertram Community Centre;
- Facility upgrades include installation of accessible toilets and ramps and audio loops at Medina Hall and Kwinana Recquatic;
- An increase in disability parking bays at Council facilities such as Kwinana Recquatic, Thomas Kelly Pavilion, Fiona Harris Pavilion, Wellard Pavilion and community centres at Wellard and Bertram;
- New recreational facilities have been designed and built with accessibility features central to the facility design. These have been included at venues such as Kwinana Adventure Park, Kwinana Skate Park, Rhodes Park, Sloan's Reserve, and Harry McGuigan Park;
- Kwinana Beach wheelchair and matting has been made available at Wells Park and a wheelchair is available for public use at the City's library;
- All new community park playground improvements are made with accessibility features central to the project;
- Other facility improvements across the City have included installation of a pool hoist at the Recquatic, decreased the speed limit and installed a new pedestrian crossing on Chisham Ave, increased pathway maintenance, improved access to nature trails, provided a community bus with improved accessibility, and created an ACROD drop off bay at the Recquatic.

The consultation also identified areas for improvement and a number of recurring barriers, including:

- Accessible footpaths need to be free of impediments;
- Access at events that are conducted on grassed ovals is a challenge;
- The City needs to better promote the services, activities and events available for people with disability;

- The lack of sensory activities at events and in community centres;
- The need for more ACROD parking in high density areas that better meets the needs of the community;
- Issues with access to parking areas and ease of negotiating footpaths and curbs;
- Direct transport to venues and facilities, lack of disability friendly bus stops with no shade or pathways;
- Financial constraints and not being able to afford to participate in activities;
- Lack of seating at community events;
- Community perceptions about safety;
- Trouble navigating the City's website;
- Change room facilities at the Kwinana Recquatic hydro pool need to be larger and an adult change table installed;
- Appropriate signage e.g. plain language, bigger text and pictures;
- Awareness of consultation/community engagement opportunities. Consultation methods that are fully accessible and inclusive; and
- Job opportunities that are not tailored to people with disabilities.

Strategies developed to improve access and inclusion identified via the consultation process have been captured within Section 8 Implementation Plan of the DAIP.

The *Disability Services Act 1993* requires that Disability Access and Inclusion Plans be reviewed at least every five years. Whenever the Plan is amended a copy must be lodged with Disability Services. The Plan can be updated more frequently if desired. The next review of the City of Kwinana's DAIP will take place prior to June 2021.

By bringing forward the review date for the next DAIP, Officers are provided with an opportunity to integrate feedback garnered through the City's new placed based operating model and undertake a rigorous engagement process.

While the City's current DAIP has lapsed during the updating process, actions relevant to the seven Outcomes have continued to be implemented and reported on. Disability Services are aware of this and have supported the City through the engagement process to achieve the updated draft DAIP.

LEGAL/POLICY IMPLICATIONS:

The DAIP responds to the City's responsibilities under the:

- Disability Services Act 1993, Part 5 Disability access and inclusion plan by public authorities (states that each local authority must have a disability access and inclusion plan);
- The Western Australian Equal Opportunity Act (1984) and the Commonwealth Disability Discrimination Act (1992); and
- The City's Policy Access and Equity.

FINANCIAL/BUDGET IMPLICATIONS:

The Disability Access and Inclusion Plan relates to all Directorates across the City. A budget allocation exists within each Directorate to implement key strategies, as required. Additional financial resources required to implement the DAIP are considered as part of the Long Term Financial Plan and Annual Budget deliberation processes.

ASSET MANAGEMENT IMPLICATIONS:

All new City assets are required to comply with the DAIP. Existing assets have been refurbished to meet requirements where practicable, with plans created to prioritise the modification / retrofitting of assets as part of an integrated improvement program.

ENVIRONMENTAL IMPLICATIONS:

Current and future landscaping and other environmental designs are required to comply with the DAIP.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcomes and objectives detailed in the Strategic Community Plan.

Plan	Outcome	Objective
Strategic Community Plan	A unique identity	1.1 Develop and strengthen community identity to create a sense of belonging
	A City alive with activity	1.2 Inspire and strengthen community spirit through community activities and events
	Services for an active community	1.4 A healthy and active community with services for everyone's needs
	Accessibility for everyone	1.9 Improve levels of disability access and inclusion throughout the community
	Quality education for all ages	2.2 The Community has a choice of quality public and private facilities to meet their education and training needs throughout their life time
	Great public places	4.1 Residents are provided with a range of multifunctional community places and accessible recreation facilities
	Well-kept green spaces	4.2 The community has easy access to well equipped, quality parks and public open spaces
	A well planned City	4.4 Create diverse places and spaces where people can enjoy a variety of lifestyles with high levels of amenity
	A connected transport network	4.6 Provide a safe and efficient integrated network of roads, footpaths and cycle routes supported by a good public transport system

COMMUNITY ENGAGEMENT:

- 1. Community Engagement has taken place in the following forms:
 - Online and hardcopy survey. Requests for community members to
 participate in the surveys were advertised through newspaper articles,
 Facebook, email and by face to face networking with community groups. 86
 surveys were completed and included 386 comments in relation to access and
 inclusion issues.
 - Face to face discussions with staff responsible for actions within the DAIP, to identify what had been working in their respective areas, what achievements had been made and what ongoing actions could be included in the revised DAIP.
 - Consultation with the 'Access and Inclusion Advisory Group'. Meetings have been taking place once per quarter. The purpose of this Group is to maintain and improve the quality of life of residents by creating an accessible community in which information, services, facilities, programs, decision-making processes and other activities are open and available to all residents, in an effort to provide equal opportunities, rights and responsibilities, and the equitable distribution of resources according to priority.
- 2. The following community engagement is proposed:

Following endorsement of the Disability Access and Inclusion Plan by Council and Disability Services, the plan will be promoted to the community by the following methods:

- The City of Kwinana's website
- The City of Kwinana's Social Media pages
- A notice in the local newspaper
- Notification to staff via internal methods, intranet and at relevant staff meetings

PUBLIC HEALTH IMPLICATIONS

The recommendation/proposal has the potential to cause a significant improvement to the following determinants of health -

- Built Environment Sanitation; Environmental Quality; Neighbourhood Amenity;
- Health Behaviours Diet and Exercise; Participation
- Socio-economic Factors Education; Employment; Income; Family and Social Support; Community Safety

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	The City does not have an appropriate and current Disability Access and Inclusion Plan (DAIP)
Risk Theme	Failure to fulfil statutory regulations or compliance requirements
Risk Effect/Impact	People/Health Reputation Compliance
Risk Assessment Context	Strategic
Consequence	Moderate
Likelihood	Almost certain
Rating (before treatment)	High
Risk Treatment in place	Avoid - remove cause of risk
Response to risk	Adoption of the DAIP in line with Disability
treatment required/in	Services protocols. Develop and implement a
place	communications plan.
Rating (after treatment)	Low

COUNCIL DECISION

488

MOVED CR W COOPER

SECONDED CR D WOOD

That Council adopt the *City of Kwinana Disability Access and Inclusion Plan 2019-2021* as detailed in Attachment A.

CARRIED 8/0

CITY OF KWINANA

DISABILITY ACCESS AND INCLUSION PLAN

2019 - 2021

This Disability Access and Inclusion Plan is available in alternative formats upon request and includes: in electronic format, by email, in hard copy, in both large and standard print, in audio on compact disc, and on the City's website at www.kwinana.wa.gov.au



Management Community Engagement Team
Responsibility Manager Community Engagement

Created Disability Access and Inclusion Plan 2019-2021

Latest Update CM9 - D17/5362[v2]

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1. Mayor's Message

I am pleased to present the City of Kwinana's Disability Access and Inclusion Plan 2019-2021 (DAIP).

This Plan has been created with the intention of building a community in which all people have access to, and are included in, everything our wonderful City has to offer.

The City of Kwinana is growing rapidly, and with this growth comes our responsibility to ensure the changing needs of our community, our work force and our visitors are met. Like many other local governments, the City of Kwinana is also faced with the prospect of an ageing population, which brings its own set of challenges in terms of accessibility and the need to consider those members of our community who are vulnerable or at risk of isolation.

In creating this Plan, the City has extensively consulted with individual community members, service providers, community groups and employees to identify barriers and develop strategies to overcome them. These strategies are focused on developing and maintaining strong relationships with service providers and organisations that can assist us in promoting an inclusive environment for our residents.

Whilst the Plan has a strong focus on individuals with disability, the City recognises that access and inclusion challenges affect many other community members and groups. This Plan addresses these challenges, in the hope that everyone in the community can access the City's many great services and facilities.

This Plan aligns with the City's values and our Strategic Community Plan. We acknowledge our diverse community and we are committed to providing residents, visitors and employees with a holistic approach to access and inclusion challenges – now and into the future.

2. Acknowledgements

The City of Kwinana acknowledges the traditional custodians of the lands on which the City is located and we pay our respects to their Elders, past and present.

The City would also like to acknowledge and thank all individuals, community groups, and organisations who have provided input and feedback. This has been instrumental in the development of this Disability Access and Inclusion Plan.

3. Introduction

The City of Kwinana adopted its first *Disability Service Plan* in 1995. Since then it has delivered many improvements to help ensure all people have access to, and are included in, the City's services, facilities, and events.

The City recognises the social model of disability. We are committed to looking at ways to remove barriers to access and inclusion that may restrict a person's abilities. The City is committed to actively promoting environments and services in which all people are valued and have the choices to live their best lives.

The development of the *Disability Access and Inclusion Plan* is guided by *The Western Australian Disability Services Act 1993 (Amended 2004*). The Act requires all Local Governments to develop and

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implement a *Disability Access and Inclusion Plan* (DAIP). This helps ensure that people with disability have equal access to facilities, services, and employment opportunities.

Other legislation underpinning access and inclusion includes the *Equal Opportunity Act 1984* (WA) and the *Disability Discrimination Act 1992* (Cth) [DDA]. Both of which ensure that discrimination on the basis of a person's disability is unlawful.

This Plan outlines the City's key strategies to address each of the 'outcome' areas of the *Disability Access and Inclusion Plan*:

- 1. People with disability have the same opportunities as other people to access the services of, and any events organised by the City of Kwinana.
- 2. People with disability have the same opportunities as other people to access the buildings and other facilities of the City of Kwinana.
- 3. People with disability receive information from the City of Kwinana in a format that will enable them to access the information, as readily as other people are able to access it.
- 4. People with disability receive the same level and quality of service from the staff of the City of Kwinana as other people receive from the staff at the City of Kwinana.
- 5. People with disability have the same opportunities as other people to make complaints to the City of Kwinana.
- 6. People with disability have the same opportunities as other people to participate in any public consultation by the City of Kwinana.
- 7. People with disability have the same opportunities as other people to obtain and maintain employment with the City of Kwinana.

4. Background

4.1 About the City of Kwinana

The City of Kwinana is located in Perth's outer southern suburbs, between 25 and 37 kilometres south of the Perth CBD covering an area of 120km². The City currently has an estimated population of 43,511, a significant increase from 29,227 in 2011.

Our community includes residential, industrial, rural, and rural residential areas, as well as a retail and commercial centre in the Kwinana City Centre. The Kwinana Industrial Area is one of Perth's largest employment areas, employing approximately 5,616 people and generating approximately \$15.77 billion into the State and national economy.

In 2016 approximately 1,540 people, or 4.0% of our community reported needing help in their day-to-day lives due to disability¹.

The population of Kwinana is set to double in the next ten to fifteen years. Population growth is being supported by available land for new housing developments, affordable housing, and increased

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¹ https://profile.id.com.au/kwinana (2016)

accessibility to Perth City via the Kwinana Freeway and southern railway. It is expected that there will be a further increase in the number of people with a disability living in the City as a result of population growth, our ageing population, and those who take up residency in the City.

4.2 Function, Facilities and Services

The City of Kwinana is responsible for a range of functions, facilities and services:

Services to Property and Environment

- Provision and maintenance of roads, footpaths, cycle ways and dual use paths;
- Provision and maintenance of community buildings and facilities for community and sporting groups;
- Maintenance of playing areas and playgrounds, reserves, parks and sports grounds;
- Land drainage and development;
- Waste management collection, disposal and recycling;
- Street cleaning and litter patrol;
- Planting and caring for street trees; and
- Installation of signs and numbering of buildings and lots.

Services to the Community

- Recreation centre and pool, related services and programs;
- Provision of playing areas and playgrounds, reserves, parks and gardens, sports grounds and facilities for sporting and community groups;
- Provision of community centres, halls and pavilions;
- Public library;
- Information services and the City's website;
- Environmental health services:
- Accommodation for seniors :
- The Zone Youth Space;
- Youth development and services;
- Family Day Care;
- Community events and cultural development;
- Volunteer Resource Centre; and
- Community grants.

Regulatory Services

- Planning of roads, subdivisions and implementation of the City's Planning Schemes;
- Building investigations, approvals for construction, alterations and additions;
- Compliance services for swimming pools and noise pollution; and
- City Assist services including dog control, parking maintenance/control and bush fire control.

General Administration

- Public information services; and
- Lodging of complaints.

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4.3 Key Achievements 2012 - 2017

Community Events and Celebrations

The City offers a number of events and celebrations to the community every year. Each event is planned using the Disability Services 'Creating Accessible Events Checklist'. Community groups are also encouraged to use the checklist and this is made available on the City's website.

Access to buildings and facilities

The City has undertaken a remedial works program to improve accessibility to City of Kwinana facilities. Some of these works have included:

- New facilities built within the City now include adult change tables and audio loops. This
 includes the facilities at Thomas Kelly Pavilion, Darius Wells Library and Resource
 Centre, Fiona Harris Pavilion, John Wellard Community Centre, and the William Bertram
 Community Centre.
- Facility upgrades including toilets, ramps and audio loop at Medina Hall and Kwinana Recquatic.
- An increase in disability parking bays at City facilities such as Kwinana Recquatic, Thomas Pavilion, Fiona Harris Pavilion, Wellard Pavilion and the community centre's at Wellard and Bertram.
- New recreational facilities have been designed and built with accessibility features central
 to the facility. These have been included at venues such as Kwinana Adventure Park,
 Kwinana Edge Skate Park, Rhodes Park, Sloan's Reserve, and Harry McGuigan Park.
- Kwinana Beach wheelchair and matting has been made available at Wells Park and a wheelchair is available at the City's library for community use.
- All new community park playground improvements are made with accessibility features central to the project.
- Other facility improvements across the City have included a pool hoist at the Recquatic, decreased the speed limit and installed a new pedestrian crossing on Chisham Ave, increased pathway maintenance, improved access to nature trails, provided a community bus with improved accessibility, created an ACROD drop off bay at the Recquatic.

Services and Programs

The City continues to provide services to meet the needs of the community:

- Priority bin services;
- Library home delivery service;
- · Wheelchair for library access;
- Studiosity;
- SAIL disability swim program;
- All abilities Multi Sports program; and
- Living Longer Living Stronger, for over 50's.

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Programs held during 2012 -2017 include:

- Community Connections Program: support to assist people with a disability stay connected to and involved with their communities.
- Disability Awareness Week celebrations.

You're Welcome Project

The City of Kwinana is involved in the You're Welcome Project, helping people with disability, seniors, and carers identify disability accessible community facilities and businesses in Kwinana. To date, 127 facilities and locations have been assessed and placed on the You're Welcome - AcessWA² website.

Access and Inclusion Advisory Group

The City facilitates an 'Access and Inclusion Advisory Group' to provide advice, feedback, and assistance on a range of access and inclusion opportunities or issues in the City. Members of the group include representatives from the City of Kwinana, local agencies and groups, and local community members. The group meets quarterly. If you would like to be involved please contact the City via the website³ or by calling (08) 9439 0226.

Companion Card Program

The City participates in the Companion Card Program providing carers and companions free entry to the City's facilities and programs.

5. Policy Statement

Access and Equity Policy

The City of Kwinana aims to maintain and improve the quality of life of its residents by creating an accessible community in which information, services, facilities, programs, decision-making processes, and other activities are open and available to all residents in an effort to provide equal opportunities, rights and responsibilities, and the equitable distribution of resources according to need⁴.

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² https://www.accesswa.com.au/

³ http://www.kwinana.wa.gov.au

⁴ https://www.kwinana.wa.gov.au/our-council/policies/

6. Links to Strategic Community Plan

ASPIRATIONS	OBJECTIVE	STRATEGY
Rich in Spirit	1.1 Develop and strengthen community identity to create a sense of belonging	Place Plans for City areas
	1.2 Inspire and strengthen community spirit through community activities and events	Reconciliation Action Plan, Multicultural Action Plan, Events Strategy
	1.4 A healthy and active community with services for everyone's needs	Public Health Plan, Parks for People Strategy, Active Ageing Strategy, Youth Strategy
	1.9 Improve levels of disability access and inclusion throughout the community	Disability Access and Inclusion Plan
Alive With Opportunities	2.2 The community has a choice of quality public and private facilities to meet their education and training needs throughout their life time	Lifelong Learning Strategy, Local Planning Strategy
It's All Here	4.1 Residents are provided with a range of multifunctional community places and accessible recreation facilities	Community Infrastructure Plan, Building Assets Management Plan
	4.2 The community has easy access to well equipped, quality parks and public open spaces	Community Infrastructure Plan, Parks for People Strategy, Asset Management Plans, Public Health Plan
	4.4 Create diverse places and spaces where people can enjoy a variety of lifestyles with high levels of amenity	Local Planning Strategy, Public Open Space Policy, Local Housing Strategy, Place Plans
	4.6 Provide a safe and efficient integrated network of roads, footpaths and cycle routes supported by a good public transport system	Local Planning Strategy, Transport Strategy, Asset Management Plans, Bike and Walk Plan

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7. Development and Review of the Disability Access and Inclusion Plan

7.1 Responsibility for the Planning Process

The City's Community Engagement team is responsible for overseeing the development of the City's *Disability Access and inclusion Plan*.

The Community Development Officer—Diversity, with the support of the 'Access and Inclusion Advisory Group', will be responsible for driving the implementation of the Plan and supporting City officers in achieving the outcomes.

7.2 Community and Stakeholder Consultation

The Disability Service Act Regulations 1993 sets out the minimum consultation requirements for public authorities in relation to DAIPs. Local Governments must call for submissions (either general or specific) by notice in a newspaper, circulating in the local district of the Local Government and on any website maintained by, or on behalf of, the Local Government. The City exceeded these requirements and took additional measures to gain community feedback, as listed below.

The City of Kwinana community consultation period for the 2019- 2021 *Disability Access and Inclusion Plan* was open from 9 April 2019 until 10 May 2019. The consultation was advertised through:

- The community newspaper;
- The City website;
- City social media platforms;
- The community engagement stakeholder list (engagement network);
- Local disability service providers;
- City networking groups; and
- Local schools and education support centres.

Feedback could be provided via electronic or hard copy surveys, via phone, or attendance at any of the City's community centres. Surveys were also promoted to City staff, who also had the opportunity to provide one on one feedback.

In total 86 surveys were returned and a total of 386 comments received in regards to access and inclusion for individuals living, visiting and working within the City. This feedback was analysed and has informed the development of the City's 2019-2021 *Disability Access and Inclusion Plan*.

The review and development of the *Disability Access and Inclusion Plan* also took into consideration other relevant community consultations that had occurred throughout the five year period, a review of other City of Kwinana plans and policies, as well as complaints and feedback received in regards to access and inclusion.

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7.3 Findings of the Consultation Process

Throughout the consultation period it was identified that the City has made many notable advancements in the areas of access and inclusion. The consultation also identified there are still areas for improvement and a number of recurring barriers, including:

- Accessible footpaths need to be free of impediments;
- Access at events that are conducted on grassed ovals is a challenge;
- The City needs to better promote the services, activities and events available for people with disability;
- The lack of sensory activities at events and in community centres;
- The need for more ACROD parking in high density areas;
- Issues with access to parking areas and negotiating footpaths and curbs;
- Direct transport to venues and facilities, lack of disability friendly bus stops, no shade/ no paths;
- Financial restraints and not being able to afford to participate in activities;
- Lack of seating at community events;
- Community perceptions about safety;
- Trouble navigating the City's website;
- Hydrotherapy pool change room facilities at Kwinana Recquatic need more room and an adult change table installed;
- Appropriate signage e.g. plain language, bigger text and pictures;
- Awareness of consultation/ community engagement opportunities. Consultation methods that are fully accessible and inclusive; and
- Job opportunities that are not tailored to people with disabilities.

7.4 Responsibility for implementing the Disability Access and Inclusion Plan

Disability Access and Inclusion Plans must include all practicable measures to ensure that they are implemented by the City, its officers, employees, agents, and contractors (*Disability Services Act 1993 29B*). Each Directorate within the City of Kwinana will be responsible for implementation of the strategies relevant to their areas.

7.5 Communicating the Plan to Staff and Community

Following endorsement of the *Disability Access and Inclusion Plan* by Council and Disability Services, the Plan will be promoted to the community by the following methods:

- The City of Kwinana's website;
- The City of Kwinana's social media pages;
- A notice in the local newspaper; and
- Notification to staff via internal methods, intranet and at relevant staff meetings.

Staff will be informed of the revised *Disability Access and Inclusion Plan* and the location within the City's corporate record keeping system. Information about the *Disability Access and Inclusion Plan* will be provided in training sessions including the staff induction process. Strategies will be included in the City's business planning software to enable staff to report on achievements.

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7.6 Review and Reporting

The *Disability Services Act* requires that Disability Access and Inclusion Plans be reviewed at least every five years. Whenever the Plan is amended a copy must be lodged with Disability Services. The Plan can be updated more frequently if desired. The next review of the City of Kwinana's DAIP will take place prior to June 2021.

The Community Engagement team will have the responsibility for the review of the DAIP and will collect data from senior staff and provide information on inclusion in the City of Kwinana Annual Report and to Disability Services. The report will outline:

- Progress towards the desired outcomes of the Disability Access and Inclusion Plan;
- Progress of the City's agents and contractors towards meeting the seven desired outcomes;
 and
- The strategies used to inform agents and contractors of the *Disability Access and Inclusion Plan*.

The strategies to improve access and inclusion within the City of Kwinana are contained in the following Implementation Plan.

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8. Implementation Plan

trategy		Who	Performance Measure	When
1.1	Develop links between the Disability Access and Inclusion Plan and other Council plans and strategies, including departmental business plans. Implement the Disability Access and Inclusion Plan consistently across the organisation, in line with the City's Strategic Plan.	All Directors and Managers	Strategic Plan acknowledgement	2019-2020 2020-2021
1.2	Ensure staff are aware of the relevant requirements and have the necessary resources to provide accessible and inclusive services, programs and events.	Community Development Officer- Diversity	Feedback from community on accessibility issues	2019-2020 2020-2021
1.3	Encourage and advocate for accessible and inclusive events arranged by community members and groups. Continue to make available the <i>Creating Accessible Events Checklist</i> to community members and groups and ensure awareness of access and inclusion requirements at all stages of the event planning and application process.	Community Development Officer- Diversity	Feedback from community on accessibility issues.	2019-2020 2020-2021
1.4	City of Kwinana Library and Community Centres to trial the inclusion of sensory related activities/ spaces in programs and events offered to the community.	Manager Community Services	Number of sensory related activities over an agreed period of time and registered attendance at these.	2019-2020
1.5	Ensure that tender and contracts documentation includes the Disability Access and Inclusion Plan and that contractor requirements are met as per legislative requirements. Contractors to report on their delivery of Disability Access and Inclusion Plan objectives and strategies if applicable.	Manager Contracts	Review contractor responses in tender documentation. Review contractor reports if applicable.	2019-2020 2020-2021

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Strategy		Who	Performance Measure	When
2.1	Ensure that public facilities and infrastructure comply with minimum access standards as required by the Australian Standards on Access and Mobility and are physically accessible and safe: particularly pedestrian facilities such as footpaths, bus stops, parks, reserves, gardens etc.	Manager Engineering Services	Number of upgrades / improvements completed following audits, community consultations and complaints process.	Ongoing 2019-2020. 2020-2021
2.2	New building works to have mobility disability access and disability access. Throughout the design phase of new building projects comment to be invited on access and inclusion matters from the Access and Inclusion Advisory Group.	Manager Assets Management Services	Number of improvements following consultation process.	2019-2020. 2020-2021
2.3	Redevelopment works to have where practical mobility disability access and disability access. Throughout the design phase of new building projects comment to be invited on access and inclusion matters from the Access and Inclusion Advisory Group.	Manager Assets Management Services	Number of upgrades / improvements following consultation process.	2019-2020. 2020-2021
2.4	Audit and investigate the need for increased ACROD parking in high density areas to ensure the City is meeting the needs of the community. Increase the provision of ACROD parking as needed.	Manager Engineering Services	Number of ACROD bay audits completed. Develop a strategy to address the findings of the ACROD bay audits.	2019-2020
2.5	Ensure public spaces created in land development areas are accessible and equipment installed, including playgrounds in new developments, is accessible and inclusive.	Engineering Services Landscape Architects	Public spaces that comply with Australian Standard AS 1428.1	2019-2020. 2020-2021
2.6	Investigate the effectiveness of current signage in City facilities with respect to accessibility and wayfinding. Consult with the Access and Inclusion Advisory group and the community to identify ways to upgrade signage to meet accessibility requirements.	Manager Community Services	Number of signs identified requiring update. Number of signs updated (subject to budget).	2020-2021
2.7	Promote and provide facilities and equipment, where appropriate, to assist people with specific needs, for example, a beach	Community Development Officer- Diversity	Promotions undertaken quarterly.	2019-2020

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wheelchair and matting for use by the community at Kwinana		
Beach and a wheelchair for Library users.		

Outcome 3: People with disability receive information from the City of Kwinana in a format that will enable them to access the information as readily as other people are able to access it.

Strategy		Who	Performance Measure	When
3.1	Promote the achievements of the Disability Access and Inclusion Plan to the community.	Community Development Officer- Diversity	Number of achievements captured, public announcements by press release and or Facebook and other forms of social media.	2019-2020. 2020-2021
3.2	Ensure all of the City of Kwinana public information is available, on request, in alternative formats. Promote this to the community.	Manager Corporate Communications	Stated in all communication methods.	2019-2020. 2020-2021
3.3	Ensure the City's website is compliant to the Web Content Accessibility Guidelines (WCAG) 2.0 AA standards.	Manager Corporate Communications	Updated website meets universal design principles.	2020 - 2021
3.4	Develop a register of employees who have skills that may be of assistance when providing customer service to people with alternative communication needs (such as an understanding of Auslan).	HR Manager	An available register and promotion of its location.	2019 - 2020
3.5	Develop an accessible information work instruction for staff on how to access information in alternative formats for customers, and promote to staff.	Community Development Officer- Diversity	Available Work Instruction and promotion of its location.	2019 - 2020

Outcome 4: People with disability receive the same level and quality of service from the staff of the City of Kwinana as other people receive from the staff at the City of Kwinana.

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Strategy		Who	Outcome	When
4.1	Review HR induction 'Disability Awareness' and identify areas for improvement to ensure staff have comprehensive awareness of access and inclusion requirements.	HR Development Coordinator	Improved disability awareness delivered at induction. Effectiveness of induction training identified through staff feedback and observation.	2019-2020
4.2	Review and if necessary develop/update policies and procedures for improving service accessibility to people with disability.	Community Development Officer- Diversity	Updated policies and procedure	2019 – 2020
4.3	Ensure new and existing staff who have direct contact with the public receive additional training to ensure they have adequate skills in disability awareness and communication techniques.	HR Development Coordinator	Number of employees trained in Disability Awareness	2019-2020
4.4	Ensure resources are readily available to staff on access and inclusion matters.	Community Development Officer - Diversity	A central referral point for staff	2019-2020 2020-2021
Outcome	5: People with disability have the same opportunities as other p	eople to make complaints	to the City of Kwinana	
Strategy		Who	Performance Measure	When
5.1	Develop a process whereby community can provide feedback and make suggestions in relation to access and inclusion. Develop a compliments, feedback and complaints register and continuous Improvement system that captures all issues to do with access and inclusion. Increase awareness of the City's compliments, feedback and complaints policy and ensure it is accessible to all members of the community.	Community Development Officer- Diversity	Access to a continuous improvements register, available for staff to view to help inform future plans, strategies and actions. Increase in feedback received from members of the public.	2019-2020
5.2	Continue to hold bimonthly Access and Inclusion Advisory Group meetings. Include individuals with disability, their families, carers	Community Development Officer- Diversity	Number of meetings held and consistent attendance noted.	2019-2020 2020-2021

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	and support providers and continue to use meetings as an avenue for members to provide feedback.			
5.3	Ensure the City's grievance and complaints policies are clear, equitable and available in accessible and alternative formats.	Community Development Officer- Diversity	Review of policies	2019-2020 2020-2021
Outcome (Kwinana	6: People with disability have the same opportunities as other p	eople to participate in pub	olic consultations conducted by	the City of
Strategy		Who	Performance Measures	When
6.1	The City to review its community engagement policy and framework and include a tool kit (if appropriate) to support all staff when consulting with the community, including those with disability and their service providers.	Coordinator Community Engagement and Place	Updated policy and framework that is accessible to all staff	2019-2020
6.2	Continue to facilitate the Access and Inclusion Advisory Group ensuring representation from the community and agencies.	Community Development Officer- Diversity	Meetings conducted and number of consistent attendees.	2019-2020 2020-2021
6.3	Develop a data base of people with lived experience of disability, including families and carers, for ongoing consultation and information provision.	Community Development Officer- Diversity	Access to a data base of individuals that is updated regularly	2019-2020
6.4	All community consultations, meetings, forums and workshops to be accessible and inclusive.	Community Development Officer- Diversity	Accessibility issues addressed	2019-2020 2020-2021

Strategy		Who	Performance Measure	When
7.1	Senior staff to attend disability employment forums/training that emphasises the importance and benefits of employing people with disability.	HR Manager	Increased awareness. Number of staff attending.	2020-2021
7.2	Connect with, build and maintain relationships with Disability Employment Services.	Community Development Officer- Diversity	Number of working relationships developed with DES providers	2019-2020 2020-2021

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7.3	Investigate options for traineeships and entry level positions within the City.	HR manager	Number of positions identified and advertised.	2019-2020 2020-2021
7.4	Develop a data base of contractors who employ people with disability.	Community Development Officer – Diversity	Data base of contractors	2019-2020 2020-2021
7.5	Include WA Disability Enterprise when seeking tenders for projects and services.	Manager Contracts	Number of tenders received via WA Disability Enterprises	2019-2020 2020-2021
7.6	Encourage all staff to complete a diversity questionnaire to capture a true reflection of employees within the organisation.	HR Manager	Increase of statistical data reflective of our diverse organisation.	2019-2020

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9. Glossary

What is Disability, Access, and Inclusion?

Disability

A disability is any continuing condition that restricts everyday activities. Within the Act it is defined as a disability if it:

- Is attributed to an intellectual, psychiatric, cognitive, neurological, sensory or physical impairment or a combination of those impairments;
- Is permanent or likely to be permanent;
- May or may not be of an episodic nature;
- Results in substantially reduced capacity of the person for communication, social interaction, learning or mobility and a need for continuing support services.

Access

Access in this context refers to an individual's physical ability to get to, into, and around facilities and services. Access is created by removing structural barriers and including mechanisms to enable structural access.

Inclusion

Inclusion in this context refers to an individual's ability to participate as fully as possible in programs and services provided by organisations in an integrated and holistic manner that does not ostracise, embarrass or humiliate an individual.

Discrimination

Discrimination is defined as treating people with a disability less favorably than people without a disability would be treated under the same circumstances.

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Administration

Cnr Gilmore Ave and Sulphur Rd, Kwinana WA 6167 PO BOX 21, Kwinana WA 6966

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customer@kwinana.wa.gov.au www.kwinana.wa.gov.au

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Appendix A

Agent and Contractor Report

Name of contracted s	ervice:
Name of contact pers	on:
Phone number:	
Email:	
Date:	Name of City of Kwinana Contact:

Purpose

This reporting sheet assists contractors to identify which outcome areas they are working in. It also serves as a reference for all contractors and their staff about how to provide a more accessible service.

It is noted that not all outcomes will be applicable to the services you provide on behalf of the City of Kwinana.

On completion please forward Contractor Reporting Template to the City of Kwinana by the requested return date.

Actions by contractors consistent with Disability Access and Inclusion (DAIP) outcome areas:

Disability Access and Inclusion Plan Outcome	Example of actions (Please mark if appropriate)	
All people within the Kwinana	Ensured contracting and procurement staff were aware of DAIP responsibilities	
community will have the same	Ensured events organised and or promoted were accessible for people with disability	
opportunities as other people to access services and events.	Other actions implemented (please describe):	

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	Not applicable	
2. All people within	When carrying out work on public buildings or facilities we ensure access is not obstructed	
the Kwinana community will have	Ensured entry and exit ways remain obstruction free	
the same opportunities as other people to	Ensured the correct signage was displayed when work was being undertaken	
access buildings and other facilities	Other actions (please describe):	
	Not applicable	
3. All people within the Kwinana community will receive information	Reviewed the State Government Guidelines to Information, Services and Facilities to ensure information is delivered in an accessible format.	
in a format that will enable them to access information	Ensured information was made available in alternative formats upon request.	
as readily as other people are able to	Reviewed our website to ensure it was accessible	
access it	Other actions implemented (please describe):	
	Not applicable	
4. All people within the Kwinana community will receive the same	Improved staff awareness of disability and access issues and improve skills to provide a good service to people with disability.	
level and quality of service from staff as other people receive.	Staff were provided with training to assist with customer service.	
	Accessibility information is regularly reviewed and readily available to staff.	
	Other actions implemented (please describe):	
	Not applicable	
5. All people within the Kwinana community will have	Accept complaints in a variety of formats such as by telephone, email, written or in person.	
the same	Have grievance mechanism processes available to	

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opportunities as other people to make	meet the needs of people with disability.	
complaints.	Ensured that complaints policy and procedure are accessible for people with disability.	
	Other actions implemented (please describe):	
	Not applicable	
6. All people within the Kwinana community will have	Making sure the consultation process is held in an accessible venue	
the same opportunities as other people to participate in any public consultation.	Ensure information is available in alternative formats (if required) including AUSLAN interpreters.	
	Other actions implemented (please describe):	
	Not applicable	
7. All people within the Kwinana community will have	Providing job related information in alternative formats upon request.	
the same opportunities as	Holding the interview in an accessible venue.	
other people to obtain and maintain employment with a public authority.	Other actions implemented (please describe):	
	Not applicable.	

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13 Reports - Economic

Nil

14 Reports – Natural Environment

14.1 Banksia Road Rifle Range (Lots 53 and 1320 Banksia Road, Wellard) and Boomerang Road site (Lot 6 Banksia Road and Lots 300-301 Boomerang Road, Oldbury)

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

Council resolved to reiterate its long standing opposition to the sand mining proposal at the Banksia Road Rifle Range in August 2018 and reconfirmed this position in June 2019 inclusive of its opposition to sand mining at Boomerang Road Oldbury. City Officers have been authorised to give effect to this position in the City's submissions to: Clearing Permit CPS 4935/2 at Boomerang Road; and the Publication of Preliminary Documentation under the *Environment Protection and Biodiversity and Conservation Act 1999* (EPBC Act) at Banksia Road Rifle Range.

Ongoing opportunities for City submissions have since arisen and are likely to be ongoing. These requests for submissions usually involve limited timeframes for response, and require significant assessment and review. To ensure the effective use of City resources and ensure that critical timelines are achieved, City Officers are seeking authorisation from Council to prepare and submit correspondence that gives effect to the Council's resolution to maintain its long standing opposition to sand mining at Boomerang Road and Banksia Road Rifle Range. To ensure that Council is informed of City submissions and the status of relevant approvals specific to each site, regular updates are proposed.

OFFICER RECOMMENDATION:

That Council:

- Authorise the CEO and the Director City Regulation to prepare and submit correspondence that gives effect to the Council's resolution to maintain its long standing opposition to sand mining at Boomerang Road and Banksia Road Rifle Range.
- 2. Requests City Officers to provide regular updates (as and when appropriate), on City submissions and advocacy efforts in regards to Boomerang Road and Banksia Road Rifle Range.

DISCUSSION:

At the Ordinary Council Meeting of 8 August 2018, Council reiterated its long standing opposition to the sand mining proposal at Lot 53 and Lot 1320 Banksia Road and endorsed the City Submission on the Publication of the Preliminary Documentation under the *Environment Protection and Biodiversity and Conservation Act 1999* (EPBC Act). In its submission, Council strongly opposed Hanson Construction Materials Pty Ltd's (Hanson Construction) application to clear 16.25 ha of very good to excellent Banksia Woodland, now listed as Endangered under the EPBC Act for the purposes of the mining operation. In addition, Council resolved to authorise the City Officers to work collaboratively with the Casuarina Wellard Progress Association to give effect to the Council resolution.

In addition, at the Ordinary Council Meeting of 12 December 2018, Council resolved to endorse the City Submission to the application to amend a Clearing Permit (CPS4935/2) for Extractive Industry (sand mining) at the Boomerang Road Oldbury (Shire of Serpentine Jarrahdale). In its submission, Council clearly articulated its lack of support for the removal of native vegetation in this location and its objection to the amendment of conditions sought by the applicant. The position taken was on the basis that together with the Banksia Road Rifle Range site, the two sites provide a valuable foraging and roosting habitat for two species of federally protected Black Cockatoos.

Council declined Hanson Construction's request for City of Kwinana representation to a Community Consultative Group at its meeting of 12 June 2019. This request for representation was as per a Community Consultation Program to guide sand mine operations at the Banksia Road Rifle Range and the Boomerang Road sites respectively.

Given the tenure of each site is quite different and the fact that the sites are in two local government areas, Hanson Construction and their predecessors have progressed sand mining approvals for each site separately, with little if any regard to the adjoining site operations. It is clear from Hanson Construction's Community Consultation Program that Hanson is seeking to mine both sites as one operation (in stages). That being said the approvals that have been assessed, and subsequently issued, have been done so based on a separate and isolated assessment of each site's proposed operations and independent off-site impacts. These approvals provide a limited understanding of the operations in totality and in turn does not acknowledge the cumulative impacts of both sites being sand mined concurrently, this includes the extent of vegetation removal and habitat loss.

In giving effect to each of the Council resolutions, City Officers are continuing to correspond with key State and Federal Ministers, Members of Parliament and Department Officers in regards to Council's opposition to the proposed sand mining of both sites. In addition, specific opportunities in regards to the status of relevant approvals for each of the sites is being pursued. This has included:

- The Department of Water and Environmental Regulations (DWER) approved the amendment to the Clearing Permit (CPS4935/2) for Extractive Industry (sand mining) at Boomerang Road Oldbury on 29 January 2019. The Amended Clearing Permit authorises the clearing of 11.6 ha of native vegetation within the 24 ha footprint area of the site. The City lodged an appeal against the decision to amend CPS4935/2 and was subsequently requested to meet with the Appeals Convenor to state its case in early June 2019. Since this meeting, the City was afforded a further opportunity to submit its response to DWER's assessment of the City's grounds for appeal. The City responded to Appeals Convenor on 26 June 2019. All correspondence prepared by the City in this instance has aligned with Council's adopted position in regards to the sand mine operation and seeks to further challenge such decisions as opportunities arise. These opportunities, once presented, often provide limited time for response and do not take into account the length of time necessary for Council's decision-making process.
- DWER has referred a Works Approval under the Environmental Protection Act 1986 (EP Act) to the City for comment. The application is from Hanson Constructions for the Boomerang Road site and is related to:

Category 12 – screening etc. of material: Premises where material is extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.

The deadline for comments is 22 July 2019. The volume of documentation submitted by Hanson Constructions in support of the Works Approval Application will require resources from both the City's Environment and Environmental Health teams to inform the City's submission. Due to the timing of the submission date, the report will not be presented to the next Council meeting prior to it being lodged with DWER.

On this basis, it is sought that delegation to the CEO and Director City Regulation be authorised by Council to progress with any submissions, and correspondence that give effect to the Council's resolution to maintain its long standing opposition to sand mining at Boomerang Road and Banksia Road Rifle Range.

To ensure that Council is informed of City submissions and the status of relevant approvals specific to each site, regular updates are proposed.

LEGAL/POLICY IMPLICATIONS:

Environmental Protection Act 1986. Environment Protection and Biodiversity and Conservation Act 1999

FINANCIAL/BUDGET IMPLICATIONS:

There are no financial implications arising from the recommendations of this report.

ASSET MANAGEMENT IMPLICATIONS:

There are no asset management implications arising from the recommendations of this report.

ENVIRONMENTAL IMPLICATIONS:

Council's consideration to authorise the CEO and the Director City Regulation to prepare and submit correspondence that gives effect to Council's previous resolutions in regards to Boomerang Road and Banksia Road Rifle Range, will ensure that the City continues to provide timely and comprehensive correspondence. This ensures that deadlines are more likely to be achieved and in turn contributes to a greater chance of achieving the conservation and protection of the Banksia Woodlands of the Swan Coastal Plain and the Tumulus Mound Spring that abuts the site.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objective detailed in the Strategic Community Plan.

Plan	Outcome	Objective
Strategic Community Plan	A beautiful natural environment	3.1 Improve conservation or biodiversity and protection of native vegetation whilst achieving high levels of environmental protection in new development.

COMMUNITY ENGAGEMENT:

City Officers will continue to work with the Casuarina Wellard Progress Association (CWPA) to give effect to Council resolutions relevant to the Banksia Road Rifle Range site and the Boomerang Road site. City Officers will liaise with CWPA, as appropriate, when preparing and submitting submissions, however, the City's submission will be separate to and independent of the CWPA submission prepared for relevant applications.

PUBLIC HEALTH IMPLICATIONS

The recommendations of this report aim to ensure that the City remains agile in its ability to respond to various applications within limited timeframes. This in turn will ensure that the City positively influences the potential negative impact of the following determinants of health arising from the potential sand mine operations -

• Built Environment – Environmental Quality; Neighbourhood Amenity.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	Timeframes for submissions are not met
Risk Theme	Inadequate environmental management
Risk Effect/Impact	People/Health Environment Reputation
Risk Assessment Context	Operational
Consequence	Major
Likelihood	Likely

Rating (before treatment)	High
Risk Treatment in place	Reduce - mitigate risk
Response to risk treatment required/in place	City Officers to prepare and submit correspondence under delegated authority to meet timeframes.
Rating (after treatment)	Moderate

COUNCIL DECISION

489

MOVED CR S LEE

SECONDED CR S MILLS

That Council:

- 1. Authorise the CEO and the Director City Regulation to prepare and submit correspondence that gives effect to the Council's resolution to maintain its long standing opposition to sand mining at Boomerang Road and Banksia Road Rifle Range.
- 2. Requests City Officers to provide regular updates (as and when appropriate), on City submissions and advocacy efforts in regards to Boomerang Road and Banksia Road Rifle Range.

CARRIED 8/0

15 Reports – Built Infrastructure

15.1 Amendment 4 to the Anketell North Local Structure Plan (multiple landholdings under separate ownership) – Consideration of submissions and recommendation to the Western Australian Planning Commission

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

The City of Kwinana has received two proposals to amend the adopted Anketell North Local Structure Plan (ANLSP). These are Amendments 4 and Amendment 5 to the ANLSP and both have been submitted in accordance with Schedule 2, Clause 29(1) of the *Planning and Development Regulations 2015* (P&D Regulations).

The proposed amendments are quite different in design and scale. Amendment 4 versions A and B affects most of the Anketell North urban area as per Attachments A and B whilst Amendment 5 applies to a small number of lots in the north-west part of the Anketell North urban area (Attachment C). However, the two proposed ANLSP amendments are not compatible and recommend different land uses and design approaches over a number of the same lots. Importantly, the incompatible land uses involve key open space and recreation areas.

As a result, City officers consider it appropriate to assess both amendments in parallel, consider the issues, determine a preference and make a recommendation to Council. Council can then inform the Western Australian Planning Commission (WAPC) of its recommendation on this matter so that the WAPC can consider this as part of its final determination on the proposed amendments. Officers of the Department of Planning Lands and Heritage (DPLH) have indicated that this approach to considering the two proposals is appropriate.

The assessment of Amendment 4 to the ANLSP is addressed in this Council Report. An assessment of the merits of Amendment 5 to the ANLSP is addressed in a separate Council Report presented to this Ordinary Council Meeting (Agenda Item 15.2). Both reports are interrelated but considered separately for simplicity and ease of understanding.

In summary, City officers are recommending support for Version B of Amendment 4 for the following reasons:

• The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.

 The relocation of the Local Sporting Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.

Amendment 4 covers approximately 87 hectares (ha) of land consisting of multiple landholdings under separate ownership. The location of the proposed amendment is shown in Attachment D.

The proposed amendment has been advertised twice due to modifications that were made to the amendment following the first period of advertising. Both versions of Amendment 4 (versions A and B) have redesigned large parts of the adopted ANLSP with a key part being the relocation of the Local Sporting Ground from the site shown in the adopted ANLSP to a site closer to Anketell Road in the north-west part of the structure plan. The proponent has argued that the proposed new site for this use has locational advantages to that of the adopted plan in that the site is flatter, will require less earthwork, and provides an opportunity to integrate the sporting ground with the future Dry Recreation Centre situated to the east. The proposed amendment was also seeking to introduce significant areas of Service Commercial land uses fronting Anketell Road.

Version A of Amendment 4 (referred to as Amendment 4A) was submitted for Council's consideration in December 2018 and was then advertised from 25 February 2019 to 18 March 2019. During the advertising City officers requested the proponent to provide:

- a) an assessment of the traffic noise levels at noise sensitive land uses within the amendment area; and
- b) justification for the suitability and sustainability of the Service Commercial land uses on Lots 7, 89 and 90 Anketell Road.

The proponent subsequently prepared a justification study that suggested that the extent of Service Commercial area shown in Amendment 4A may not be viable.

Following the close of advertising of Amendment 4A, the proponent lodged a modified version of the amendment (version B - referred to as Amendment 4B) which reduced the amount of Service Commercial proposed along Anketell Road. This revised structure plan was then re-advertised by the City from 29 May 2019 to 12 June 2019.

City officers have subsequently engaged Macroplan to provide independent advice on the viability of the Service Commercial areas shown in versions A and B of Amendment 4 (Attachment E). In summary, Macroplan has advised that the proposed Service Commercial floorspace in Amendment 4A is likely to have a significant impact on the viability of the 'Other Retail' floorspace in the City which in turn could affect the timing, staging and total developable area of the designated activity centres in the City. The report supports provision of up to 5,000m² of Service Commercial floorspace, particularly for transport-related uses (this equates to 1.35ha of Service Commercial land).

The City received 23 submissions on proposed Amendment 4A and eight submissions for proposed Amendment 4B and the City's comments on the submissions are summarised in the Schedules of Submissions for each version of the amendment (Attachments F and G).

The key points raised in the submissions were that:

- a) The amount of Service Commercial land proposed in version A of Amendment 4 is not justified.
- b) That the Local Sporting Ground should remain in a central location as shown in the adopted ANLSP.
- c) The Department of Education has significant concerns that the allocated size of the public primary school site will be inadequate to support the increased dwelling yield anticipated within the school catchment area.

City officers recommend that Version B of Amendment 4 is supported for the following reasons:

- a) The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4 (version B) is considered the best long-term location because it allows the proposed Dry Recreation Centre to be integrated with the Local Sporting Ground. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields.
- b) Locating the Local Sporting Ground adjacent to Anketell Road is an appropriate land use in the vicinity of potentially high noise emissions from Anketell Road.
- c) The relocation of the Local Sports Ground allows the current Treeby Road reserve alignment to be retained and for a land use to be situated adjacent to Anketell Road that is compatible with traffic noise emissions.
- d) Relocation of the Local Sporting Ground will facilitate greater retention of significant trees within the ANLSP.
- e) Allows for good traffic access/egress to Anketell Road.

OFFICER RECOMMENDATION:

That Council makes the following recommendation to the Western Australian Planning Commission (WAPC) in respect to version B of Amendment 4 submitted by Taylor Burrell Barnett Planning Consultants on behalf of multiple landholdings in the Anketell North area to the Anketell North Local Structure Plan (ANLSP);

- 1. Advises the WAPC that proposed Amendment 4B to the ANLSP (Attachment B) can be supported subject to the following actions and modifications:
 - a) Inclusion of the following requirements in Part 1 of Amendment 4 (version B) text to the City's satisfaction:

- i) Preparation of a Traffic Noise Assessment (TNA) assessing the impact of traffic noise from Anketell Road on residential areas including appropriate noise mitigation measures such as acoustic barriers and / or quiet house design requirements and the timing and stage of their application to the satisfaction of the City of Kwinana. The TNA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
- ii) A Transport Impact Assessment (TIA) is to be prepared to the satisfaction of Main Roads WA in consultation with the City of Kwinana and in accordance with the Department of Planning Lands and Heritage Transport Impact Assessment Guidelines. The TIA should include details concerning the design of the Anketell Road intersection (in the north east corner of Amendment 4B) to the satisfaction of Main Roads WA. The TIA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
- iii) The Service Commercial area in the north-east corner of Amendment 4B is to have a maximum gross leasable floor area of 5,000m2.
- iv) A Local Water Management Strategy (LWMS) is to be prepared to the satisfaction of the Department of Water and Environmental Regulation and the City of Kwinana. The LWMS shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
- v) Landscape Feature and Tree Retention Plan
 A Landscape Feature and Tree Retention Plan should be prepared in
 accordance with Local Planning Policy No 1, to ensure that the retention
 of significant trees is optimised as part of the subdivision design, civil
 design and earthworks.
 - The Landscape Feature and Tree Retention Plan should be developed in consultation with the City of Kwinana at the detailed design stage.
- vi) Modification of the proposed Amendment 4 (version B) to the ANLSP by relocating the road proposed to extend along the boundary of the ANLSP into the Jandakot Groundwater Protection Area (but outside the Urban and Development zoned land) to be within the Urban and Development Zones.
- vii) Modification of the Anketell North Landscape Master Plan description submitted with version B of Amendment 4 to the ANLSP for POS Area 5 to require that the 50 metre (m) wetland buffer be revegetated to ensure the area acts as an ecological buffer to the Conservation Category Wetland (CCW).

- Modification of the ANLSP Bushfire Management Plan submitted with the proposed Amendment to the ANLSP to show the position of the CCW boundary and its 50 metre buffer, and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.
- b) Request that the WAPC impose a condition on future subdivision applications within the area of ANLSP requiring:
 - i. The provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis.

All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.

No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

- ii. The provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road advising prospective purchasers that the lot is situated in the vicinity of the Anketell Road and is currently affected and/or may in the future be affected by transport noise.
- iii. The preparation of an Urban Water Management Strategy for the area the subject of Amendment 4B to the ANLSP in consultation with the City of Kwinana and Department of Water and Environmental Regulation.
- iv. The preparation of a Local Development Plan (LDP) for the proposed Service Commercial area as part of the subdivision approval for Lot 90 Anketell Road, Anketell. The LDP should address the following matters:
 - requirement for Service Commercial built form to orientate towards Anketell Road;
 - built form to respond to open space/rural interface;
 - The application of the principles of Council's Local Planning Policy No 8: Designing out Crime and Local Planning Policy No 7: Uniform Fencing.

- c) Requests that the concerns raised by the Department of Education (DoE) about the future size and configuration of the Primary School (which are yet to be fully articulated by the DoE) be the subject of further consideration and discussions by the Department of Planning, Lands and Heritage, DoE and the City of Kwinana prior to the final adoption of an amended ANLSP by the WAPC.
- 2. Endorse the Schedules of Submissions (Attachments F and G) pursuant to Schedule 2, Part 4, Clause 20(2) of the *Planning and Development Regulations* 2015.
- 3. Advises the WAPC that Council has assessed current Amendment 4 (versions 4A and 4B) and Amendment 5 to the ANLSP in parallel so that it can consider the issues, determine a preference and make its recommendation to the WAPC. The amendments affect similar landholdings and are not compatible. In this respect, it strongly supports Amendment 4B in preference to proposed Amendment 5 to the adopted ANLSP.

The reasons for this are as follows:

- The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.
- The relocation of the Local Sports Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. It allows the current Treeby Road reserve alignment to be retained and for a land use to be situated adjacent to Anketell Road that is compatible with traffic noise emissions.
- It will facilitate the greater retention of significant trees within the ANLSP.
- Allows for good traffic access/egress to Anketell Road.
- Allows for the retention of the current alignment of Treeby Road within the ANLSP avoiding the closure and redevelopment of the north – south internal distributor road.

Further, the City is of the view that proposed Amendment 5, even if considered in isolation to Amendment 4, should not be supported. It is not considered to be an appropriate amendment to the adopted ANLSP as it proposes to introduce residential land uses within 50 metres of Anketell Road, a critical and long planned freight route. The land in question has previously been excised from the adopted ANLSP given uncertainties about appropriate land uses and freight and noise impacts associated with Anketell Road. In this respect, it should be noted that the adopted ANLSP does not identify residential land uses until approximately 250 metres south of Anketell Road, significantly further from Anketell Road than the proposed Amendment 5.

While the proponent for Amendment 5 has provided a noise mitigation strategy, the City believes a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP. The proponent has not adequately demonstrated to the City that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

4) Forward this Ordinary Council Meeting Report, Council's recommendations and the Schedules of Submissions for versions A and B of Amendment 4 to the WAPC pursuant to Schedule 2, Clause 20 of the *Planning and Development Regulations* 2015.

BACKGROUND:

The area the subject of Amendment 4 is zoned Urban under the *Metropolitan Region Scheme* (MRS) and Development under *Local Planning Scheme No. 2* (LPS2).

Original approved ANLSP

The WAPC granted approval to the original ANLSP on 17 December 2015 (Amendment H). The approved ANLSP excluded the land immediately south of Anketell Road.

When the WAPC granted approval to the ANLSP, it advised (letter dated 18 December 2015) that the following information would be required before the area on the south side of Anketell Road could be considered for inclusion in the ANSLP:

- a) The requirements of State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning would need to be met inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan;
- b) The required type, extent and form of Commercial land uses that will provide for and support the needs of the ANLSP and complement the land uses and development envisaged for the Wandi District Centre; and
- c) Options to provide for safe pedestrian/cycle connectivity between the ANLSP area and the Wandi District Centre.

These requirements have been considered by the City in its assessment of Amendment 4, which includes land excluded from the original ANLSP.

Description of Amendments 1, 2 and 3

Council has considered three previous amendments to the ANLSP (Amendments 1, 2 and 3) which were concerned with various landholdings abutting Anketell Road to the west of Treeby Road.

The areas that were the subject of these amendments are shown in Attachment I. These amendments proposed Service Commercial, Commercial and higher density residential and raised similar issues to Amendment 4.

Comparing versions A and B of Amendment 4

Both versions A and B of the Amendment 4 propose to:

- a) relocate the Local Sporting Ground to the east of the proposed Community Purpose site (intended for a Dry Recreation Centre under the City's adopted Community Infrastructure Plan) and include this area within the ANLSP;
- b) remove the proposed bend in Treeby Road to retain current road alignment;
- c) extend the boundary of the ANLSP into the Jandakot Groundwater Protection Area for the purpose of providing a road; and
- d) apply minor changes to the residential density codes and road alignments.

However, as shown in the concept plans below, the main difference between the two versions is the extent of the Service Commercial area along Anketell Road.

The Service Commercial area in 4B has been reduced in size to a site in the north east corner of the amendment area. In turn, the Local Sporting Ground has been moved north into the area vacated by Service Commercial and the area south of the local sporting ground has been identified as Residential in Amendment 4B.

The modification to the size of the Service Commercial area was at the request of the proponent who decided to reduce the extent of the Service Commercial area following a request by the City for information justifying the suitability and viability of Service Commercial at this location. The proponents study suggested that the extent of Service Commercial area shown in the Amendment 4A may not be viable.

Concept plan for the north portion of Amendment 4A



Concept plan for the north portion of Amendment 4B



Amendment 5

Another amendment (Amendment 5) to the ANLSP has been lodged with the City for an area included in Amendment 4. The location of Amendment 5 in relation to Amendment 4B is shown in Attachment J.

It can be seen that Amendment 4B proposes different land uses to Amendment 5 for these lots in so far as Amendment 4B proposes a portion of the Local Sporting Ground whereas Amendment 5 proposes residential lots.

City officers have assessed Amendment 5 and do not support the proposal. This is largely because Amendment 5 proposes to introduce sensitive residential land uses in close proximity to Anketell Road. City officers do not agree that residential land uses can be supported given the potential adverse impacts of traffic noise emissions from Anketell Road.

SUMMARY AND RESPONSE TO ISSUES RAISED IN THE SUBMISSIONS

Twenty two submissions were received during the advertising period for Amendment 4A, including six from State Government agencies/service providers and fifteen from the affected landowners with one from the Kwinana Market Place. The issues raised in the submissions on Amendment 4A and the City responses are outlined in the Schedule of Submissions in Attachment F.

Eight submissions were received while Amendment 4B was being advertised, including two from State Government agencies/service providers and six from affected landowners. The main issues raised in the submissions on Amendment 4B and the City responses are summarised in the Schedule of Submissions in Attachment G.

The main issues raised during both periods of advertising and the City's Officers response to these issue are summarised in Table 1 below:

Table 1: City officers response to the main issues raised in the submissions

M	ain Issues Raised In Submissions	City officers Comments
1.	Optimising land uses in the vicinity of Anketell Road The amount of Service Commercial proposed in version A of Amendment 4 is not justified	City officers Comments The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City officers based on an independent commercial assessment. The independent commercial advice supports provision of up to 5,000m2 of Service Commercial floorspace, particularly for transport-related uses (1.35ha of Service Commercial land).
		iana).

 Optimising the location of the Local Sporting Ground
 A number of submitters are of the view that the Local Sporting Ground should remain in a central location as shown in the adopted ANLSP.
 The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields.

The relocation of the playing fields affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.

It is acknowledged however that the relocation of the Local Sporting Ground from its more central location on the adopted ANLSP will mean that the oval is not as readily accessible to residents living on the southern parts of the urban cell. It can be noted however that the urban cell does have a primary school (with a junior oval) in its southern part and, the ANLSP abuts two large areas of land reserved as Parks and Recreation under the Metropolitan Region Scheme. So there will still be good access to recreational areas for residents.

3. Land uses compatible with traffic noise from Anketell Road

The relocation of the Local Sports Ground away from its previous location as shown in the adopted ANLSP, allows for a land use to situate adjacent to Anketell Road that is compatible with traffic noise emissions.

The proponent has lodged a noise assessment for Amendment 4B (Herring Storer Acoustics, May 2019) which concludes that a number of residential lots to the south of the local sporting field may require noise amelioration in the form of quiet house design or Notification on Titles.

City officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road, advising prospective purchasers that the lot is situated in the vicinity of Anketell Road and is currently affected and/or may in the future be affected by transport noise.

4.	Extending the boundary of the ANLSP into the Jandakot Groundwater Protection Area (JGPA)	The portion of the JGPA that is proposed to be included within the ANLSP by Amendment 4 is classified as a P2 area by DWER (Water quality protection note no. 25 – Land use compatibility table for public drinking water source areas). Urban/residential or Urban Deferred are determined to be incompatible in a P2 area and on this basis, City officers do not support the extension of the ANLSP boundary into the JGPA. This refers in particular to the road proposed along the eastern boundary of the proposed amended ANLSP.
5.	The Department of Education (DoE) has significant concern that the allocated size of the public primary school site will be inadequate to support the increased dwelling yield anticipated within the school catchment area. In view of the above, DoE's support for the draft Amendment will be subject to the review of the approved Anketell North LSP in its entirety to secure a public primary school site larger than the standard four hectare site required by the State Planning Policy 2.4 Development Control (This submission was received in relation to Amendment 5 and is also relevant to Amendment 4)	The Primary School site proposed in the amended ANLSP is 4 hectares which meets State Planning Policy requirements (Development Control Policy 2.4) for the school and accords with the adopted ANLSP. DoE has expressed concerns about the size of the school but have not been able to define an appropriate size and configuration at this stage. It is not clear when such advice may be received. In the interests of progressing the assessment process, it is recommended that Council raise this concern as part of its recommendation to the WAPC and require further discussion on this matter between City officers, the DoE and the Department of Planning Lands and Heritage about an adequate primary school site in the Anketell urban area prior to the final adoption of an amended ANLSP by the WAPC.
6.	Retention of Significant Trees	The significant tree survey conducted by the proponent identifies a clump of significant trees at the western end of Lot 36, in the location where the Local Sporting Ground is shown in the adopted ANLSP. The earthworks for the Local Sporting Ground will necessitate lowering the ground level approximately 13m at this point to achieve a level playing field. Relocating the Local Sporting Ground to the area south of Anketell Road and retaining the current alignment of Treeby Road, as proposed in versions A and B of Amendment 4, will enable the significant trees on Lot 36 to be retained within the residential subdivision.

7.	Main Roads WA has advised that a revised Transport Impact Assessment is required to be provided for assessment, and prepared in accordance with the Transport Impact Assessment Guidelines.	City officers recommend that the proponent be required to provide a Traffic Impact Assessment to the satisfaction of Main Roads WA prior to the final adoption of proposed Amendment 4B to the ANLSP.
8.	Department of Biodiversity Conservation and Attractions Modify the description for POS Area 5 in the Anketell North Landscape Master Plan to require that the 50 metre wetland buffer be revegetated to ensure the area acts as an ecological buffer to the Conservation Category Wetland Modify the Bushfire Management Plan to show the position of the Conservation Category Wetland boundary and its 50 m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.	City officers are supportive of the requests of the DBCA and are recommending that Amendment 4B be modified as requested by the DBCA.

CITY OFFICERS ASSESSMENT OF VERSIONS A AND B OF AMENDMENT 4

To ensure that the area the subject of the amendment is developed in an orderly and proper manner and achieves the best possible long term planning outcome, City officers considered the following matters in the assessment of Amendments 4A and 4B:

Optimising the location of the Local Sporting Ground

A key change to both versions of Amendment 4 by the proponent has been to relocate the Local Sporting Ground from a more central location on the adopted ANLSP to site to the north west of the adopted ANLSP. The reason argued by the proponent was that this site has a landscape that is flatter and requires less earthwork in comparison to the location shown in the adopted ANLSP (as shown in the plans below). Relocating the Local Sporting Ground also provides an opportunity to integrate the sporting ground with the future Dry Recreation Centre situated to the east and retain the existing alignment of Treeby Road.



As discussed, City officers take the view that whilst different from the adopted ANLSP, the relocation is a good long-term outcome for this community. A key reason is that the location of the playing fields allows for an integration with the proposed Dry Recreation Centre. This presents a great opportunity for the City to create a high quality recreation precinct in the locality and potentially utilise the presence of the Western Power power lines across the site. Further, the playing fields will front Anketell Road and create a strong and beneficial 'open' visual impact across the urban landscape.

Of less importance from a longer term design viewpoint, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields. The relocation affords marginally more flexibility to the design and land use for the balance of the local structure plan area.

Whilst the Local Sporting Ground would no longer be as central to future residents in the ANLSP it is noted the area is served by the presence of the primary school (with junior oval) in the southern part of the ANLSP and the presence of two large areas of land reserved as Parks and Recreation under the Metropolitan Region Scheme adjacent to the urban cell.

On balance, the proposed amendment to relocate the Local Sporting Fields is supported by City officers.

Optimising land uses in the vicinity of Anketell Road

During the advertising period City officers requested the proponent to provide additional advice to support the proposed Service Commercial area shown in Amendment 4, including;

- providing justification for the Service Commercial land uses on Lots 7, 89 and 90
 Anketell Road as shown in the amended ANLSP; and
- describing which Service Commercial land uses would be best suited to 7, 89 and 90 Anketell Road as proposed in the amended ANLSP.

The proponent sought advice from Taktics4 which advised that Service Commercial development in this location may be unsustainable (Amendment K). Taktics4 recommended that the western part of the Service Commercial area be removed and advised that the eastern part of the Service Commercial area may be best suited to Freight Transport related commercial activities. Taktics4 suggest that Freight Transport related activities may include a petrol station, truck wash facilities, fast food and takeaway geared to large freight vehicles rather than cars. The land uses on the eastern Service Commercial site would not be connected to the Wandi District Centre or the proposed Service Commercial areas to the south of Anketell Road.

City officers engaged Macroplan to provide independent advice on the commercial viability of the Service Commercial areas shown in versions A and B of Amendment 4. In summary, Macroplan has advised that the proposed Service Commercial floorspace in Amendment 4A is likely to have a significant impact on the viability of the 'Other Retail' floorspace in the City which in turn could affect the timing, staging and total developable area of the designated activity centres in the City.

Macroplan further advised that the subject site in the ANLSP has no visual exposure to the Kwinana Freeway and would rely on the local catchment and the east-west passing trade on Anketell Road. MacroPlan considers it 'probable' that the size of the Service Commercial area in Amendment 4A would not be viable based on the residential catchment size and therefore would need to provide a unique offering to attract clientele. Macroplan supports the provision of up to 5,000m² of Service Commercial floorspace, particularly for transport-related uses (1.35ha of Service Commercial land).

The retention then of the portion of Service Commercial land abutting Anketell Road in the north eastern corner of the ANLSP within proposed Amendment 4B can be supported by the retail/commercial assessment. This land use also provides a compatible buffer for the management of noise emissions from Anketell Road. Consideration will need to be given to the built form as it relates to Anketell Road and the open space and rural interface areas.

Land use compatibility with traffic noise from Anketell Road

Anketell Road is identified as a Strategic Freight Route in the Perth Freight Transport Network Plan for Transport @ 3.5 million (Department of Transport, 2016). As a Strategic Freight Route to the future Outer Harbour, Anketell Road will provide operations for heavy vehicles up to 36.5m in length, and vehicles carrying Over-Size Over-Mass and Heavy Wide Cargos.

In September 2017, the State Government established the Westport Taskforce to investigate a total supply chain solution to Western Australia's growing freight volumes recognising the importance of providing high standard freight corridors to the future Outer Harbour. The provision of freight corridors to connect the future Outer Harbour to the broader metropolitan transport network requires a number of east - west links across the south-west metropolitan sub-region to be upgraded, including Anketell Road.

The future Outer Harbour will need to be capable of operating on a 24/7 basis, and heavy vehicles travelling along Anketell Road may cause night time noise and vibration exposure to properties in the vicinity of Anketell Road.

City officers are of the view that orderly and proper planning and the long term optimal use of the lots adjacent to Anketell Road should take into consideration the potential impact of noise emissions from heavy vehicles travelling along Anketell Road.

State Planning Policy - 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4) (WAPC, 2009) aims to minimise the adverse impact of transport noise on noise sensitive residential development by achieving:

- acceptable indoor noise levels in noise sensitive areas [L_{Aeq(Day)} 40dB(A) in living areas and L_{Aeq(Night)}35dB(A) in bedrooms]; and
- a reasonable degree of acoustic amenity in at least one outdoor living area $[L_{Aeq(Day)} 55dB(A)]$ and $L_{Aeq(Night)} 50dB(A)]$.

The proponent has lodged a noise assessment for Amendment 4B (Herring Storer Acoustics, May 2019) (Attachment L) which concludes that a number of residential lots to the south of the local sporting field may require noise amelioration in the form of quiet house design and/or Notification on Titles as shown in Attachment O. The proponent's noise assessment also states that the orientation of the residential lots closest to Anketell Road will act as a barrier to back yard outdoor living areas and residential properties to the south. The City's Environmental Health Officers have reviewed the study and are satisfied that noise limits can be met within residential areas in accordance with SPP 5.4.

City Officers recommend the inclusion of a requirement in Part 1 of Amendment 4B to prepare a Traffic Noise Assessment (TNA) assessing the impact of traffic noise from Anketell Road on residential areas including appropriate noise mitigation measures such as acoustic barriers and / or quiet house design requirements and the timing and stage of their application to the satisfaction of the City of Kwinana. The TNA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.

City officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road. The notifications would advise prospective purchasers that the lot situated in the vicinity of the Anketell Road is currently affected and/or may in the future be affected by transport noise.

Safe and Efficient Freight Transport Network – Controlled access and egress to Anketell Road

Main Roads has advised that a revised Transport Impact Assessment (TIA) is required to be provided for assessment, and prepared in accordance with the Transport Impact Assessment Guidelines (August 2016) and electronic SIDRA files (.sip) in version 8;

City officers recommend that the proponent be required to provide a revised Traffic Impact Assessment to the satisfaction of Main Roads WA prior to adoption of the Amendment 4B to the ANLSP

Extending the boundary of the ANLSP into the Jandakot Groundwater Protection Area

Both versions of Amendment 4 (versions A and B) propose to extend the boundary of the ANLSP into the Jandakot Groundwater Protection Area (JGPA) for the purpose of providing a road.

State Planning Policy 2.3 Jandakot Groundwater Protection (SPP2.3) aims to protect the Jandakot Groundwater Protection area from development and land uses that may have a detrimental impact on the water resource.

SPP 2.3 states that:

- a) Local structure plans prepared for areas rezoned to Urban in the Metropolitan Region Scheme after the gazettal of this policy are to be consistent with the special conditions for areas changed from P1/P2 to P3 contained in Water Quality Protection Note 25: Land use compatibility tables for public drinking water source areas.
- b) Land uses not mentioned in Water Quality Protection Note 25: Land use compatibility tables for public drinking water source areas should only be provided for in local structure plans following consultation with the Department of Water.

The portion of the JGPA that is proposed to be included within the ANLSP by Amendment 4 is classified as a P2 area by DWER (Water quality protection note no. 25 – Land use compatibility table for public drinking water source areas). Urban/residential or Urban Deferred are determined to be incompatible in a P2 area and on this basis City officers do not support the extension of the ANLSP boundary and the road into the JGPA.

Retention of Significant Trees

The ANLSP was adopted by the WAPC in December 2015 and the Local Planning Policy 1: Landscape Feature and Tree Retention (LPP1) was adopted by the City in September 2016. LPP1 is not intended to be applied retrospectively, therefore, it is the City's view that LPP1 can only apply to any material changes proposed by Amendment 4

The area of land affected by the material changes proposed in both versions of Amendment 4 (versions A and B) is primarily concerned with the relocation of the Local Sporting Ground which represents a relatively small proportion of the overall area included within the ANLSP.

The significant tree survey conducted by the proponent identifies a clump of significant trees at the western end of Lot 36, in the location where the Local Sporting Ground is shown in the adopted ANLSP. The earthworks for the Local Sporting Ground will necessitate lowering the ground level approximately 13m at this point to achieve a level playing field. Relocating the Local Sporting Ground to the area south of Anketell Road and retaining the current alignment of Treeby Road, as proposed in versions A and B of Amendment 4, will enable the significant trees on Lot 36 to be retained within the residential subdivision as shown in Attachment M.

Attachment M shows that the best quality foraging habitat and potential habitat trees are retained within POS, and the placement of POS in both versions of Amendment 4 (versions A and B) retains connectivity with the surrounding Bush Forever 270 and the Conservation Category Wetland.

City officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring the preparation of a Landscape Feature and Tree Retention Plan in accordance with LPP1, to ensure that the retention of significant trees is optimised as part of the civil design and earthworks. It is recommended that the Landscape Feature and Tree Retention Plan is developed in consultation with the City at the detailed design stage.

Bushfire Management

State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP3.7) (WAPC, 2015). SPP3.7 outlines how development and / or land uses should address bushfire risk in Western Australia and it applies to all land which has been designated as a Bushfire Prone Area. The area the subject of Amendment 4 is partially situated within a designated Bushfire Prone Area in the Map of Bushfire Prone Areas (2015).

A Bushfire Management Plan (BMP) has been prepared for Amendment 4 by an accredited assessor (Strategen Environmental, December 2018) in accordance with Clause 6.5 of SPP3.7.

The pre-development Bushfire Hazard Level (BHL) assessment, included with the BMP, shows that based on the existing vegetation, the area the subject of Amendment 4 contains land with Low, Moderate and Extreme BHLs. The post-development BHL assessment shows that following development, the amendment area will contain land with Low and Moderate BHLs.

The Department of Fire and Emergency Services (DFES) has advised (letter dated 11 May 2019) that Amendment 4B and the BMP have adequately identified issues arising from the BHL assessment and considered how compliance with the bushfire protection criteria can be achieved at subsequent planning stages.

Designing Out Crime

Local Planning Policy No. 8 (LPP8) sets out design guidelines to be implemented during the design and assessment of structure plans, subdivision applications and development applications to reduce the likelihood of crime and anti-social behaviour in the City of Kwinana.

As a result of concerns raised during the advertising period (February to March 2019), the applicant modified the LSP to reduce the extent of Service Commercial land to a single 1.21ha site within the north-eastern corner of the Anketell North Local Structure Plan (ANLSP). The Local Sporting Ground area was moved northwards closer to Anketell Road with the land to the immediate south of the sporting ground allocated for residential purposes.

POS areas should ideally be located where they can be surrounded by a mix of land uses to generate activity over acceptable extended hours. The proposed relocation of the Local Sporting Ground to the north-eastern corner, adjacent to the Lyon/Anketell Road intersection and co-located with the proposed Community Purpose Site (Dry Recreation Centre) is considered to meet this Designing Out Crime objective. Having the sporting ground immediately adjoining the recreation centre as well as adjoining residential land will also help foster and promote community use and ownership of the sporting ground area. The residential land to the immediate south of the sporting ground is proposed to be Residential having a density of R40 – this density will ensure a high level of passive surveillance over the Local Sporting Ground.

Parks need to be located to be highly visible from the Street. The relocation of the Local Sporting Ground fronting Anketell Road (a Primary Distributor Road) and adjoining the proposed recreation centre will ensure the sporting ground is highly visible and is consistent with the City's Public Open Space Policy. Further, the natural surveillance of the sporting ground being visible from both residential land and the recreation centre improves safety for users and discourages crime.

Western Power easement

Western Power has advised that Amendment 4 facilitates the proliferation of development and land use which affects their easement and may result in potential network reliability and public safety risks that would require further assessment by Western Power prior to subdivision or development.

The structure plan, future subdivision and development processes must protect the transmission line corridor and associated assets from encroachment, mitigating public safety or network reliability risks and ensuring there is no impediment to routine and emergency land access to the network.

For this reason, City officers are supportive of additional requirements on the proponent prior to the adoption of Amendment 4B to the ANLSP and at subdivision stage. These are as follows;-

- 1. Prior to subdivision, Western Power will need to review, assess and provide prior written consent to any proposals below within the registered easement, in accordance with standard easement conditions:
 - Landscaping plans (including mature heights and location of species);
 - Ground level changes;
 - Permanent structures;
 - Drainage plans;
 - Conservation controls.

- 2. The additional provisions to be included on the Structure Plan for consideration at the subdivision and development stages:
 - Provision of Section 70A Notifications on all proposed lots adjoining the
 existing Western Power registered easement prior to subdivision clearance
 advising prospective purchasers that they are in close proximity to power
 infrastructure which will be maintained, upgraded and expanded on a
 regular basis.
 - All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.
 - No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

LIVEABLE NEIGHBOURHOODS ASSESSMENT

The WAPC requires LSPs to be prepared in accordance with objectives and requirements of Liveable Neighbourhoods (WAPC, 2009). Amendment 4B has been assessed by City officers against the following elements of Liveable Neighbourhoods:

Lot Layout

Amendment 4B proposes a variety of housing choices through the density ranges of R10-R20, R25-R40 and R-40-60 density codings.

Amendment 4B will provide approximately 1,397 residential lots, 331 more lots than the approved ANLSP. Amendment 4 proposes an increased number of lots zoned R25, R30 and R40 and achieves an average residential density of 16 dwellings per gross urban zoned land and 32 dwellings per residential zoned hectare of land. These densities are consistent with the minimum requirements of 15 dwellings per gross urban hectare and 26 dwellings per residential site hectare, set out in Liveable Neighbourhoods.

Public Parkland

The area of land affected by the material changes proposed in both versions of Amendment 4 (versions A and B) is primarily concerned with the relocation of the Local Sporting Ground which represents a relatively small proportion of the overall area included within the ANLSP.

The Local Sporting Ground has been relocated where the natural surface area level difference requires comparatively little earthworks compared to the approved ANLSP location to create a useable space for playing fields, and is co-located with the proposed Dry Recreation Centre.

Attachment M shows that the best quality foraging habitat and potential habitat trees are retained within POS, and the placement of POS in both versions of Amendment 4 (versions A and B) retains connectivity with the surrounding Bush Forever 270 and the Conservation Category Wetland.

A total of 10.07ha (13.47%) of credited POS is provided within Amendment 4B. The area of POS exceeds the 10% minimum required under Liveable Neighbourhoods (74,758m² required – 100,689m² provided) as set out in the Table 2 below.

The proposed POS provides for a variety of purposes and sizing including playing fields, neighbourhood parks, local parks and a linear park. The POS will be provided in accordance with the proposed amended ANLSP and POS Schedule and will be landscaped by the developer to Liveable Neighbourhood requirements and to the satisfaction of the City of Kwinana.

Table 2: Summary of POS requirements

	POS Required	POS Provided
10% POS	74,758m ²	
Max restricted permitted (20%)	14,952m ²	19,618m ²
Min unrestricted permitted (80%)	59,806m ²	81,071m ²
Non credited	-	25,931m ²
Total credited POS (20% restricted & 80% unrestricted)	-	100,689m ² (13.47%)

Urban Water Management

The following water management plans and strategies have been prepared for the area the subject of Amendment 4. These strategies include:

- Jandakot Drainage and Water Management Plan Peel Main Drain Catchment (Department of Water, 2009); and
- Anketell North Urban Cell Local Water Management Strategy (Bioscience November, 2014).
- Anketell North Urban Cell (Amendment 4) Local Water Management Strategy (Bioscience November, 2018).

These plans address water management within the area the subject of Amendment 4 providing a greater level of detail at each successive stage of the planning process. The system of stormwater management proposed for the area the subject of Amendment 4 in the Anketell North Urban Cell LWMS (November, 2018) is consistent with the Better Urban Water Management guidelines and the Local Water Management Strategy (Bioscience March, 2014) that was approved as part of the adopted ANLSP.

Utilities

The Engineering Infrastructure Report (Tabec, May 2019) prepared to support Amendment 4 does not identify any major constraints to the provision of water, sewer, electricity, gas and telecommunications services. It is normal practice for the WAPC to impose subdivision conditions requiring that these services are provided to an urban standard.

The servicing agencies have not raised concerns with respect to Amendments 4A or 4B.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering a financial or impartiality interest only, the proponent for Amendment 4 is Acumen Development Solutions on behalf of Sanpoint Pty Ltd and RPoint Land Pty Ltd.

Acts and Regulations

- Environmental Protection Act 1986
- Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)
- Planning and Development Act 2005
- Planning and Development (Local Planning Schemes) Regulations 2015

Schemes

- Metropolitan Region Scheme
- City of Kwinana Local Planning Scheme No. 2

State Government Policies

- Jandakot Drainage and Water Management Plan Peel Main Drain Catchment
- Liveable Neighbourhoods 2009
- Perth Freight Transport Network Plan for Transport @ 3.5 million (DoT, 2016)
- State Planning Policy 3.7 Planning in Bushfire Prone Areas
- State Planning Policy 4.2 Activity Centres for Perth and Peel
- State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning

Local Planning Policies

- Local Planning Policy No. 1 Landscape Feature and Tree Retention
- Local Commercial and Activity Centres Strategy (LCACS)
- Local Planning Policy No 8: Designing out Crime
- Local Planning Policy No 7 Uniform Fencing

FINANCIAL / BUDGET IMPLICATIONS:

The cost of preparing the amendment to the ANLSP and advertising has been borne by the applicant.

ASSET MANAGEMENT IMPLICATIONS:

The City will be financially responsible for maintaining POS, roads, verge trees and footpaths within the ANLSP once the area has been developed.

ENVIRONMENTAL IMPLICATIONS:

MRS Amendment 1116/33 to rezone Anketell Cell 3 from Rural to Urban Deferred was assessed by the Environmental Protection Authority (EPA) on 13 March 2006 under the *Environmental Protection Act 1986* (WA). The EPA advised that Amendment 1116/33 did not require formal assessment under the EP Act 1986 and provided advice and recommendations. In particular, the EPA advised that it had not assessed the following issues in its assessment of Amendment 1116/33:

- Drainage
- Wetlands
- Remnant vegetation
- Fauna

- Peel Harvey catchment
- Contamination
- Air emissions
- Noise & Vibration

The EPA's decision to not formally assess Amendment 1116/33 was on the basis that the environmental issues listed above can be resolved during subsequent stages of the planning process.

The area of land affected by the material changes proposed in both versions of Amendment 4 (A and B) represent a small proportion of the overall area the subject of the ANLSP. Similarly, the changes to the overall environmental impact of the proposed amendment as assessed by the EPA, are minimal.

The best quality foraging habitat and future potential habitat trees are retained within POS. The placement of POS retains connectivity with the surrounding Bush Forever 270 and the CCW, which also provides foraging and breeding habitat.

The proponent has advised that potential significant impacts to Threatened Ecological Communities (TECs), will be referred to the Commonwealth Department of Environment and Energy.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objective detailed in the Strategic Community Plan.

Plan	Outcome	Objective
Strategic Community Plan	A well planned City	4.4 Create diverse places and spaces where people can enjoy a variety of lifestyles with high levels of amenity.

COMMUNITY ENGAGEMENT:

The proposed amendment has been advertised twice due to modifications that were made to the amendment following the first period of advertising. Both versions of Amendment 4 (versions A and B) have redesigned large parts of the adopted ANLSP with a key part being the relocation of the Local Sporting Ground from the site shown in the adopted ANLSP to a site closer to Anketell Road in the north-west part of the structure plan.

Proposed Amendment 4A was submitted for Council's consideration in December 2018 and was then advertised from 25 February 2019 to 18 March 2019. Public advertising was conducted in the following manner:

- Nearby land owners and State government agencies were notified of the proposal in writing and invited to comment;
- The proponent erected two signs within the area the subject of the amendment;
- A notice was placed in a local newspaper once over the course of the advertising period; and
- Copies of the Amendment 4 to the ANLSP and relevant documents were made available for inspection at the City's Administration Office and placed on the City's website.

The following State government agencies were notified of the proposal in writing and invited to comment:

- Main Roads WA
- Department of Fire and Emergency Services
- Department of Biodiversity, Conservation and Attractions
- Department of Water and Environmental Regulation
- Western Power
- Water Corporation

During the advertising, to further support the amendment, City officers requested the proponent to provide:

- a) an assessment of the traffic noise levels at noise sensitive land uses within the amendment area; and
- b) justification for the suitability and sustainability of the Service Commercial land uses on Lots 7, 89 and 90 Anketell Road.

Following the close of advertising of Amendment 4A, the proponent subsequently lodged a modified version the amendment (version B) which reduced the amount of Service Commercial proposed along Anketell Road. This revised structure plan was then readvertised by the City from 29 May 2019 to 12 June 2019. Public advertising was conducted in the same manner as the first advertising period above.

The City received 23 submissions on proposed Amendment 4A and eight submissions for proposed Amendment 4B. The City's comments on the submissions are summarised in the Schedules of Submissions for each version of the amendment (Attachments F and G).

PUBLIC HEALTH IMPLICATIONS:

As discussed, noise impacts, particularly from traffic using Anketell Road needs careful management. It is important that future subdivision and development applications are accompanied by appropriate noise studies to demonstrate that the sensitive land uses will not be exposed to unacceptable noise levels. The City will only support land uses in locations where it can be confident there will not be long-term noise conflicts.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	Future development of the Anketell North area does not meet Council's policies and expectations for quality urban form.
Risk Theme	Failure to fulfil statutory regulations or compliance requirements
Risk Effect/Impact	Compliance
Risk Assessment Context	Strategic

Consequence	Moderate
Likelihood	Possible
Rating (before treatment)	Moderate
Risk Treatment in place	The 60 day period in which the City is required to report to the WAPC, under Schedule 2 Clause 20 of the P&D Regulations, expired on the 21 May 2019 (60 days from close of advertising). The City has sought an extension of time under clause 20(c) of the Planning and Development Act until the 16 July 2019 to provide sufficient time to report to Council. The City will be reporting to the WAPC following the Council meeting on the 10 July 2019.
Response to risk treatment required/in place	The City is to give due regard to the amended ANLSP when providing advice to the WAPC in relation to subdivision applications and making decisions in relation to development applications.
Rating (after treatment)	Moderate

COUNCIL DECISION

490

MOVED CR S MILLS

SECONDED CR W COOPER

That Council makes the following recommendation to the Western Australian Planning Commission (WAPC) in respect to version B of Amendment 4 submitted by Taylor Burrell Barnett Planning Consultants on behalf of multiple landholdings in the Anketell North area to the Anketell North Local Structure Plan (ANLSP);

- 1. Advises the WAPC that proposed Amendment 4B to the ANLSP (Attachment B) can be supported subject to the following actions and modifications:
 - a) Inclusion of the following requirements in Part 1 of Amendment 4 (version B) text to the City's satisfaction:
 - i) Preparation of a Traffic Noise Assessment (TNA) assessing the impact of traffic noise from Anketell Road on residential areas including appropriate noise mitigation measures such as acoustic barriers and / or quiet house design requirements and the timing and stage of their application to the satisfaction of the City of Kwinana. The TNA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.

- ii) A Transport Impact Assessment (TIA) is to be prepared to the satisfaction of Main Roads WA in consultation with the City of Kwinana and in accordance with the Department of Planning Lands and Heritage Transport Impact Assessment Guidelines. The TIA should include details concerning the design of the Anketell Road intersection (in the north east corner of Amendment 4B) to the satisfaction of Main Roads WA. The TIA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
- iii) The Service Commercial area in the north-east corner of Amendment 4B is to have a maximum gross leasable floor area of 5,000m2.
- iv) A Local Water Management Strategy (LWMS) is to be prepared to the satisfaction of the Department of Water and Environmental Regulation and the City of Kwinana. The LWMS shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
- v) Landscape Feature and Tree Retention Plan
 A Landscape Feature and Tree Retention Plan should be prepared
 in accordance with Local Planning Policy No 1, to ensure that the
 retention of significant trees is optimised as part of the subdivision
 design, civil design and earthworks.
 - The Landscape Feature and Tree Retention Plan should be developed in consultation with the City of Kwinana at the detailed design stage.
- vi) Modification of the proposed Amendment 4 (version B) to the ANLSP by relocating the road proposed to extend along the boundary of the ANLSP into the Jandakot Groundwater Protection Area (but outside the Urban and Development zoned land) to be within the Urban and Development Zones.
- vii) Modification of the Anketell North Landscape Master Plan description submitted with version B of Amendment 4 to the ANLSP for POS Area 5 to require that the 50 metre (m) wetland buffer be revegetated to ensure the area acts as an ecological buffer to the Conservation Category Wetland (CCW).
- viii) Modification of the ANLSP Bushfire Management Plan submitted with the proposed Amendment to the ANLSP to show the position of the CCW boundary and its 50 metre buffer, and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.

- b) Request that the WAPC impose a condition on future subdivision applications within the area of ANLSP requiring:
 - i. The provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis.

All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.

No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

- ii. The provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road advising prospective purchasers that the lot is situated in the vicinity of the Anketell Road and is currently affected and/or may in the future be affected by transport noise.
- iii. The preparation of an Urban Water Management Strategy for the area the subject of Amendment 4B to the ANLSP in consultation with the City of Kwinana and Department of Water and Environmental Regulation.
- iv. The preparation of a Local Development Plan (LDP) for the proposed Service Commercial area as part of the subdivision approval for Lot 90 Anketell Road, Anketell. The LDP should address the following matters:
 - requirement for Service Commercial built form to orientate towards Anketell Road;
 - built form to respond to open space/rural interface;
 - The application of the principles of Council's Local Planning Policy No 8: Designing out Crime and Local Planning Policy No 7: Uniform Fencing.
- c) Requests that the concerns raised by the Department of Education (DoE) about the future size and configuration of the Primary School (which are yet to be fully articulated by the DoE) be the subject of further consideration and discussions by the Department of Planning, Lands and Heritage, DoE and the City of Kwinana prior to the final adoption of an amended ANLSP by the WAPC.
- 4. Endorse the Schedules of Submissions (Attachments F and G) pursuant to Schedule 2, Part 4, Clause 20(2) of the *Planning and Development Regulations* 2015.

5. Advises the WAPC that Council has assessed current Amendment 4 (versions 4A and 4B) and Amendment 5 to the ANLSP in parallel so that it can consider the issues, determine a preference and make its recommendation to the WAPC. The amendments affect similar landholdings and are not compatible. In this respect, it strongly supports Amendment 4B in preference to proposed Amendment 5 to the adopted ANLSP.

The reasons for this are as follows:

- The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.
- The relocation of the Local Sports Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. It allows the current Treeby Road reserve alignment to be retained and for a land use to be situated adjacent to Anketell Road that is compatible with traffic noise emissions.
- It will facilitate the greater retention of significant trees within the ANLSP.
- Allows for good traffic access/egress to Anketell Road.
- Allows for the retention of the current alignment of Treeby Road within the ANLSP avoiding the closure and redevelopment of the north – south internal distributor road.

Further, the City is of the view that proposed Amendment 5, even if considered in isolation to Amendment 4, should not be supported. It is not considered to be an appropriate amendment to the adopted ANLSP as it proposes to introduce residential land uses within 50 metres of Anketell Road, a critical and long planned freight route. The land in question has previously been excised from the adopted ANLSP given uncertainties about appropriate land uses and freight and noise impacts associated with Anketell Road. In this respect, it should be noted that the adopted ANLSP does not identify residential land uses until approximately 250 metres south of Anketell Road, significantly further from Anketell Road than the proposed Amendment 5.

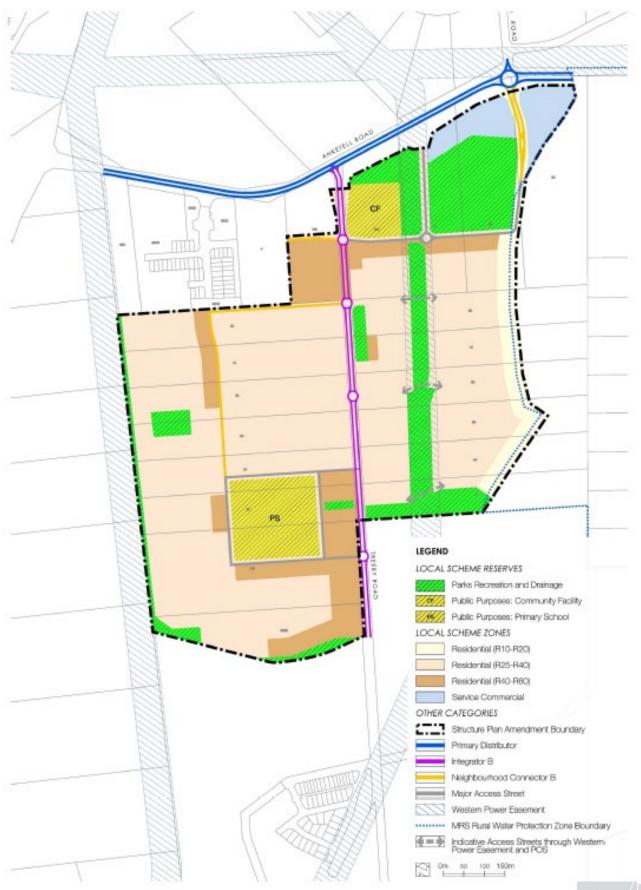
While the proponent for Amendment 5 has provided a noise mitigation strategy, the City believes a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP. The proponent has not adequately demonstrated to the City that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

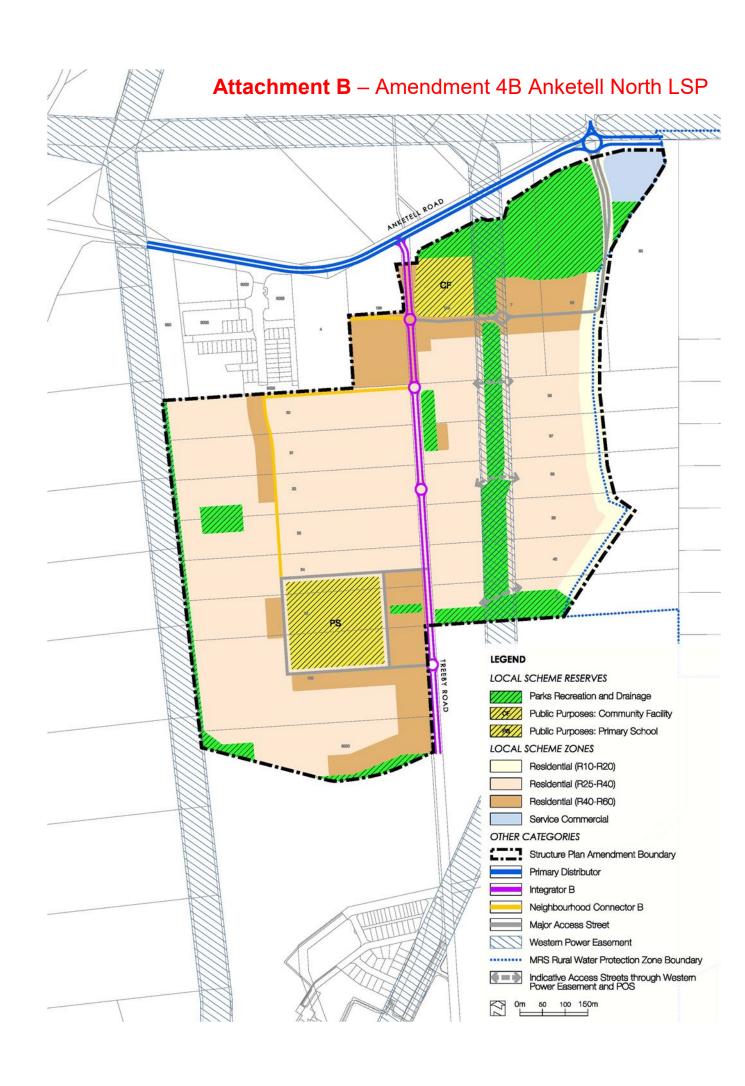
5) Forward this Ordinary Council Meeting Report, Council's recommendations and the Schedules of Submissions for versions A and B of Amendment 4 to the WAPC pursuant to Schedule 2, Clause 20 of the *Planning and Development Regulations 2015*.

CARRIED 5/4
MAYOR CAROL ADAMS USED HER CASTING VOTE

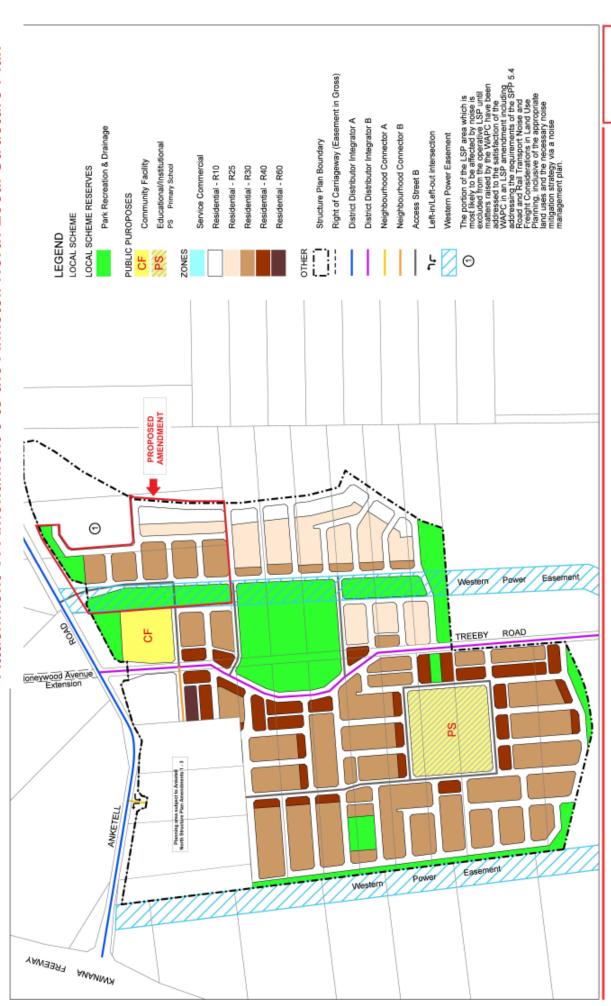
Attachment A

Amendment 4A - Anketell North LSP





Attachment C: Amendment 5 to the Anketell North Local Structure Plan



ANKETELL NORTH LOCAL STRUCTURE PLAN

Veris

PLAN 1

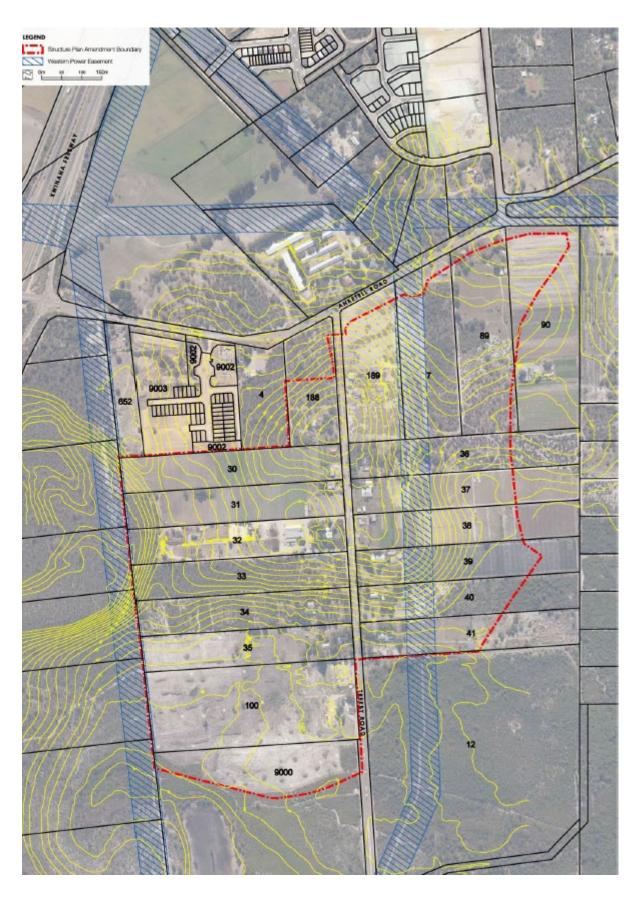
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Attachment D – Location Plan

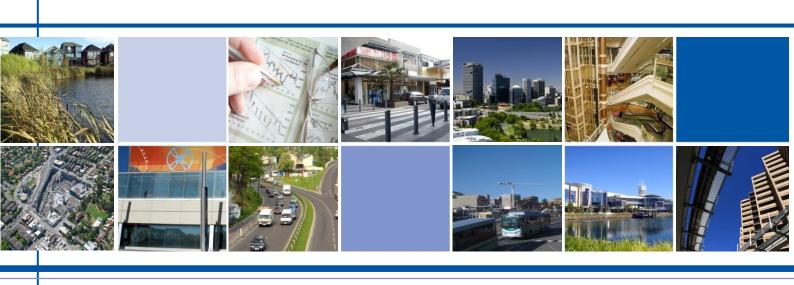


Attachment E

Planning and economics advisory; Anketell North Local Structure Plan Amendment No. 4

City of Kwinana

June 2019





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Approved for release:

Name	Signature	Date
Stuart McKnight		19 June 2019

Executive summary

The City of Kwinana engaged MacroPlan Dimasi ("MacroPlan") to provide planning and economics advice regarding the proposed Amendment No. 4 of the Anketell North Local Structure Plan (ANSLP).

This advice focuses on the proposed Service Commercial zone along Anketell Road within the suburb of Anketell, in the City of Kwinana. This advice includes demand for, supply of, and type of businesses that locate within Service Commercial land in the area.

The purpose of this assessment is to determine the pros and cons of the proposed amendment and provide a recommendation to the City whether to support or oppose the proposed amendment.

Findings

Current approved ANLSP

- The existing approved Anketell North Local Structure Plan includes two parcels of land identified for Service Commercial uses over a total area of 3.0674 hectares.
- MacroPlan estimates that the subject site could physically accommodate approximately 12,000m² of Service Commercial ("Other Retail") floorspace.
- This quantum of Service Commercial floorspace is:
 - Comparable to the total 'Other Retail' floorspace in the City of Kwinana as at 2011;
 - Greater than the total 'Other Retail' floorspace proposed in either the Kwinana Town Centre or the Wandi District Centre (10,000m² in each location); and
 - Sufficient to service a population catchment of more than 17,000 people.
- The approved Service Commercial floorspace in Anketell North is not accounted for in the City of Kwinana Local Commercial and Activity Centres Strategy (KLCACS). This strategy plans for a total of 82,456m² of Other



Retail (corresponding to Service Commercial land use) across the City of Kwinana by 2031. Therefore, the Service Commercial land within the Anketell North development would add another 15 percent to this total floorspace.

- The proposed Service Commercial floorspace in the existing Anketell North LSP is likely to have a 'significant' impact on the viability of the Other Retail floorspace as planned in the KCLACS. This could affect either or both the timing/staging and/or the total developable floorspace in the designated activity centres in the KCLAC.
- The subject site in the ANLSP has no visual exposure to the Freeway and would not be able to rely on this factor to benefit from any north-south traffic. Therefore, it relies on the local catchment and the east-west passing trade on Anketell Road.
- The principal logical rationale for the 12,000m² of Service Commercial floorspace in the ANLSP would be a dramatic change in the role of Anketell Road in the short to medium term to a major freight route, however this not yet certain.
- MacroPlan considers it 'probable' that the 12,000m² would not be viable based on the residential catchment size and therefore would need to provide unique offering to attract clientele. The best opportunity would be freightretaliated uses (filling station, truck wash, convenience food), but raises the question about the impact on residential amenity in ANLSP and other residents.
- If the existing approval is retained and there is a lack of demand for Service Commercial uses, then it is likely that the landowner would subsequently apply to rezone the subject site to allow some shop/retail (PLUC5) uses. This could further erode the planned activity centre hierarchy in the KCLACS and be a threat to the timely development of the Wandi District Centre.

Impact of Amendment No. 4 to the ANLSP

 The proposed removal of the western site currently designated for Service Commercial use, would reduce the Service Commercial land area by approximately 1.75 hectares to 1.32 hectares.



- This amendment would reduce the Service Commercial floorspace by 7,100m², from 12,000m² to 4,900m² (land areas and floorspace are MacroPlan estimates).
- The reduction in Service Commercial floorspace would limit (but not totally remove) the negative impacts of the Anketell North development on the planned activity centres hierarchy as per the KCLACS.
- emoval of the proposed Service Commercial development from the western side of Neighbourhood Connector B will remove a visual and noise barrier that would have otherwise ameliorated the impacts of traffic along Anketell Road.
- Other ways of ameliorating the noise from Anketell Road may potentially be needed if, and when, the freight traffic volumes on that road increase to a point they have a deleterious effect on amenity in the Anketell North subdivision.
- Based on this assessment, MacroPlan would support no more than 5,000m² of Service Commercial floorspace in Anketell North. This equates to a maximum of around 1.35 hectares of Service Commercial land.

Recommendations

MacroPlan recommends that the City of Kwinana should support the proposed reduction of Service Commercial land as per Amendment No. 4 to the Anketell Road Local Structure Plan on the basis that the amendment is consistent with supporting the primacy of the City's Local Commercial and Activity Centres Strategy.



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Introduction

The City of Kwinana engaged MacroPlan Dimasi ("MacroPlan") to provide planning and economics advice regarding the proposed Amendment No. 4 fo the Anketell North Local Structure Plan (ANLSP), within the suburb of Anketell, in the City of Kwinana.

This advice focuses on the proposed Service Commercial zone along Anketell Road. This advice includes demand for, supply of, and type of businesses that locate within, Service Commercial land in the area.

Purpose

The purpose of this assessment is to determine the pros and cons of the proposed amendment and provide a recommendation to the City whether to support or oppose the proposed amendment.

Site context

The following plan shows the structure planning context for the region. This context provides an indication of the future development of the catchment area for the proposed Service Commercial development in Anketell North as well as for the future Wandi District Centre.

When combined with the Metropolitan Region Scheme Urban and Urban Deferred and the Perth @ 3.5 Million Urban Expansion and Urban Investigation areas, this forms the bigger picture of the potential total catchment area and is fundamental to informing the viability of activity centres and commercial development in the corridor.

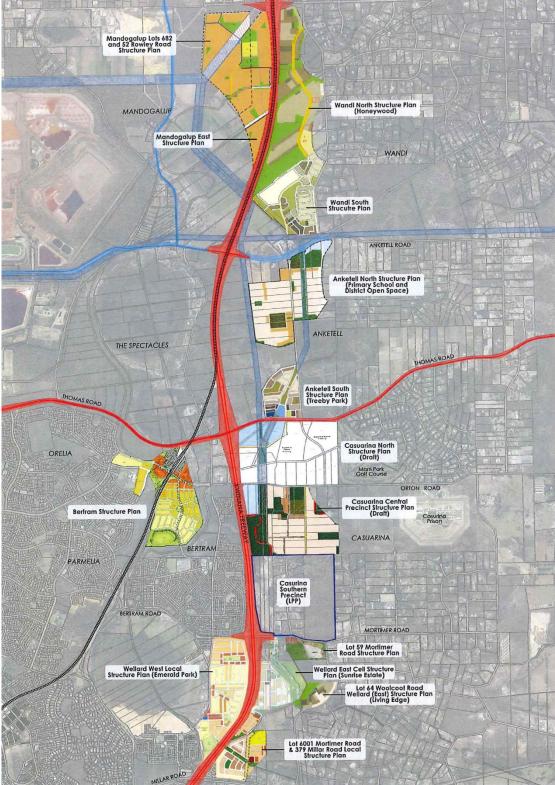


Figure 1. Regional structure planning context

Source: Taylor Burrell Barnett

Subject site and study area

Existing approved Service Commercial areas

The Service Commercial site is 3.0674 hectares in total, split into two parcels by future road ('Neighbourhood Connector B') and roundabout connection to Anketell Road. It is zoned Urban under the Metropolitan Region Scheme.

The following figure shows the originally proposed two Service Commercial parcels in the context of the surrounding road network and the local recreation space to be developed as part of the Anketell North development.

Local Sporting
Ground With
Facility Building
A60rc
(4.37ro)

Figure 2. Service Commercial zones in ANLSP (as originally proposed in original Amendment 4)

Source: Extract from TBB Anketell North Structure Plan Amendment (5/4/2019)



MacroPlan's estimate of the land areas proposed for Service Commercial use is provided in the following table.

Table 1. Land areas for Service Commercial use

Parcel	Land area (est. hectares)	Proportion
Western Service Commercial	1.7517	57.1%
Eastern Service Commercial	1.3157	42.9%
Total	3.0674	100.0%

Source: MacroPlan estimate, based on TBB plans

The typical floorspace realisation for Service Commercial land ranges between 33 and 50 per cent depending on the lot geometry, access points and surrounding land uses. MacroPlan's assessment of the two parcels in their proposed layout, indicates they could yield a combined 12,000m² gross lettable area.

 Table 2.
 Estimated floorspace yields for Service Commercial use

Parcel	Floorspace (est. m²)	Proportion
Western Service Commercial	7,100	59.2%
Eastern Service Commercial	4,900	40.8%
Total	12,000	100%

Source: MacroPlan, based on TBB plans

This size site is typical of Service Commercial and developments for large format retail and showroom uses around the Perth metropolitan region.

As a benchmark, the KCLACS indicated that the whole of the City of Kwinana had 13,816m² of 'Other Retail' floorspace (PLUC6) as at 2011. Therefore, this proposal alone would nearly double that amount to over 25,800m².

Proposed ANLSP Amendment No 4

The following figure shows the proposed changes to the Service Commercial land are as per Amendment No. 4 to the ANLSP. This proposal effectively reduces the total Service Commercial uses to the eastern portion only. MacroPlan estimates this amendment would reduce the total Service Commercial land by 57.1 per cent and the total floorspace by 59.2 per cent.



The amendment to the ANLSP has been advertised twice due to modifications that were made to the amendment following the first period of advertising. Amendment 4 was initially submitted and advertised by the City of Kwinana (this version is referred to as Amendment 4A). A modified amendment was subsequently prepared by the proponent which is referred to as Amendment 4B. Amendment 4B was readvertised.

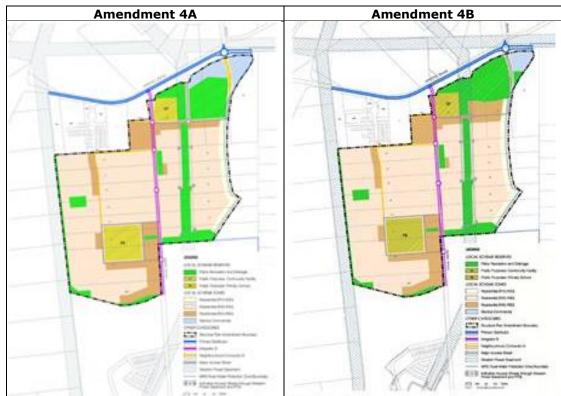


Figure 3. Proposed Amendment to Service Commercial Land in the Anketell North LSP

Source: Extract from TBB Anketell North Structure Plan Amendment No.4 (5/4/2019)

Planning background

WAPC approvals

The Western Australian Planning Commission (WAPC) adopted the Anketell North Local Structure Plan (ANLSP) on 18 June 2015, subject to the following modifications:

 The requirements of State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning have been met, inclusive



- of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan;
- The required type, extent and form of Commercial land uses that will provide for, and support, the needs of the Anketell North LSP and complement the land uses and development envisaged for the Wandi District Centre; and
- Options for provide for safe pedestrian/cycle connectivity between the Anketell North LSP area and the Wandi District Centre.

Following those modifications, the WAPC granted final approval to the ANLSP on 17 December 2015.

Planning considerations

Key considerations in this assessment are:

- KLCACS states that there is considerable potential for bulky goods and other retail floorspace within the Wandi District Centre, albeit with some caution regarding the limited catchment and the need for exposure to the Freeway;
- commercial land uses would provide services and amenity to the future ANLSP residential community and complement the land uses planned within the Wandi District Centre; and
- service commercial activities fronting Anketell road would help to ameliorate
 the impacts of noise from traffic along Anketell Road, which could increase
 substantially given its potential future role in the Perth metropolitan freight
 network.

Economic considerations of subject site suitability for service commercial use

The proposed sites for Service Commercial use has several positive attributes, particularly from a planning and land use perspective. These include:

 Anketell Road is designated to become a major freight route making residential development an undesirable land use fronting the road corridor. Service Commercial use at the subject site would provide a visual and sound buffer between the Anketell North subdivision and Anketell Road.



- Main Roads data indicate that at present 85.8 per cent of all east-west traffic on Anketell Road (east of the Kwinana Freeway) is cars and that in 2017/18 an average of 6,155 vehicles used the route per day.
- Anketell Road is potentially a major commuter route for people living in the south-east metropolitan corridor (via Thomas Road to the east) that work in the Kwinana area. This would be boosted if the new Westport outer harbour is developed at Kwinana.
- The exposure to traffic volumes along Anketell Road would help support the
 commercial viability of Service Commercial uses at the subject site. Note
 that most of this exposure would rely on passenger vehicle (ie. commuter)
 traffic on Anketell Road rather, than the freight traffic.
- The proposed Service Commercial sites would be accessible via a future proposed roundabout as the intersection of Neighbourhood Connect B and Anketell Road. This would provide a high level of access to the Service Commercial sites.
- The narrow urban corridor depicted in **Figure 1** highlights the limited urban catchment which forms a narrow corridor around the Kwinana Freeway.

The commercial impacts of the proposed Service Commercial development have not been supported with a quantified assessment of the demand and supply of such a development. Nor have the impacts of the proposal been tested with an assessment how it could affect the timing or quantum of development within the Wandi District Centre.

What is service commercial land use?

Service commercial land is not well defined and can include a range of typologies, including large format, bulky gooks and light industrial uses. In this context, they typically have significant synergies with designated activity centres and should be collocated, but they can also be found in 'out of centre' or stand-alone locations on high-exposure sites if appropriately located and of a sufficient scale to attract customers.



The Service Commercial and Commercial zones designated in the City of Kwinana Local Planning Scheme No. 2 permits a range of land uses that could be developed on the subject site. These permitted uses on the subject site should:

- not have an unacceptable impact on the primacy of the designated future
 Wandi District Centre in providing for the daily and weekly household
 shopping needs of the local and wider community;
- benefit from exposure and access to the east-west traffic and passing trade travelling along Anketell Road; and
- provide a built form that would act as a noise buffer between Anketell Road and residential land use to the south.

The following table is informed by the City of Kwinana Local Planning Scheme No. 2, the City of Kwinana Local Commercial and Activity Centres Strategy and the WAPC Planning Land Use Categories (PLUC codes).

Table 3. Service Commercial – typical land uses

Potential uses	Example businesses	
Bulky goods showroom and other retail us	es include:	
Liquor store	BWA, First Choice, Dan Murphy's	
Showrooms -	Bunnings Warehouse, Freedom, Bedshed, Harvey Norman, Good Guys, Reb Sports, Officeworks and Anaconda.	
Other non-retail uses include:		
Amusement Centre	Timezone, AMF Bowling	
Boat sales	Considered as PLUC6 ('Other Retail') use but not explicitly stated in KCLACS or LPS zone table.	
Consulting rooms		
Drive-in Takeaway Food Shop		
Dry Cleaning Premises		
Funeral Parlour		
Health Centre	Pathwest, SKG Radiology, Clinipath facility or Bigfoot Massage	
Medical Clinic	GP, allied heath (physio, chiropractic)	
Health Studio	F45, JETTS 24 Hr Fitness, Snap Fitness.	
Licensed Restaurant	Not explicitly including the KCLACS or LPS zone table.	
Motor Repair Station	Repco, K-Mart Auto, Bob Jane T Marts or Bridgestone Tyres	
Museum		
Office / Professional Office	Accountants, lawyers, real estate agents, professional consultants and banking institutions	
Petrol Filling Station / Service Station		
Private Recreation I Recreational Facilities	KidZone, BOUNCEinc (indoor trampoline), Q-Zar Laser Tag, indoor paintball courses, yoga I mediation studios, squash, dance studios	
Place of Public Assembly / Worship		
Tavern		
Vehicle Sales	Considered as PLUC6 ('Other Retail') use but not explicitly stated in KCLACS or LPS zone table.	
Veterinary Clinic		

Source: MacroPlan based on City of Kwinana Local Planning Scheme No. 2, the City of Kwinana Local Commercial and Activity Centres Strategy and the WAPC Planning Land Use Categories (PLUC codes)



Based on an assessment of Perth's Service Commercial areas, the following table provides an indication of the mix of uses. The first column shows the Planning Land Use Code (PLUC) as defined by the Department of Planning, Lands and Heritage. The second defines the approximate proportion of floorspace based on the actual mix from a sample of Perth's service commercial areas. The third column describes the specific types of land uses.

Table 4. Typical land uses on service commercial land

Planning Land Use Code	Service commercial mix	General description		
PLUC1 - Primary / Rural	0.0% - 0.2%	Related to rural industry		
PLUC2 - Manufacturing/ processing/ fabrication (PLUC 2)	14.3%–22.3%	These are essentially industrial uses and therefore should ideally be located within industrial areas that provide ready access to a range of industrial business-to-business suppliers. In addition, many of these businesses need direct access to the regional road (freight) network and have off-site impacts (noise) that may be unacceptable next to urban activities (ie. schools, houses).		
PLUC3 - Storage / Distribution	12.9%-25.9%	These are essentially industrial uses and ideally located within industrial areas that provide ready access to the regional road (freight) network. These businesses have very low employment densities and therefore do not make any significant contribution to employment self-sufficiency.		
Shop/retail uses (PLUC 5)	3.0%-5.8%	These uses should be located within designated activity centres.		
PLUC6 - Other retail uses:	8.80%-16.7%	Typically these are large format, bulky goods and uses that are motor-vehicle related (service stations, vehicle and motor cycle sales, tyre sales, battery sales, caravan and trailer sales & hire, boat sales, automotive accessories, motor vehicle rentals) and as such require frequent vehicle access. Limited vehicle access and exposure could compromise the viability of such uses.		
PLUC7 -Office/ business uses	9.7%-16.7%	These uses should be located within designated activity centres as a first priority or, alternatively, within industrial areas if they are directly related to industrial activity.		
PLUC8 – Health / Welfare / Community Services	1.3%-2.4%	These activities are located within designated activity centres, specialised activity centres or within urbanised areas.		
PLUC9 – Entertain / Recreation / Culture	1.1%-2.4%	These uses include dance studios and churches. Note that they are sometimes located within service commercial areas but should be encouraged to located in activity centres when appropriate.		
PLUC10 - Residential	0.0%-0.0%	These primarily include short-stay and hotel accommodation uses within an appropriate mixed use area.		
PLUC11 – Utilities / Comms	0.7%-2.6%	These are either industrial uses (if they have external impact/ buffer requirements) or they are located within activity centres.		

Source: MacroPlan, using WAPC Land Use and Employment Survey



What is the take-up (absorption) of service commercial floorspace?

Across Australia, the benchmark take-up for large format/bulky goods floorspace is is 0.58m² per capita.

Given the proposed $12,000\text{m}^2$ of floorspace in the ANLSP, it implies that it would need a service catchment of about 20,700 people ($12,000\text{m}^2 \div 0.58\text{m}^2$ per capita). This benchmark can vary depending on the ability of the development to attract passing trade.

Designated activity centre hierarchy

The proposed Service Commercial as part of the Anketell North LSP is within one kilometre of the planned Wandi District Centre.

The City of Kwinana *Local Commercial and Activity Centres Strategy* (KLCACS) designates the Wandi District Centre on the northern side of Anketell Road, opposite the Anketell North LSP area. The KCLACS identifies the potential for the Wandi District Centre to accommodate 30,000m² floorspace by 2031, and notes there is capacity (sufficient land area) to go beyond this level if there is sufficient demand.

Table 5. Estimated floorspace by year – Wandi District Centre

Land use	2016	2021	2026	2031
Shop/Retail (PLUC 5)	0	6,000	16,000	20,000
Other Retail (PLUC 6)	0	5,000	10,000	10,000
Total	0	11,000	26,000	30,000

Source: City of Kwinana Local Commercial and Activity Centres Strategy

As stated in the KCLACS:

"The future Wandi district centre proposed at the corner of the Kwinana Freeway and Anketell Road has the potential for a first stage of 6,000 sqm Shop/ Retail floorspace by 2021, increasing to 16,000 sqm by 2026 and 20,000 sqm in the longer term. This growth potential is somewhat constrained by the need to maintain the strength of the Kwinana city centre over time, as well as the significant future growth potential identified for Cockburn Central further north. The narrowness of the urban corridor in the vicinity of the district centre is also something of a



constraint on the Wandi centre's Shop/Retail floorspace potential, but this is being offset to some extent by the relatively high suburban residential densities being planned in the locality.

There are considerable site constraints associated with development of the Wandi centre that may limit the developer's ability to neatly stage development of the centre in the recommended manner, which has largely been determined through the need to manage the centre's potential impact on Kwinana. For this reason, some development scenarios for the centre will require a Retail Sustainability Assessment (RSA) if the staging of development does not accord with certain quidelines (see Strategic Plan section).

There is also considerable potential for Other Retail and bulky goods floorspace in the Wandi district centre. It is estimated that the centre could support 5,000 sqm of this floorspace by 2021, increasing to 10,000 sqm by 2026. This potential relies more on freeway exposure and accessibility and much less on local population. The centre's location is such that, if a high profile region-serving tenant wished to establish in the centre, then the amount of supportable Other Retail floorspace could, if required, be increased well beyond these calculated levels.

Source: KCLACS, Section 7.4.2. p33

In terms of shop/retail floorspace, a district centre of this size would normally accommodate two full-line supermarkets (Coles, Woolworths, or potentially Kaufland), potentially one smaller or convenience supermarket (Aldi, IGA), and a district department store (Target, Kmart or BigW).

Service Commercial zones can stand alone in particular cases, but they perform best when they are contiguous with designated activity centres so they can provide a complementary function but still benefit from synergies between the two activities. Given the proposed Service Commercial land in the Anketell North LSP and the Wandi District Centre are separated by Anketell Road there may be limited potential for synergies between the two employment nodes.

From a planning perspective, including traffic, access, exposure and controlling external impacts (noise, congestion), Service Commercial development would logically be located adjacent to activity centres, such as the Wandi District Centre.



The LCACS provides for future development of around 10,000m² of 'Other Retail' (effectively equivalent to Service Commercial uses) at the Wandi District Centre, but notes this is only on the basis of the visual exposure and access from the Kwinana Freeway, rather than on the catchment. In other words, the Service Commercial uses rely on having a broad catchment because it becomes a known destination and attracts people from a wider area (predominantly from the south).

The potential constraints to the urban development of Mandagalup as originally supposed in the KLCACS, would have a limiting effect on the development of the Wandi District Centre – both the Shop/Retail and the Other Retail (service commercial) land uses.

Tactics4 has indicated that the Mandogalup yields could effectively limit the nearby catchment size by around 35 per cent from the original planned development.

However, there is doubt over the future potential for residential development in Mandogalup which may restrict the population in the Wandi DC catchment:

- 1.5km catchment 8,500 residents instead of an initially planned 13,000 residents.
- 3km catchment 15,300 residents instead of an initially planned 24.600 residents

The LCACS provides a caution around the future development of the Wandi District Centre both in terms of its staging and the ultimate development size. Much depends on the centre's capacity to attract the right mix of major tenants that can effectively broaden the attraction capacity of the centre beyond a typical district centre. Such tenants could include a Costco or Ikea. In addition, a unique supermarket offering could also have a similar boosting effect if for example Kaufland was to locate there (yet to open a supermarket in WA, but is currently opening stores in Victoria).

A 'typical' major DDS (Target, Kmart, BigW) would have a smaller draw. Such tenants are becoming more cautious and BigW is currently closing some stores that are underperforming as their market share for such goods is being eroded by online retailers.



Demand for floorspace is fundamentally dependent on the catchment size and the capacity to capture passing trade.

1.1 Catchment area and population

The following figure indicates a 5km radius around the subject site, indicating the existing and future urban development in the catchment. This reinforces the limited catchment corridor immediately to the east due to environmental constraints. To the west, much of the catchment is constrained from future development due to industrial uses and The Spectacles Reserve.



Figure 4. Subject site with 5km catchment area

Source: MacroPlan: WAPC MRS, Perth @3.5 Milion and Urban Development Program

The KCLACS envisaged that the catchment for the Wandi District Centre would include further small-scale infill development in the established suburbs (Bertram,



Wellard, Medina, Leda) as well as opening up new development areas in Wandi and Mandogalup:

In addition to the established areas discussed above, there are extensive future urban development areas on the eastern side of the freeway, and on both sides of the freeway near the northern boundary of the LGA in Wandi and Mandogalup. Neighbourhood centres and a district centre have been planned for these areas, and their future development potential is assessed in this RNA to help ensure that sufficient land is allocated for their long term development. The potential for some additional local centres is also assessed.

Source: KCLACS, Section 7. p29

The following table indicates the total resident population as at the 2016 Census of Population and Housing around the subject site.

Table 6. Population within catchments areas of subject site

	1.5 km	2.5km	3.5km	5km
Total population	2,549	3,059	4,400	23,954
Annual average growth rate 2011-2016	89,2%	42.6%	19.7%	6.3%

Source: MacroPlan; ABS Census of Population and Housing 2016

The City of Kwinana had a population of nearly 39,000 as at the 2016 Census.

Floorspace benchmarks

The following table provides the floorspace per capita benchmarks relevant to activity centres in Australia. This relationship between population and floorspace is connected through the mechanism of expenditure on goods and services and the rates of turnover per square metre that underpin the viability of retail and commercial tenancies.



Table 7. Floorspace per capita benchmarks for activity centres

Category	Estimated floorspace (GLA) per capita (sq. m)	Typical type of activity centre
Food retailing (typical "Shop/Retail" / PLUC5)		
Supermarkets & food stores	0.35	Local, neighbourhood and district centres
Take-home food & liquor spec.	0.25	Local, neighbourhood and district centres; highway commercial
Food catering	<u>0.25</u>	Neighbourhood, district centres and above
Total food retailing	0.85	
Non-food retailing (typical "Other Retail" / PLUC6)		
Department stores / discount department stores	0.24	District, secondary and strategic metropolitan centres
Non-food mini-majors / specialties	0.45	District, secondary centres (and above)
Bulky goods	0.58	Dedicated large format retail centres ('out of centre' developments); district centres
Total non-food retailing	1.27	
Retail services		
Retail services specialties	<u>0.08</u>	All centres
Total retail and retail services	2.20	

Source: MacroPlan Dimasi

The term 'retail services' (as defined by the Shopping Centre Council of Australia) includes banks, ATMs, financial institutions, health insurance, TAB/gaming venues, amusements, professional services, gyms/fitness centres, medical centres, childcare, libraries, schools and offices.

Trade areas overlap for activity centres at different levels in the hierarchy. For example, a strategic metropolitan centre will have a very wide trade area as it provides a greater range and variety of goods and services than are available at a centre lower in the hierarchy. This also means that a strategic metro centre will also capture *some* of the supermarket expenditure that might otherwise been spent in the resident's nearest centre. For this reason, these benchmarks need to be applied carefully and consider all potential competition for retail expenditure.

Service Commercial uses include non-food retailing, which incorporates large format and bulky goods categories. This can be located within centres or as 'out of centre' developments such as the one proposed in the ANLSP.

An overall total of 1.27m² per capita of Other Retail would be required to meet the expenditure requirements of the population for Other Retail purchases.



Two relevant factors that influence the total requirement for Other Retail floorspace are:

- Some Other Retail expenditure is necessarily in higher-order centres (Strategic Metropolitan Centres and the Perth City), because they can provide specialised goods (particularly fashion), that would not be viable in smaller centres; and
- The advent of online retailing in this Other Retail sector has changed the quantum of total floorspace required. That means smaller showroom space, although because customers are looking for short delivery times, many of their orders are fulfilled from the nearest large format centre.

Therefore, MacroPlan estimates that the demand for Other Retail floorspace within the City of Kwinana is about 0.9m² per person. The following table indicates that total requirement in the catchment areas.

 Table 8.
 Bulky goods floorspace required in catchment area

	Anke	Anketell North (and Wandi) Catchment			City of
	1.5 km	2.5km	3.5km	5km	Kwinana
Total population	2,549	3,059	4,400	23,954	39,000
Bulky goods floorspace required (@0.9m ² per capita)	2,294	2,753	3,960	21,559	35,100

Source: MacroPlan; ABS Census of Population and Housing 2016

Based on the current benchmarks for bulky goods floorspace, a total of 35,100 floorspace was justifiable across the City of Kwinana in 2016. Based on the 2019 estimated population of 47,331, this has grown to $42,598m^2$, and by 2036, the City would need about $76,642m^2$ of 'Other Retail' floorspace to meet demand to service the population *within* the local government area.

Table 9. Bulky goods floorspace required in City of Kwinana – from local catchment demand

	2016	2019	2036
City of Kwinana	39,000	47,331	85,158
Bulky goods floorspace required (@0.9m² per capita)	35,100	42,598	76,642

Source: MacroPlan; ABS Census of Population and Housing 2016; ForecastID



1.2 Passing trade

The ANLSP Service Commercial precinct would need to attract passing trade. Much of the vehicle traffic on Anketell Road is cars at present, although there is potential for more trucks to use the route if it is upgraded to service the Outer Harbour at Kwinana.

Besides the residential catchment, the proposed Service Commercial development could potentially benefit from passing trade. The following figure indicates the traffic by time of day, weekday/weekend, and type of vehicle. This shows a significant 'commuter peak'. In 2017/18, 85.8 per cent of all east-west traffic on Anketell Road (east of the Kwinana Freeway) was by car and an average of 6,155 vehicles used the route per day.

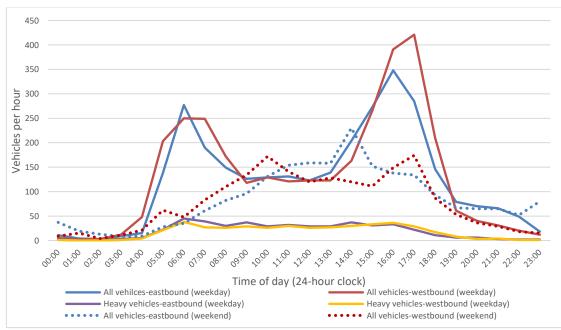


Figure 5. Traffic counts past subject site – 2017/18

Source: MainRoads traffic data, site 7004, Anketell Road, east of Kwinana Freeway

The existing traffic levels on Anketell Road (east of the Kwinana Freeway) are not particularly high in comparison to other areas that have potential for Service Commercial uses. For example, in the Perth metropolitan region in 2017/18 the following corridors ideal for Service Commercial recorded significantly higher traffic volumes:



Thomas Road Anketell, east of Kwinana Freeway
 Dixon Road, Rockingham
 Pinjarra Road, Furnissdale
 16,100 vpd
 25,000 vpd
 15,500 vpd

Potential future traffic volumes on Anketell Road will be driven by:

- Possible development of container-handling facilities at the Outer Harbour in Kwinana which is forecast to handle around 3 million TEU's per annum by 2050. Anketell Road could become a major freight route to access the port and link through to Tonkin Highway to the east.
- Transport @3.5 Million: Perth and Peel Transport Plan identifies Anketell Road as having a major freight function in the future requiring upgrade to a four-lane, median-divided road and designed to for:
 - classification as a strategic freight road, provide RAV 7 access (allowing for heavy vehicles up to 36.5m in length); and
 - key route for transporting Over-Size Over-Mass and High Wide Load cargos.
- Additional urban development of the south-eastern sub-region (Armadale-Byford corridor) which would increase east-west commuter traffic using Anketell Road.

The question is whether these impacts will have a material effect on the viability of Service Commercial land uses at the subject site in the ANLSP. Even if the proposed changes did take place in the timeframes indicated, then at best they could create a demand for a freight-related facility (fuel station, truck wash, fast food), but are unlikely to influence any significant Service Commercial demand.



2.1 Existing and future Other Retail floorspace

The proposed Service Commercial land use is classified as 'Other Retail' under the WAPC Planning Land Use Classification (PLUC). This category is also referred to as 'PLUC6'.

The following table is an extract from the KCLACS showing the Other Retail floorspace by each centre. The local centres have been excluded from the table as they have no Other Retail floorspace.

The City of Kwinana was projected to need 82,456m² of Other Retail floorspace by 2031. This does not include the proposed 12,000m² that is currently within the ANLSP area.

Table 10. Existing and projected Other Retail (PLUC6) floorspace in the City of Kwinana

			Ot	her Retail (sqm NL	A)	
ID	Centre Year:	2011	2016	2021	2026	2031
1	Kwinana SC	1,000	2,000	5,000	8,000	10,000
2	Wandi DC	0	0	5,000	10,000	10,000
Tota	Secondary / District	1,000	2,000	10,000	18,000	20,000
3	Medina	500	500	500	500	500
4	Bertram	0	0	0	0	0
5	Leda	140	140	140	140	140
6	Thomas Rd	0	0	0	0	500
7	Mortimer Rd	0	0	300	300	500
8	Wellard 01	0	0	2,000	2,000	2,000
Tota	Neighbourhood	640	640	2,940	2,940	3,640
23	Thomas/ Holden Cl	350	13,000	13,000	15,000	20,000
24	Orton Rd	0	3,000	5,000	10,000	15,000
25	Postans 01	0	2,000	3,000	4,000	5,000
26	Spectacles 01	0	3,000	3,000	4,000	5,000
Tota	Mixed Business	350	21,000	24,000	33,000	45,000
27	Naval Base	6,399	6,399	6,399	6,399	6,399
28	Kwinana Beach	7,417	7,417	7,417	7,417	7,417
Tota	Total Industrial Areas 13,816 13,816 13,816 13,816 13					
TOTA	AL	15,806	37,456	50,756	67,756	82,456

Note: Table excludes local centres as these have no 'Other Retail' floorspace

Source: MacroPlan, from City of Kwinana Local Commercial and Activity Centres Strategy



SHRAPNEL URBAN PLANNING 17 16 **Secondary Centre** 1. Kwinana City Centre **District Centres** 2. Wandi DC 27 **Neighbourhood Centres ACTIVITY CENTRES** 3. Medina 4. Bertram **Existing Planned** 5. Leda Secondary Centre 6. Thomas Road (Kwinana): No 7. Mortimer Road 2 upper limit, but Retail 8. Wellard 01 Sustainability Assessment (RSA) required before **Local Centres** Shop/ Retail floorspace can 9. Orelia 13 exceed 50,000 sqm. 11. Calista SPP 4.2 Mix of land uses 12. Parmelia requirement applies. 13. Anketell 02 14. Casuarina 02 District Centre (Wandi): 15. Casuarina 03 25 Maximum 16,000 sqm of 16. Wandi LC 28 Shop/ Retail floorspace 17. Mandogalup 01 26 6 without RSA (post 2021). 18. Station 19. Wellard 02 No RSA for significantly smaller first stage at anytime. 20. Wellard 03 23 24 18 RSA required if 16,000 sqm 21. Wellard E 01 maximum is proposed 22. Wellard E 02 prior to 2021. Mix of land uses Mixed Business/ Industrial 23. Thomas Rd/ Holden Cl requirement applies. 24. Orton Road Neighbourhood 25. Postans 01 **1**2 15 Centres: Various Shop/Retail 26. Spectacles 01 maxima apply; an RSA will be required to vary them. Industrial Areas RSA required for 27. Naval Base 7 any new neighbourhood 28. Kwinana Beach centre not indicated on this map 21 Local Centres: **2**0 Maximum 800 sqm. Mixed Business/ Light 22 Industrial Area: Limited 19 Shop/ Retail: Unlimited Other kilometres Retail floorspace Dashed lines indicate centre is an unconfirmed or optional City of Kwinana Local Commercial and Activity Centres Strategy proposal subject to further STRATEGY MAP more detailed consideration.

Figure 6. City of Kwinana existing and future activity centres

Source: City of Kwinana Local Commercial and Activity Centres Strategy



Version: 20140829

The following table shows the relative impact of the additional 12,000m² Other Retail floorspace within the ANLSP on the overall existing and future supply of similar floorspace across the City of Kwinana.

 Table 11.
 Impact of the ANLSP Service Commercial Floorspace

	Other Retail (sqm NLA)				
	2011	2016	2021	2026	2031
Total KLACS Other Retail floorspace	15,806	37,456	50,756	67,756	82,456
Anketell North Service Commercial	0	0	0	10,000	12,000
Total Other Retail floorspace	15,806	37,456	50,756	77,756	94,456
Change (%)	0.0%	0.0%	0.0%	14.8%	14.6%

Source: MacroPlan; City of Kwinana Local Commercial and Activity Centres Strategy

Under the WAPC State Planning Policy 4.2: Activity Centres for Perth and Peel, a retail sustainability assessment is not generally required for Other Retail floorspace.

The table above indicates that the Service Commercial land within the ANLSP is likely to have a 'significant' impact on the either or both the timing/staging, and the ultimate development, of the planned activity centres designated within the KCLAC.



Section 3: Demand-supply balance and conclusion

As it stands the ANLSP would yield approximately 12,000m² of Service Commercial ('Other Retail') floorspace. This quantum of floorspace is:

- Comparable to the total 'Other Retail' floorspace in the City of Kwinana as at 2011;
- Greater than the total 'Other Retail' floorspace proposed in either the Kwinana Town Centre or the Wandi District Centre (10,000m² in each location); and
- Sufficient to service a population catchment of more than 17,000 people.

Amendment No. 4 to the ANLSP would reduce the amount of Service Commercial floorspace by an estimated 7,100m² to 4,900m².

3.1 Demand-supply balance

The demand in the catchment area is not sufficient to support the development of 12,000m² of Service Commercial Floorspace at Anketell North.

The City's KCLACS also reaches a similar conclusion regarding the 10,000m² of Other Retail planned for the Wandi District Centre. It notes that:

This potential relies more on freeway exposure and accessibility and much less on local population.

Source: KCLACS, Section 7.4.2. p33

The subject site in the ANLSP has no visual exposure to the Freeway and would not be able to rely on this factor to benefit from any north-south traffic. Therefore, it relies on the local catchment and the east-west passing trade on Anketell Road.

The principal logical rationale for the 12,000m² of Service Commercial in the ANLSP would be a dramatic change in the role of Anketell Road in the short to medium term to a major freight route, however this far from certain.



Westport is still assessing a range of options, including the potential containerisation of Bunbury Port which may either postpone or replace the need for a containerised Outer Harbour at Kwinana.

Therefore, on an economic perspective, the 12,000m² of Service Commercial land designated in the existing approved ANLSP, seems pre-emptive and speculative.

Based on this assessment, MacroPlan would support no more than 5,000m² of Service Commercial floorspace in Anketell North. This equates to a maximum of around 1.35 hectares of Service Commercial land.

3.2 Implications of the Service Commercial proposed in the current approved ANLSP

- The estimated 12,000m² of Service Commercial floorspace in the ANLSP has
 the potential to be a significantly negative impact on the future Wandi
 District Centre both in terms of the staging of that centre and in the total
 Other Retail floorspace that can be developed, given the catchment size and
 constraints.
- It is probable that the 12,000m² would not be viable based on the residential catchment size and therefore would need to provide unique offering to attract clientele. The best opportunity would be freight-retaliated uses (filling station, truck wash, convenience food), but raises the question about the impact on residential amenity in ANLSP and other residents.
- If the landowner cannot find suitable Service Commercial tenants, the likely
 outcome is that a further amendment would be lodged to rezone the site for
 shop/retail uses. This will have a direct effect on the Wandi District Centre
 and future effect on City's planned retail network.



3.3 Implications of ANLSP Amendment No. 4

- The reduction in Service Commercial land area would reduce the developable land are by 1.75ha to 1.32ha. This would reduce floorspace yield by an estimated 7,100m², from 12,000m² to 4,900m² (land and floorspace areas are MacroPlan estimates).
- Even with this reduction, the remining Service Commercial area could provide a challenge to secure a suitable tenant in the short term.
- Removal of the proposed Service Commercial development from the western side of Neighbourhood Connector B will remove a visual and noise barrier that would have otherwise ameliorated the impacts of traffic along Anketell Road.



Section 4: Recommendations

MacroPlan recommends that the City of Kwinana should support the proposed reduction of Service Commercial land as per Amendment No. 4 to the Anketell Road Local Structure Plan on the basis that the amendment is consistent with supporting the primacy of the City's Local Commercial and Activity Centres Strategy.

Other ways of ameliorating the noise from Anketell Road may potentially be needed if, and when, the freight traffic volumes on that road increase to a point they have a deleterious effect on amenity in the Anketell North subdivision. As part of the process for Amendment No. 4, potential ways of limiting noise impacts could be considered.



References

City of Kwinana, Local Planning Scheme No. 2

City of Kwinana, Local Commercial and Activity Centres Strategy, September 2014

Site Planning and Design, Anketell Road Frontage Land Use and Design Options, Anketell North Local Structure Plan, Various Lots, Anketell Road, Anketell, 22 November 2017

Tactics4, Service Commercial Implications – Professional Opinion, Anketell North LSP Amendment No. 4, 18 April 2019.

Taylor Burrell Barnett, Anketell North: Structure Plan Amendment (No. 4), December 2018

Western Australian Planning Commission, Land Use and Employment Survey 2015-2017

Western Australian Planning Commission, State Planning Policy 4.2: Activity Centres for Perth and Peel.



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SCHEDULE OF SUBMISSIONS

	mitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
1.	Department of Water and Environmental Regulation PO Box 332 Mandurah WA 6210 Contact: Mark Hingston	Not supported	In a broad sense, DWER noted that the proposed Local Structure Plan should be supported by an approved Local Water Management Strategy (LWMS) prior to final approval of the proposed Local Structure Plan and, further, that the LWMS which accompanies the proposed Local Structure Plan and, further, that the LWMS which accompanies the proposed Local Structure Plan until it is satisfied with the LWMS. Accordingly, the proposed Local Structure Plan until it is satisfied with the LWMS. Accordingly, the proposed structure plan should not be finalised prior to the endorsement of a satisfactory LWMS by the DWER and the City of Kwinana in accordance with BUWM (WAPC, 2008). DWER has reviewed the LWMS and provided the following more specific advice: Groundwater levels Request maximum groundwater levels (MGL) rather than annual average maximum groundwater levels (AAMGL) when calculating distance from drainage basin inverts to groundwater. MGL gives greater confidence, particularly as there have been instances within the City of Kwinana where groundwater levels have been rising over the last few years due to urbanisation Conceptual Management Strategy The current LWMS must justify why rain gardens have been removed from the revised LWMS, as these were proposed along roads in the approved LWMS (March 2014) Written confirmation required from Western Power that storage of stormwater in their service corridor is supported Section should describe how off-site discharges from Basins B7(2) and B7(4) connect to the Peel Sub-R Drain to the north of the site Detention Structure Configuration Section notes that the drainage basin required volumes are included in Table 14, however they are missing. Please include these volumes in the Table Subdivision and UWMP Groundwater data used is derived from monitoring during 2006 and 2007 and is quite dated. This section should confirm future UWMP(s) will provide updated data on groundwater levels and quality Given that surface water discharges off-site are proposed, this section shoul	Noted City Officers note that DWER's submission is in relation to Version A but is also applicable to Version B. The City Officers recommend that Part 1 of Amendment 4B be modified to include a provision requiring that a Local Water Management Strategy be prepared to the satisfaction of DWER.

SCHEDULE OF SUBMISSIONS

	omitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 Conservation Category Wetlands (CCW) require a 50m buffer from development. Need to include a diagram indicating CCW area and buffer. Need to include any written agreement with the Department of Biodiversity, Conservation and Attractions regarding the setting of the CCW area and buffer 	
2.	Water Corporation 629 Newcastle Street Leederville WA 6007 Contact: Charles Sabato	No objection	 The proposed changes to the Anketell North Local Structure Plan have been noted and are not likely to compromise water and wastewater planning for the area. The proponent's consulting engineer will need to liaise with the Water Corporation to update the detailed reticulation planning to accommodate the changes proposed in the amendment 	Noted
3.	Main Roads WA Contact: Maryanne Thornely	Not supported	 Main Roads WA is unable to support the proposed Amendment at this point in time, based on the information currently provided A revised Transport Impact Assessment (TIA) is required to be provided for assessment, and prepared in accordance with the Transport Impact Assessment Guidelines (August 2016) and electronic SIDRA files (.sip) in version 8; The following comments are made regarding the submitted TIA: The SIDRA modelling must be provided for Main Roads review. Main Roads at this point in time is unable to determine the amendments impact upon the State Controlled Road Network and verify the TIA inputs and assumptions. The TIA submitted refers to modelling being undertaken in Section 4.2, however does not provided such modelling for review. Further explanation is required regarding 6.4.3 Vehicle Trip Distribution and Assignment. More background is required regarding how external trip distribution figures were determined. Figure 6.4 Excerpt ANLSP Amendment Traffic Demand Model is unreadable. Information should be referenced referred to in Section 6.3 Future Baseline Traffic. The reference for the ROM 24 data should include as a minimum Job No, land use, supplied by and date. The applicant is to amend TIA and appropriately reference source data. Further justification of adopted Trip Generation rates is required. From a land use planning perspective the TIA presented has not considered worst case scenario (in terms of traffic generation) when considering the type of uses permitted in the Service Commercial Zone. Only an office land use has been considered. The applicant is required to review all land uses envisaged in the Service Commercial Zone, and provide a revised TIA detailing worst case scenario in terms of land use trip generation rates. The TIA should cross check the land use definitions within Town Planning Scheme No. 2. 	City Officers recommend that Part 1 of the Amendment 4 (version B) text be modified to include the following requirement: • A Transport Impact Assessment (TIA) is to be prepared to the satisfaction of Main Roads WA, and in consultation with the City of Kwinana in accordance with the Department of Planning Lands and Heritage Transport Impact Assessment Guidelines. The TIA should include details concerning the design of the Anketell Road intersection to the satisfaction of Main Roads WA.

Submitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
		use different rates from two guidelines. Further justification is required clarifying why the selected rates are acceptable in this instance. - The new roundabout as presented on Anketell Road is not supported. Further detail regarding this matter will be forwarded to Council in the near future. - The TIA as presented is deficient in information and cannot be relied upon.	
4. Department of Education	No Objection	The Department notes the amendment to the configuration of the Structure Plan and the increased R Code development surrounding the primary school site.	Noted
		 As local structure planning occurs around the school site the Department requests that consultation takes place regarding the local roads to ensure that there is no impediments regarding access to the school site and to maximise on-street embayment parking. 	City Officers understand that the WAPC refers subdivision applications in the vicinity of primary schools to the Department of Education for comment to ensure that there is no impediments regarding access to the school site and to maximise on-street embayment parking.
		The stand—alone 4 ha primary school will also be expected to accommodate students who reside in the Anketell South Local Structure Plan area.	Noted
		 The estimated lot yield for the North and South Anketell Structure Plans indicates a total yield of 1,600 lots. The Department would welcome any information regarding increases to the anticipated lot yield for the proposed structure plan areas to assist in its future student analysis. 	Noted
5. Department of Biodiversity Conservation and Attractions		Matters of National Environmental Significance The Environmental Assessment Report for the Anketell North Local Structure Plan (Amendment) prepared by Strategen (December 2018) states that development of the site would impact 27 trees considered to provide potential breeding habitat for black cockatoos. The trees are within 9.7 hectares of Black Cockatoo foraging habitat. Development of the site would also require clearing of 9.6 hectares of banksia woodlands which may be considered to be part of the recently been listed "Banksia Woodlands of the Swan Coastal Plain" Threatened Ecological Community (TEC). It would also impact 6.7 hectares of potential Banksia Woodland TEC across areas of the site that have not been surveyed. DBCA notes that within the LSP area, only the proposed development of Lot 7 Anketell Road has been referred to the Department of the Environment and Energy (DoEE) for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (EPBC 2018/8281). Other developers within the LSP amendment area must also contact DoEE to determine what responsibilities they have under the EPBC Act.	Noted
		Conservation Category Wetland The Landscape Master Plan Anketell North presented as Appendix C (LD Total 5/12/18) shows a neighborhood park (Public Open Space (POS) area 5) within Lot 41 described as "areas of open turf, circulation pathways and drainage treatment basin, public amenity such as picnic facilities". Given that the majority of Lot 41 comprises the 50 metre buffer to a Conservation category wetland (CCW), identified as UFI 13506 in DBCA's Geomorphic Wetlands Swan Coastal Plain dataset, the proposed uses and facilities within the POS are not supported. DBCA recommends that any future planning approval to create the POS be subject to a relevant local government condition requiring revegetation of the 50 m wetland buffer to ensure the area acts as an ecological buffer to the CCW.	City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require that the 50 m wetland buffer be revegetated to ensure the area acts as an ecological buffer to the CCW.

SCHEDULE OF SUBMISSIONS

	mitter and property affected by nendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			The EPA's position in Guidance Statement No. 33 is to fully protect the wetland and buffer area and to rehabilitate disturbed areas and manage threatening processes.	
			Fire Management All necessary fire management requirements should be provided for within the development area, in accordance with the provisions of State Planning Policy 3.7 Planning in Bushfire Prone Areas and any other relevant policies. DBCA reiterates that, in accordance with current government policy and guidance, where a 50 m wetland buffer is required for conservation purposes, the entire buffer should be restored and managed to maintain or enhance the adjoining wetland values and should not be used for bushfire protection requirements. The Bushfire Management Plan presented as Appendix B to support the structure plan (Strategen December 2018) should be reviewed and updated to show the position of the CCW boundary and its 50 m buffer and to reflect appropriate vegetation classifications (i.e. Woodland) based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.	City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require the Bushfire Management Plan show the position of the Conservation Category Wetland boundary and its 50m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.
6.	Department of Fire and Emergency Services	No Objection	DFES advises that the BMP has adequately identified issues arising from the bushfire risk assessment and considered how compliance with the bushfire protection criteria can be achieved at subsequent planning stages.	Noted
7	Western Power		The structure plan, future subdivision and development processes must protect the transmission line corridor and associated assets from encroachment, mitigating public safety or network reliability risks and ensuring there is no impediment to routine and emergency land access to the network. 1. Prior to subdivision, Western Power will need to review, assess and provide prior written consent to any proposals below within the registered easement, in accordance with standard easement conditions: • Landscaping plans (including mature heights and location of species); • Ground level changes; • Permanent structures; • Drainage plans; • Conservation controls. 1. In respect to condition 1, the proponent must submit detailed design plans for the land use and drainage proposed within the electricity infrastructure corridor to allow determination of its suitability in respect to public safety, routine and emergency land access and future network plans. Regarding public safety assessment, the requirements of the detailed study are summarised below and a required to form part of the servicing strategy: • Soil Resistivity Report outlining on-site measurement of the soil resistivity, using the Wenner method.	City Officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement prior to subdivision clearance advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis. All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

	mitter and property affected by nendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 An Earth Potential Rise study to determine touch, step and transfer potentials, including documentation of all calculations. A Low Frequency Induction study to investigate the effects of induced voltages from the power line for step, touch and transfer potentials, during both construction and operation of the site. An Electrostatic Induction study to investigate the potential of hazardous charging of metallic objects in the vicinity of the line, such as fences, gates and other services. An Electromagnetic Field Study to determine the impacts of Electric and Magnetic Fields as per ARPANSA guidelines. The studies should identify any mitigation required and be submitted to Western Power for review, record-keeping and to confirm the appropriateness of the proposed land use prior to subdivision. Please be advised that Western Power can provide data to assist in the preparation of the report, which will attract a fee. Costs will be estimated and funds must be received prior to assessment commencing. Generally assessments will take between three to five weeks, from receipt of funds. Western Power requires the following additional provisions to be included on the Structure Plan for consideration at the subdivision and development stages: Provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement prior to subdivision clearance advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis. All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line oper	
8.	Kenneth Bruce Telfer Property affected by proposed amendment: Lot 36 (35) Treeby Road, Anketell	Support	 Owner/occupier of the property – amended plans are suitable for future development and sale; full support given. The relocation of the park (<i>oval</i>) has now enhanced the opportunity for future development of 35 Treeby Road and other landowners in Treeby Road 	Noted
9.	Tina Bazzo Property affected by amendment: Lot 35 (82) Treeby Road, Anketell	Support	Fully support proposed amendments to the Anketell North Local Structure Plan	Noted
10.	Moshee Pty Ltd	Support	Fully support proposed amendments to the Anketell North Local Structure Plan	Noted

	Submitter and property affected by amendment (where applicable) Overall object / support / neutral		Summary of Submission	City Response
	Property affected by amendment: Lot 57 (31) Kenby Chase, Wandi			
11.	Well Holdings Pty Ltd and Trevalley Investments Pty Ltd Property affected by amendment: Treeby Park subdivision, Lots 100 and 9000 Treeby Road, Anketell South	Support	Fully support proposed amendments to the Anketell North Local Structure Plan	Noted
12.	Mincha Pty Ltd	Object	Strongly object on the following bases:	
	Contact: Sam Galati, Director Property affected by Amendment: Owner of Lot 90 Anketell Road, Anketell		 Has relocated a major playing field away from the centre of its catchment, making it remote from most of its residents. New location of playing fields results in its ped shed being substantially reduced as its northern half is not residential – it is now either commercial or ground water zone, effectively reducing by half the number of residents the can walk to the oval. There is a lack of open space in the LSP area generally and as a result, the open space that is there needs to be relatively centrally located. 	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. A total of 10.07ha (13.47%) of credited POS is provided within Amendment 4B. The area of POS exceeds the 10% minimum required under Liveable Neighbourhoods (74,758m2 required – 100,689m2 provided). The proposed POS provides for a variety of purposes and sizing including playing fields, neighbourhood parks, local parks and a linear park. The POS will be provided in accordance with the proposed amended ANLSP and POS Schedule and will be landscaped by the developer to Liveable Neighbourhood requirements and to the satisfaction of the City of Kwinana. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
			The huge amount of commercial land being proposed is not justified by any commercial needs assessment and is likely to make the existing low viability commercial in the area even less viable.	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.

	omitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 Development of the land comprising Lot 7 (which contains a portion of the proposed relocated playing fields) is unlikely to proceed given the structure plan as the entry road has no lots fronting it (just park and power lines) and the land remaining for development is so small, making this piece of infrastructure unlikely to be developable. Who will fund this land with no developable land on each side? 	Noted
			Submitter has presented an alternative location plan for the playing fields and Community Facility site, encompassing land within and to the immediate east of the current playing fields site as per the approved Anketell North Local Structure Plan.	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an
			PLAN NOTES Suggested location for playing fields Suggested location for new commercial Suggested location for CF Treeby Road alignment Plained Area redesigned for residential Playing fields and power easement utilised for parking Possible co-location of community facility Possible co-location of community facility Landowner believes that the alternative location for the playing fields is much better, as it would be located on flat land, the new community centre is still co-located with the park, Lot 7 can be developed viably, which will allow Lots 89 and 90 to be sequenced after it. It should be noted that the Water Corporation sewer planning catchments show Lots 36, 37 and 38 sewering to the south, with a main needing to be built from the existing Treeby Park Estate pump station though multiple separate ownerships. Accordingly, these three lots are likely to be the last to develop and the location of the playing fields on these lots will make less of an impact on staging of other lots and development of those other lots. The proposed attached plan has a much more centrally located park.	integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
13.	Massimo Valentini	General support	Relocation of oval to a flatter surface makes sense, as well as straight road.	Noted
	Property affected by Amendment: Lot 39 Treeby Road, Anketell			

	omitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
14.	Anketell Property Investments WA Pty Ltd Contact: Carlo Galati, Director Property affected by Amendment: Lot 7 Anketell Road, Anketell	Object	Strongly object on the following basis: - Has relocated a major playing field away from the centre of its catchment, making it remote from most of its residents. - New location of playing fields results in its ped shed being substantially reduced as its northern half is not residential – it is now either commercial or ground water zone, effectively reducing by half the number of residents the can walk to the oval. - There is a lack of open space in the LSP area generally and as a result, the open space that is there needs to be relatively centrally located.	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
			The huge amount of commercial land being proposed is not justified by any commercial needs assessment and is likely to make the existing low viability commercial in the area even less viable	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.
			 Development of the land comprising Lot 7 (which contains a portion of the proposed relocated playing fields) is unlikely to proceed given the structure plan as the entry road has no lots fronting it (just park and power lines) and the land remaining for development is so small, making this piece of infrastructure unlikely to be developable. Who will fund this land with no developable land on each side? 	Noted
			Submitter has presented an alternative location plan for the playing fields and Community Facility site, encompassing land within and to the immediate east of the current playing fields site as per the approved Anketell North Local Structure Plan.	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous
				location of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.

	omitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			PLAN NOTES Suggested location for playing fields Suggested location for new commercial Suggested location for CF Treeby Road alignment value for residential Playing fields and power easement utilised for parking Possible co-location of community facility Landowner believes that the alternative location for the playing fields is much better, as it would be located on flat land, the new community centre is still co-located with the park, Lot 7 can be developed viably, which will allow Lots 89 and 90 to be sequenced after it. It should be noted that the Water Corporation sewer planning catchments show Lots 36, 37 and 38 sewering to the south, with a main needing to be built from the existing Treeby Park Estate pump station though multiple separate ownerships. Accordingly, these three lots are likely to be the last to develop and the location of the playing fields on these lots will make less of an impact on staging of other lots and development of those other lots. The proposed attached plan has a much more centrally located park.	
14.	Elton Consulting Contact: Justin Page Property affected by Amendment: Lot 7 (734) Anketell Road, Anketell	Object	The primary reason being that the landowner of Lot 7 prefers the existing approved Structure Plan and is progressing its Amendment No. 5 based on the current approved Structure Plan. Need for additional service commercial land use is not substantiated The Proponent has not adequately demonstrated the need for the substantial new areas of Service Commercial land use abutting Anketell Road, particularly in view of the already planned service commercial to the west and future planned to the north of Anketell Road. The Amendment does not provide any justification or demonstrate the viability for the additional 6.88ha service commercial land use, of which will be in a location disjointed from the main service commercial area to the west. Staging and Implementation of Development The Proponent has not adequately demonstrated the staging and implementation of the proposed Amendment and any impacts and issues that may arise in staging, including triggers for delivery of key infrastructure. In addition, the proposed Amendment makes development of Lot 7 less viable. Development of Lots 89 & 90 Anketell Road is dependent on development of Lot 7 for extension of roads and servicing (i.e. sewer and water). Without development of Lot 7 the NW portion of the structure plan is unlikely to be viable.	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment. Noted

Submitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
		Anketell Local Playing Fields not centrally located The new location for the Anketell local playing fields is not centrally located within DCA4 (Anketell) of which residents it will primarily service. This is inconsistent with the principles of Liveable Neighbourhoods. The new location will have a significantly less walkable catchment than the current approved location. Liveable Neighbourhoods Element 4 – Public Parkland advocates playing fields being located central within neighbourhoods. The new location is on the NE peripheral of Anketell urban area with a lesser walkable catchment and accessibility for residents. Figure 1 shows the location for the local playing fields (which will serve Anketell North and Anketell South residents as per the City's Community Infrastructure Plan) being in a central location consistent with the current approved Structure Plan. Currently there is limited active usable POS in the southern half of the existing approved structure plan. Most of the parkland in the southern half is constrained (restricted) by powerlines and drainage. The primary school cannot be counted as public open space. Department of Education can in future erect garrison fencing around the school and restrict public access for security. The current central location of the playing fields overcomes this problem. Locating the Anketell playing fields further north and closer to Anketell Road will result in: Substantially reduced number of residents in Anketell being within a 400m walkable catchment of the local playing fields (see Attachment 2 ped shed analysis); Local playing fields being further away (less accessible) for Anketell South residents; and Anketell local playing field should not be situated closer to the Wandi Local Playing Fields and high school playing fields in Wandi (see Figure 1) as this is inefficient in servicing residential catchments.	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
		Other Options There are other structure planning options that could (and should) be investigated before considering this Amendment, in order to mitigate any departures from the existing approved Structure Plan which has an adverse impact on other landowners. The existing Structure Plan has been approved since 2015, which has informed landowners' decision making, in particular Lot 7 Anketell Road decision to commence with its own structure planning. Other options include (but not limited to) the following:	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields.
		Option 1 Amend DCA4 (Anketell) to provide for additional funds to acquire the existing house on Lot 30 and provide for necessary upgrades to the sections of Treeby Road (internal collector road) adjacent to the community facility and local playing fields open space. This ensures that these portions of road can be developed when necessary (or triggered) to deliver DCA infrastructure and staging of urban development. The existing approved Structure Plan can then be implemented.	The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.

	omitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 Option 2 Relocate the Anketell local playing fields within the same landownership (Lots 36 – 38 Treeby Road) as shown in Attachment 1. The benefits include: Retaining a relatively central location within Anketell for resident walkability and accessibility; Power easement area can be utilised for parking; Better passive surveillance (esp. after hours) from the surrounding residential use, compared with the proposed northern location, which will have significantly less surveillance. This is due to having adjacent service commercial, rural and community facilities uses. Landowners of Lots 7 & 89 can still proceed with their intended structure planning pursuant to the planning under the existing approved Structure Plan; Anketell North service commercial area is consolidated and made viable in one area (to the west closer to freeway) to support the Wandi District Centre as per approved Structure Plan as amended; No significant net loss in residential development for landowners as local playing fields is only moved east of power easement; and Treeby Road alignment can be maintained. 	
15.	Rowe Group Contact: George Hajigabriel Property affected by Amendment: Lots 313 and 2 Anketell Road, Wandi (Denkey Pty Ltd and Anketell Holdings Pty Ltd) – future proposed Wandi District Centre (McCubbing)	Neutral, however concern regarding proposed additional 'Service Commercial' zoning at north-east corner of proposed LSP	Primary reasons for concern are: The proposed additional Service Commercial zoning will dilute the primacy of the District Centre by promoting non-residential uses well outside the (proposed) District Centre core; The proposed additional Service Commercial zoning will promote a form of 'ribbon' development along Anketell Road rather than a focused core of commercial activity; and There is sufficient identified Service Commercial zoned land already available to service the needs of the locality.	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.
			Whilst the north eastern corner of the LSP may not represent prime residential land, it is nonetheless capable of development for residential purposes subject to appropriate acoustic control measures being implemented. A residentiaL use in this area will also provide a preferred interface to the adjoining local sporting ground.	Noted
16.	RPS Contact: Joanne Cousins Property affected by Amendment: Kwinana Marketplace (on behalf of SCA Property Group)	Object	On behalf of our Client we request that the City of Kwinana and WAPC do not support the inclusion of the Service Commercial land within the ANLSP area: Consistency with Strategic Planning Documentation & Suitability of Location Perth and Peel @ 3.5M and the City of Kwinana Local Commercial and & Activity Centres Strategy (2014) (KLCACS) both identify a clear hierarchy of centres within with City of Kwinana; and without a Local Planning Strategy, therefore provide the highest and best indication of the State and Local Government intentions with respect to the location and scale of future commercial development within the City of Kwinana. The proposed Structure Plan Amendment is not consistent with either of these documents and instead proposes out of centre and out of sequence service commercial land uses within the structure plan area. The KLCACS notes that Kwinana Town Centre is to be "proactively" maintained as the "largest and most complex activity centre in the Kwinana hierarchy of centres by ensuring	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.

SCHEDULE OF SUBMISSIONS Amendment 4A to Anketell North Local Structure Plan

(Advertising Period - 25 February 2019 to 18 March 2019)

mitter and property affected by nendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
		there (and preferably nowhere else); and by ensuring that the other centres in the hierarchy remain appropriately matched to their designated roles". The strategy goes on to state that planning for other centres should not "inadvertently impinge on the potential of the city centre".	
		The proposed uses on the subject site are not consistent with the centres planning within the KLCACS:	
		- The KLCACS identifies a planned Wandi District Centre (as does Perth and Peel @ 3.5M) on the opposite side of Anketell Road adjacent to the Kwinana Freeway intersection as the key secondary centre for the City. The Wandi Centre future retail needs modelling is identified as requiring 20,000m2 NLA of Shop/Retail by 2031 and 10,000 of Other Retail by 2031 (in 2021 the identified demand is 6000m2 and 5000m2 respectively).	
		- The structure plan amendment application through identification of the proposed service commercial land uses as "complementary" to the Wandi District Centre infers that the proposed 15,000m2 of NLA on the subject site would not be inconsistent with the primacy of the Wandi District Centre or preclude it from developing to its full potential. However Permitted and "AA" uses within the Service Commercial Zone include a large number of retail/commercial uses (with the exception of Shop) that are also subject to a "P" or "AA" level of assessment within the Commercial Zone. Therefore uses such as Showrooms, Civic Buildings, consulting rooms, childcare centres, eating houses, licensed restaurants, medical clinic, offices, professional offices, recreational facilities, and veterinary clinic amongst others are effectively interchangeable between the subject site and future Wandi District Centre. This interchangeability of uses means that the proposed	
		development of the subject site in such close proximity to the Wandi District Centre would be contributing to absorbing the maximum floor space demand for that centre. The proposed 15,000m2 on the subject site is far in excess of the expected demand of both Shop/Retail and Other Retail for 2021 (which is a total of 11,000m2) and could potentially absorb all the "Other Retail" demand for this locality out to 2031. - Multiple smaller neighbourhood and local centres are identified within City of Kwinana. None of these centres are mapped in the location of the proposed Service Commercial uses on the subject site; and while an optional local centre (with a maximum size of 800m2) is located elsewhere within the ANLSP with a possible floorspace of Shop/Retail of 500m2 required by 2031, the proposed Service Commercial land use type is not addressing the possible small local centre need.	
		- The KLCACS identifies a possible opportunity for establishing Mixed Business/ Industrial Centres which are focused on Other Retail/Bulky Goods uses and service commercial and service industry activities including a cluster around the Kwinana Freeway intersections south of the ANLSP area. None of these Mixed Business Centres is mapped on or near the subject site indicating that they are uses not supported or anticipated on the subject site.	
		- In summary, the proposed creation of Service Commercial land uses on the subject site is creating a large area centre type land uses outside of the identified centres hierarchy, and in a location where it is likely to significantly inhibit the successful	

SCHEDULE OF SUBMISSIONS

	mitter and property affected by nendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			establishment of the Wandi District Centre. Further this creation of service commercial land uses on the subject site is happening outside of the normal process for the creation of a centre, and without the benefit of any previous strategic planning that assesses the merit of the site for commercial land uses or contemplates its relationship in the hierarchy of centres within the City of Kwinana, and the appropriate floor space and design considerations that attach to a comprehensive centre planning process.	
			Lack of Economic Modelling The submitted Structure Plan amendment application contains no economic assessment of the demand for and impact from the proposed Service Commercial land uses. As noted above the proposed inclusion of 3.07ha of Service Commercial land on the subject site is not envisaged or supported by any of the relevant strategic planning documentation for the City of Kwinana or establishment of centres in Perth.	
			The Structure Plan Amendment report notes that the proposed service commercial land uses on the subject site are intended to be "complementary" to the future commercial uses within the Wandi District Commercial Activity Centre. However, no detail is provided as to whether there is sufficient additional demand to require 15,000m2 NLA of service commercial land uses on the subject site and what impact this might have on the viability of existing commercial centres in the vicinity and the viability of the Wandi District Centre.	
			Whilst ever the details of the proposed district centre remain unknown it is bad economic planning to be establishing a large area of service commercial land uses nearby without consideration of economic impacts. Any development with this much proposed commercial land should be subject to a comprehensive assessment that contemplates market absorption, economic impact and precinct role and function and whether service commercial land uses on the subject site are acceptable in terms of scale and the prospects of causing blight on nearby centres and undermining the strategy for the establishment of the Wandi District Centre.	
			On this basis the Structure Plan Amendment to include Service Commercial land uses should be refused based on there being no justification of the demand for, or impacts from, this land use on the subject site.	
17.	Planning Horizons on behalf of Chen Chee Ting (Landowner)	Object	 The proposed amendment relocates the major playing field from the centre of the current approved Structure Plan to a remote corner, well away from the majority of its residents. 	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an
	Property affected by Amendment: Lot 89 (748) Anketell Road, Anketell		 The new location of the playing field will be nearer to either commercial or ground water zones, making it less accessible to the local residents. As the location of the playing field is no longer a walkable distance, it will force the local residents to drive to the playing field and therefore increases the need for additional parking spaces, which does not appear to have been taken into consideration in the proposed amendment. 	integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields.
			The location of the playing field should be near the school site. Parents and students will be able to use the playing field after school. As a parent with two young children, we always let our kids play with their friends after school.	The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For

Submitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
		 Playing fields are generally used by kids and families, locating it near the school makes more sense. Drivers constantly reminded to slow down in school zones; drivers are more attentive in school zones and this will make it safer for users of the playing field as well. Locating the playing field closer to a busy road and commercial area will give safety concerns for users. I am not sure of what type of shops will be in the area, but I would not want to use the playing field if it was back onto a group of warehouses, or shops have trucks constantly coming and going. There is already a lack of open space in the area and the maximise its effectiveness the open space should be centrally located to benefit its residents. It is also noted that the proposed DOS relocation might be justified on the basis of proximity to the Community Facility which would be situated at the northern end of Treeby Road. We contend that tucking the DOS behind this facility on a minor connector road would not serve the neighbourhood or its visitors. As Liveable Neighbourhoods and the ANSLP themselves argue, the DOS is important, warranting a central location on an integrator B category route. Moreover, noncentrally located DOS will also undermine the very design considerations that were used to determine the location of the Community Facility in the first place. Proposed relocation of DOS is justified by cost of earthworks, not sound urban planning principles. Proposed location of Service Commercial zone adjacent to proposed DOS contradicts Council's own design out crime policy, LPP8. Alternative land uses should be encouraged. 	example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
		 The increased amount of commercial land being proposed was not justified by any commercial needs assessment. I suggest before the amendment is considered any further, an assessment should be done. Modelling of Trips Generated by Service Commercial Land Uses within TIA. It is noted that the Transport Impact Assessment Report submitted in support of the ANLSP amendment application appears to have underestimated the vehicle trips which might be generated by the proposed service commercial land uses, and therefore has underestimated the demand and impact that the proposed service commercial land uses will have on the local road network. The document notes that the adopted trip generation rates for the Service Commercial are an "office" rate of 12 trips per 100m2 of GFA which, using an adjustment to the total site area of 30%, has resulted in a calculation of 3680 Daily Trips. This calculation does not appear to have made an adjustment from the total 3.07ha site area, however even so we submit that they have erred in the identification of the daily trip generation rates. The "office" rate was adopted because it is a "reasonable assumption" and a "moderate trip rate for the various types of service commercial uses". 	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.

	mitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 However we submit that by using an "office" rate in an area where Showrooms, Civic Buildings, consulting rooms, childcare centres, eating houses, licensed restaurants, and medical clinics can also be established that generate a higher level of trip generation means that the trip calculations for this amendment application are not necessarily reflective of the likely impact once the uses are established. The NSW Government identifies that Bulky Goods Retail stores generate trips at a rate of 17 vehicles per 100m2 of GFA on week days (and 19 on weekends), whereas major hardware and buildings supplies stores generate 33 vehicles per 100m2 of GFA on weekdays and 35 vehicles per 100m2 of GFA on weekends. Other published rates (used in Queensland) for uses such as a medical centre, commercial services and takeaway food have a calculation rate of 40 trips/ 100m2 Total Use Area and Service Industry and Showroom are calculated at a rate of 20 trips per 100m2 of Total Use Area. Given the disparity in the range of vehicle trips generated by the prospective uses within a Service Commercial precinct on the subject site the use of the "office" rate could significantly misrepresent the actual impact (e.g. conservatively if the 15,000m2 GFA comprises 8,000m2 of hardware (2640 trips); 2000m2 of medical centre and commercial services (800 trips); and 5000m2 of Bulky Goods Retail (850 trips) the total trips generated could total 4290 rather than the 3680 in the TIA). The Traffic Impact Assessment should be revisited to provide more nuanced details with regard to the proposed impact of the Service Commercial land uses that contemplates the actual likely land uses in this ocation, whether trip rates are impacted by the out of centre location and associated access to public transport, and whether likely increased trip rates would impact on the local road network. 	
18.	Creative Design and Planning Contact: Frank Arangio, Managing Director	Object	The proposed service commercial land has not been supported by a retail analysis. The extent of service commencial in the proposed amendment appears to be excessive.	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.
	Property affected by Amendment: Lot 188 and 189 Treeby Road, Anketell (on behalf of the landowners)		Inclusion of POS along the Anketell frontage would not provide the best amenity outcomes for the public utilising the POS given that it is abutting a Primary Freight Road. Service Commercial along this frontage would provide a better interface. The new location for the playing fields is not centrally located. This is inconsistent with the principles of Liveable Neighbourhoods. The new location will have a significantly less walkable catchment than the current approved location. The new location is on the the NE peripheral of Anketell urban area with a lesser walkable catchment and accessibility for residents. Currently there is limited active usable POS in the southern half of the approved structure plan. Most of the parkland in the southern half is contained (restricted) by powerlines and drainage. Locating the Anketell playing fields further north and closer to Anketell Road will result in: - substantially reduced number of residents being with a 400m walking catchment of the local playing fields; - local playing fields being further away for Anketell South residents;	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.

SCHEDULE OF SUBMISSIONS

	mitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 Anketell local playing fields should not be situated closer to the Wandi Playing fields and high school playing fields in Wandi as this is inefficient in servicing residential catchments. 	
			Redesign Option Amend DCA4 (Anketell) to provide for additional funds to acquire the existing house on Lot 30 and provide for necessary upgrades to the section of Treeby Road adjacent to the community facility and local playing fields. This will ensure that these portions of road can be developed when necessary to deliver DCA infrastructure and staging of development. The existing approved structure plan can then be implemented.	It is not considered appropriate to amend Development Contribution Plan 4 (DCP 4) under the City's Local Planning Scheme to include these two additional items. These are planning matters which are able to be resolved via local structure planning and subdivision design processes and/or resolved over time as part of a staged process of development for Anketell North.
			 Relocate the local playing fields within the same landownership. The benefits include: Retain a relatively central location within Anketell; Power easement can be used for parking Better passive surveillance from the surrounding residential use, compared with the proposed northern location; Landowners of Lots 7 and 189 can still proceed with the intended adopted structure planning; The service commercial area is consolidated in one area 	As dscussed above, City Officers are recommending the relocation of the playing fields in accordance with proposed Amendment 4B.
19.	GHT (WA) Pty Ltd ATF The Gucce Trust 48 Wickham St, East Perth Property affected by amendment: Lot 30 (36) Treeby Road, Anketell	Support	 Fully support the proposed Amendment The location of the sporting grounds at the top of the hill (<i>in reference to the current Anketell North LSP</i>) would require an extensive bulk earthworks strategy to create level playing fields over multiple lots, due to the steepness of the land. The proposed location of the playing fields is far superior, will cost the DCP less to deliver and should be co-located next to the future Community Facility site Retaining the existing alignment of Treeby Road avoids expensive service relocation and retains the existing dwelling on Lot 30. 	Noted
20.	Antonio Giuseppe Grillo Landowner Property affected by Amendment: Lot 189 Anketell Road, Anketell	Object	 Object to the proposed layout plan because we are of the opinion that the proposed community centre should be relocated to the southern side of the large POS. We also object to the proposed POS, this area is more suitable for a commercial precinct rather than POS because of its location. 	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous
21.	Michael and Linda Cole	Object on basis of	Appears the difference between current and proposed LSPs is the continuation of	location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated. Noted
<u>-</u> 1.	14 Black Boy Grove, Wandi	potential increase in traffic	Honeywood Avenue or making Lyon Road into a busier road.	1000

	mitter and property affected by mendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			 Very happy with the development across the road (other side of Lyon Road) thus far, but if Lyon Road became busier, would lose what they moved into the area for 30 years ago. Lyon Road is currently very dangerous, as people speed around the two bends between De Haer Road and Wandilla roundabout, notwithstanding that the speed limit has been reduced to 70kph (recommend another 70kph sign post for those exiting Wandi Drive – also, people parking on Lyon Road at the bend near the new park is dangerous). 	
22.	Turnstone Nominees Pty Ltd and Sanctum Holdings Pty Ltd	Object	Strongly object on the following basis:	
	Contact: Warren Spencer, Director Property affected by Amendment: Ex-Lots 2 and 3 Anketell Road (Albero Estate)		 Has relocated a major playing field away from the centre of its catchment, making it remote from most of its residents New location of playing fields results in its ped shed being substantially reduced as its northern half is not residential – it is now either commercial or ground water zone, effectively reducing by half the number of residents the can walk to the oval There is a lack of open space in the LSP area generally and as a result, the open space that is there needs to be relatively centrally located. 	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
			The huge amount of commercial land being proposed is not justified by any commercial needs assessment and is likely to make the existing low viability commercial in the area even less viable.	The area of Service Commercial proposed in version A of Amendment 4 has been reduced in version B of Amendment 4. A reduction in Service Commercial is supported by the City Officers based on an independent commercial assessment.
			 Development of the land comprising Lot 7 (which contains a portion of the proposed relocated playing fields) is unlikely to proceed given the structure plan as the entry road has no lots fronting it (just park and power lines) and the land remaining for development is so small, making this piece of infrastructure unlikely to be developable. Who will fund this land with no developable land on each side? 	Noted
			Submitter has presented an alternative location plan for the playing fields and Community Facility site, encompassing land within and to the immediate east of the current playing fields site as per the approved Anketell North Local Structure Plan.	The location of the Local Sporting Ground in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site

S	ubmitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	n	City Response
			Landowner believes that the alternative location for the p would be located on flat land, the new community centre Lot 7 can be developed viably, which will allow Lots 89 a should be noted that the Water Corporation sewer planni and 38 sewering to the south, with a main needing to be Park Estate pump station though multiple separate owner lots are likely to be the last to develop and the location of will make less of an impact on staging of other lots and do The proposed attached plan has a much more centrally less than the stage of the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the proposed attached plan has a much more centrally less than the location of the location of the proposed attached plan has a much more centrally less than the location of the location	is still co-located with the park, and 90 to be sequenced after it. It ing catchments show Lots 36, 37 built from the existing Treeby erships. Accordingly, these three if the playing fields on these lots development of those other lots.	reduces the need for significant earth working to create the appropriate grades for the playing fields. The relocation of the playing fields away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated.
23	PW and KL White Lot 37 (49) Treeby Road, Anketell Property affected by Amendment: Lot 37 (49) Treeby Road, Anketell	Support	Fully support the proposed Amendment to the Anketell Nor	rth Local Structure Plan.	Noted

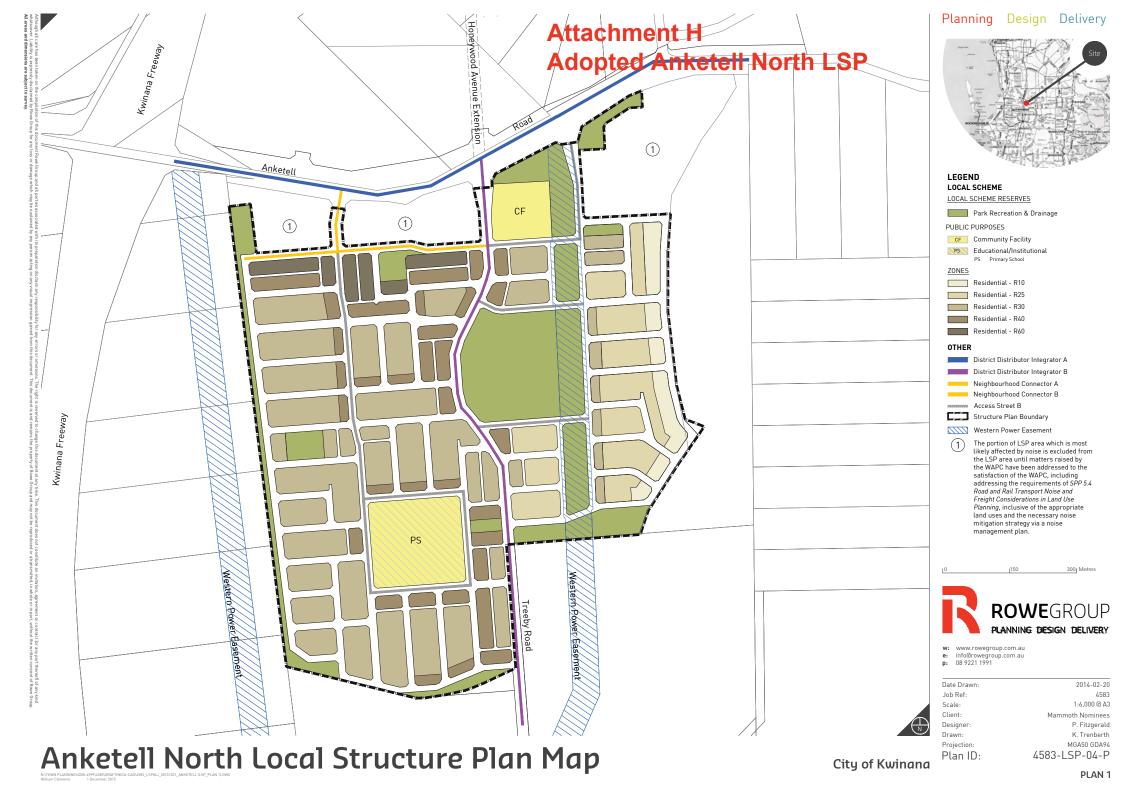
Submitter and property affected by Overall object /			Summary of Submission	City Response
í	amendment (where applicable)	support / neutral		
1.	Department of Biodiversity Conservation and Attractions		Matters of National Environmental Significance The Environmental Assessment Report for the Anketell North Local Structure Plan (Amendment) prepared by Strategen (December 2018) states that development of the site would impact 27 trees considered to provide potential breeding habitat for black cockatoos. The trees are within 9.7 hectares of Black Cockatoo foraging habitat. Development of the site would also require clearing of 9.6 hectares of banksia woodlands which may be considered to be part of the recently been listed "Banksia Woodlands of the Swan Coastal Plain" Threatened Ecological Community (TEC). It would also impact 6.7 hectares of potential Banksia Woodland TEC across areas of the site that have not been surveyed. DBCA notes that within the LSP area, only the proposed development of Lot 7 Anketell Road has been referred to the Department of the Environment and Energy (DoEE) for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (EPBC 2018/8281). Other developers within the LSP amendment area must also contact DoEE to determine what responsibilities they have under the EPBC Act.	Noted
			Conservation Category Wetland The Landscape Master Plan Anketell North presented as Appendix C (LD Total 5/12/18) shows a neighborhood park (Public Open Space (POS) area 5) within Lot 41 described as "areas of open turf, circulation pathways and drainage treatment basin, public amenity such as picnic facilities". Given that the majority of Lot 41 comprises the 50 metre buffer to a Conservation category wetland (CCW), identified as UFI 13506 in DBCA's Geomorphic Wetlands Swan Coastal Plain dataset, the proposed uses and facilities within the POS are not supported. DBCA recommends that any future planning approval to create the POS be subject to a relevant local government condition requiring revegetation of the 50 m wetland buffer to ensure the area acts as an ecological buffer to the CCW. The EPA's position in Guidance Statement No. 33 is to fully protect the wetland and buffer area and to rehabilitate disturbed areas and manage threatening processes.	City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require that the 50 m wetland buffer be revegetated to ensure the area acts as an ecological buffer to the CCW.
			Fire Management All necessary fire management requirements should be provided for within the development area, in accordance with the provisions of State Planning Policy 3.7 Planning in Bushfire Prone Areas and any other relevant policies. DBCA reiterates that, in accordance with current government policy and guidance, where a 50 m wetland buffer is required for conservation purposes, the entire buffer should be restored and managed to maintain or enhance the adjoining wetland values and should not be used for bushfire protection requirements. The Bushfire Management Plan presented as Appendix B to support the structure plan (Strategen December 2018) should be reviewed and updated to show the position of the CCW boundary and its 50 m buffer and to reflect appropriate vegetation classifications (i.e. Woodland) based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.	City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require the Bushfire Management Plan show the position of the Conservation Category Wetalnd boundary and its 50 m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.

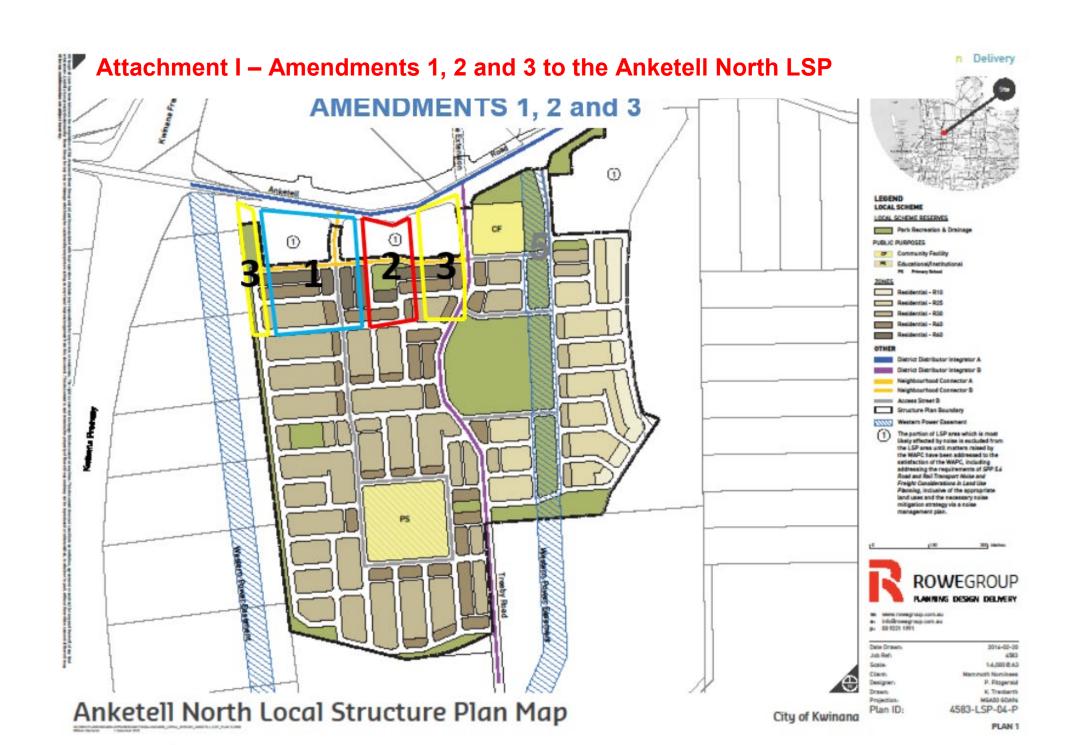
2. Department of Fire and Emergency Services No Objection DFES advises that the BMP has adequately identified issues arising from the bushfire risk assessment and considered how compliance with the bushfire protection criteria can be achieved at subsequent planning stages. Noted Noted	nommand that the WARC he requested to impace
3 Western Power The structure plan future subdivision and development processes must protect the Noted	nommand that the WARC he requested to impace
transmission line corridor and associated assets from encroachment, mitigating public safety or network reliability risks and ensuring there is no impediment to routine and emergency land access to the network. 1. Prior to subdivision, Western Power will need to review, assess and provide prior written consent to any proposals below within the registered easement, in accordance with standard easement conditions: • Landscaping plans (including mature heights and location of species); • Ground level changes; • Permanent structures; • Drainage plans; • Conservation controls. 2. In respect to condition 1, the proponent must submit detailed design plans for the land use and drainage proposed within the electricity infrastructure corridor to allow determination of its suitability in respect to public safety, routine and emergency land City Officers red a condition on f	commend that the WAPC be requested to impose ruture subdivision applications requiring action 70A Notifications on all proposed lots disting Western Power registered easement prior clearance advising prospective purchasers that the proximity to power infrastructure which will be graded and expanded on a regular basis. It shall be designed and constructed to protect infrastructure and interests from potential land at (including fill, fencing, storage or parking) will thin Western Power registered easements or written approval of Western Power or the line operator.

Submitter and property affected by amendment (where applicable)		Overall object / support / neutral	Summary of Submission	City Response
			 advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis. All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator. Note: The above advice should not be construed as Western Power's support or otherwise of the land use or development proposed in the existing electricity corridors and associated registered easements. Further detailed studies will be required to determine the suitability of subdivision and development within the easement corridors. 	
3.	Kenneth Bruce Telfer Property affected by proposed amendment: Lot 36 (35) Treeby Road, Anketell	Support	The amendments are giving all plans an overall better layout.	Noted
4.	Tina Bazzo Property affected by amendment: Lot 35 (82) Treeby Road, Anketell	Support	Fully support proposed amendment to the Anketell North Local Structure Plan	Noted
5.	Sam Galati Property affected by Amendment: Owner of Lot 90 Anketell Road, Anketell	Object	While I support the possibility of a 4 way intersection at Lyon Road the location of the proposed sporting ground in Amendment 4 would mean the road would not be feesable to build for a long time until population in the area justified it. The original location of the sporting ground would be a lot better for the future advancement of the area and for the community.	This is a matter that will be resolved as part of the subdivision approvals processes. Conditions may be imposed of the subdivision approval requiring construction and upgrading of the intersection.
6.	Massimo Valentini Property affected by Amendment: Lot 39-63 Treeby Road, Anketell	Support	We support Amendment 4 as it a logical and equitable approach to the development.	Noted
7.	GHT (WA) Pty Ltd Property affected by Amendment: Lot 30-36 Treeby Road, Anketell	Support	We fully support the proposed modifications proposed under Amendment No 4 to the ANLSP. The amendment provides the most efficient and logical planning layout for the precinct, taking into account the topography of the land, vegetation retention, retaining the existing alignment of Treeby Road, avoiding service relocation costs (in Treeby Road), and allows for the home of B & D Volpi to be retained. The modification also co-locates the playing fields next to the future Community Purpose site and places the playing fields next to Anketell Road, thereby providing a logical buffer from transport noise to the residential development areas.	Noted

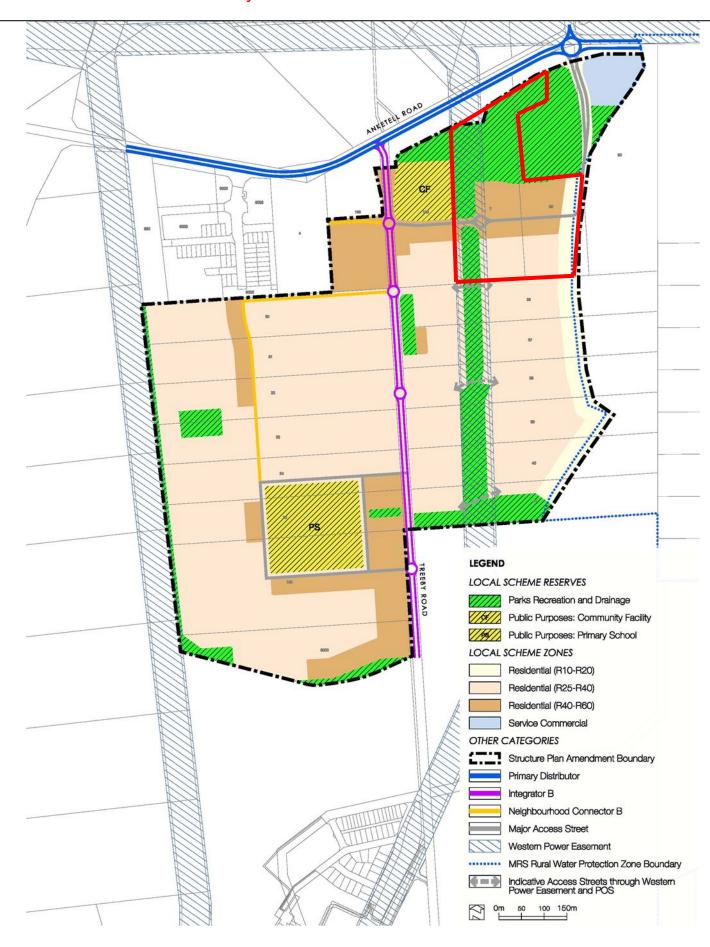
SCHEDULE OF SUBMISSIONS Amendment 4B to Anketell North Local Structure Plan (Advertising Period - 29 May 2019 to 12 June 2019)

	Submitter and property affected by Overall object /		Summary of Submission	City Response
	amendment (where applicable)	support / neutral		
8.	Well Holdings Pty Ltd & Trevalley Investments Pty Ltd	Support	We fully support Amendment No 4 to the ANLSP, consistent with our previous submission. The amendment provides the most efficient and logical planning layout for the precinct, taking into account the topography of the land, retaining the existing alignment of Treeby Road & avoiding the un-necessary service relocation costs to move the new sewer pressure main in Treeby Road. The modification also co-locates the playing fields next to the future Community Purpose site and places the playing fields next to Anketell Road, thereby providing a logical buffer from transport noise to the residential areas. It also minimises extensive & expensive earthwork costs to the DCP.	Noted





Attachment J - The boundary of Amendment 5 over Amendment 4B to ANLSP



Information Paper

To:	Jarrod Rendell	<u>jarrod@acumends.com.au</u>
Cc:	Rachel Chapman	rachel@tbbplanning.com.au
From:	Greg Davis	g.davis@taktics4.com.au
Date	Thursday, 18 April 2019	Pages 3
Subject	Service Commercial Implications - Professional Opinion Anketell North LSP Amendment No. 4	



Dear Jarrod

We understand that a Service Commercial zone is being considered along the frontage of Anketell Road in Wandi as part of an amendment to the Anketell North Local Structure Plan. You have requested Taktics4 to provide professional opinion on the suitability and sustainability of a Service Commercial zone in the area currently allocated within the LSP amendment.

Physical Capacity

The Service Commercial area is divided into two sites and are each approximately 1.5Ha in size. The combined area of both zoned sites is therefore approximately 3 Ha. Based on ground level development and an industry accepted plot ratio of between 33% and 50% of site, a land area of 3Ha (30,000sqm) would be physically able to accommodate up to 10,000 – 15,000sqm of built form. A 10,000 – 15,000sqm Service Commercial development would be consistent with similar large format retail/showroom retail developments around Perth.

Planning Logic

At face value the allocation of a Service Commercial zone along Anketell Road seems plausible. Anketell Road is ultimately designated to become a major freight route making residential development an inappropriate fronting land use to Anketell Road. Service Commercial would normally seem a logical buffer between freight traffic and residential development, as Service Commercial activity relies heavily on accessibility and exposure to significant traffic volumes. However, the limited origin and destination points to the east and west along Anketell Road would suggest that there would only be limited local or district (non-freight transport) traffic along Anketell Road, and exposure to freight transport traffic is less significant for Service Commercial businesses than resident-based vehicle traffic. I therefore have concerns about the sustainability of service commercial activity located on Anketell Road.

Wandi District Centre

Another major factor in considering Service Commercial along Anketell Road in this location could be its proximity less than 1km to the east of the planned Wandi District Centre (DC). It would normally make logical planning sense to accommodate Service Commercial adjacent to a District Centre. The Wandi DC is planned to accommodate 16,000sqm of retail floor space and 10,00sqm of Service Commercial activity. The overall size of the Wandi DC is physically capable of accommodating this floor space allocation. This sized centre typically comprises two full line supermarkets and a Discount Department Store such as Target, BigW or Kmart.

Retail development economics confirm that Wandi DC will not develop to its allocated size without securing each of these three major tenants. The Wandi DC is central to a very limited residential catchment. The residential areas planned to the east of the Kwinana Freeway from

Information Paper

Rowley Road to Mortimer Road is severely restricted by the Jandakot Water Management Plan. The potential residential development within The Wandi DC catchment is further impacted by the proximity of expansive regional open space areas including The Spectacles Reserve and Jandakot Regional Park. The main residential catchment for the Wandi DC was expected to come from Mandogalup to the north west of the Wandi – west of the freeway. However, there is doubt over the future potential for residential development in Mandogalup which may restrict the population in the Wandi DC catchment.

1.5km catchment - 8,500 residents instead of an initially planned 13,000 residents.

3km catchment – 15,300 residents instead of an initially planned 24,600 residents

I have concerns as to whether a major DDS will be attracted to Wandi DC even if future planning initiatives result in Mandogalup achieving a higher population base, meaning that I subsequently have concerns over the ability of the Wandi DC to attract the major retail anchor tenants necessary to reach its full retail planning potential.

Wandi DC may therefore initially (and potentially only) ever develop as a neighbourhood-based retail centre anchored by a single supermarket creating a total retail floor space of 5,000 sqm. This development model would limit the attractiveness of the surrounding areas for Service Commercial activity, as this activity relies heavily on the foot traffic and traffic exposure created by the major retail tenants. If this scenario does in fact unfold, the immediate Wandi DC zone will require every available commercial and community activity to be located together on the one site in order to create a vibrant hub of commercial activity where all businesses are able to trade from each other's exposure.

I also understand that there may be commercial initiatives afoot to attract a next level bulky goods warehouse retailer such as Costco to the Wandi DC site. Whilst I have concerns over the suitability and sustainability of this activity type in this location, it would not alter my position that all activity should, where possible be contained primarily within the Wandi DC site. I therefore have concerns over allowing significant Service Commercial activity to be developed along the major arterial of Anketell Road as this may inhibit the Wandi DC from reaching its full commercial potential.

Planning Implications

As discussed, the service commercial area is split in to two sites – east and west.

Western Site

With respect to other non-commercial planning considerations, I would recommend consideration be given to the removal of the Service Commercial zone (the 1.5Ha western site) along Anketell Road on the LSP. A possible alternative which achieves the current planning objectives of providing a buffer to residential activity long Anketell Road, may include the relocation of the District Open Space and Recreation activities further north to front Anketell Road. This solution would have the following consequences:

- It would provide stronger exposure and legibility for a district recreation facility rather than tucking it/hiding behind a service commercial facility
- It would allow for an increase in residential development to the south of a relocated open space area.

Information Paper

- It would maintain the synergy between the Open space and community facility site as currently shown on the LSP.
- This would be a far better amenity outcome than having a valuable district open space and recreation facility fronting to a typically untidy low amenity rear servicing area of a service commercial area

Eastern Site

The above approach would satisfy the western site but would not resolve the Service Commercial area on the eastern site currently allocated for service commercial activity. This area is irregular in shape and remains unsuitable for residential activity as per previous discussions.

Given the planned nature of Anketell Road as a freight route this site may be best suited to a Freight Transport related Commercial Activity Hub. A freight transport related commercial activity hub may include a range of uses including (but not limited to) a petrol filling station and truck wash facilities as well as fast food and takeaway, geared solely (or at least predominantly) to large freight vehicles rather than cars. This activity in this location could benefit from significant exposure to freight transport by virtue of the road alignment, depth of the site and high visibility created by the recreation fields, and the sites access to two road frontages. This potential activity type on this eastern site forms no direct synergy with the broader Wandi District Centre and planned adjacent commercial activity as they will primarily cater to local and district residents shopping and commercial needs. The distance of the eastern site from the Wandi District Centre would ensure that freight transport movement into and out of a transport hub would not impede or conflict with private car movements entering and egressing from the Wandi District Centre.

This activity type together with the relocation of the district playing fields to Anketell Road provides a suitable buffer between planned residential uses and intensive and general rural land uses immediately to the east of the site. The size of the eastern site (1.5Ha) should be large enough to accommodate a combination of these activity types, without being large enough to create a facility too large for the intended purpose.

I would therefore consider exploring this activity type for the 1.5Ha eastern Service Commercial site. It should be noted that the opportunity for this activity type at this stage is predicated solely on the planned nature of Anketell Road as a freight route. Further market analysis would be required to determine whether such a transport hub would be feasible in this location.

I trust that these views assist you with your planning for the LSP amendment. I look forward to elaborating further should you wish to explore the suggested recommendations.

Regards

Greg Davis Director

E g.davis@taktics4.com.au

M +61 439 959 762





ANKETELL NORTH DEVELOPMENT

ACOUSTIC ASSESSMENT

FOR

ACUMEN PROPERTY SOLUTIONS

MAY 2019

OUR REFERENCE: 24306-3-19086



DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT ANKETELL NORTH DEVELOPMENT

Job No: 19086

Document Reference: 24306-3-19086

FOR

ACUMEN PROPERTY SOLUTIONS

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- B Noise Contour Plot
- C Monitoring Results

EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Acumen Property Solutions, to undertake an acoustical assessment of noise that would be received at the proposed commercial and residential development located at the Anketell North Development from road traffic noise associated with the future Anketell Road.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

 $L_{Aeq(Day)}$ of 60 dB(A); $L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

 $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Additional to the above, noise received at an outdoor area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

From information provided, we understand that Anketell Road may, in the future, undergo a re-alignment, which would affect noise levels onto the development. Therefore, this report considers noise level associated with the proposed future road alignment.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

For this proposal, a Dry recreation centre, playing fields and a commercial lot have been proposed for the lots bordering Anketell Road. Depending on the final development/layout for the area, some of the residential lots located to the south of these would require noise amelioration in the form of quiet house design and/or Notification on Titles. These requirements would need to be determined once the lot layouts have been finalised.

Finally, it is noted that with the orientation of the closest residential lots to Anketell Road being such that they would face Anketell Road, the residences themselves would act as a barrier to the back yards (and the other residence behind). Hence compliance with the external criteria, for at least one outdoor area to comply with the "Noise Target" would be achieved.

1

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Acumen Property Solutions, to undertake an acoustical assessment of noise that would be received at the proposed commercial and residential development located at the Anketell North Development from road traffic noise associated with the future Anketell Road.

This acoustic study has been undertaken to assess the commercial usage at the façade lots to Anketell Road, and if these areas contain any noise sensitive premises such as child care centres, then provide advice on the acoustic requirements.

As part of the study, the following was carried out:

- Determine by noise modelling the noise that would be received at proposed Lots within this stage of the LSP from vehicles travelling on the roadway (Anketell Road) for the future road alignment.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles.

For information, a site layout is attached as Figure A1 in Appendix A.

2. CRITERIA

The WAPC released on 22 September 2009 State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations In Land Use Planning". Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to—

- proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and
- proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations —

- for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and
- for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.

Further information is provided in the guidelines.

TABLE 1: OUTDOOR NOISE CRITERIA

Time of day	Noise Target	Noise Limit
Day (6 am–10 pm)	$L_{Aeq(Day)} = 55 \; dB(A)$	$L_{Aeq(Day)} = 60 \ dB(A)$
Night (10 pm–6 am)	$L_{Aeq(Night)} = 50 \ dB(A)$	$L_{Aeq(Night)} = 55 \ dB(A)$

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to the sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot¹.

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot¹. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance

¹ For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.

with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms². For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the quidelines."

The Policy, under Section 5.7, also provides the following information regarding "Notifications on Titles":

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- the potential for transport noise impacts; and
- the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the guidelines).

² For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the quidelines.

An example of a standard form of wording for notifications is presented in the quidelines."

3. NOISE MONITORING

Previously, noise monitoring was undertaken at the boundary of the proposed LSP between the 27th June and the 4th July 2016. From these measurements, the noise received at the development from vehicles travelling along Anketell Road was determined.

The results of the noise data logging are summarised in Table 3.1 with the graphical data contained in Appendix C.

TABLE 3.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Boundary of Development (7 metres from the road edge)	71.0	69.2	62.2

Based on the noise monitoring, the calculated difference between the $L_{A10,18hour}$ and $L_{Aeq,8hour}$, and the $L_{Aeq,16\,hr}$ is -8.8 and -1.8 dB respectively. Also, as the difference between day and night L_{Aeq} noise levels is greater than 5 dB(A) (i.e. 7 dB(A)), the day period is the critical period for compliance.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows 20 years in the future.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Current Anketell Road	Future Anketell Road
Traffic flows	7,226 vpd	20,000 vpd
Heavy Vehicles (%)	19.6%	19.6%
Speed Limit (km/hr)	80/110	80/110
Road Surface	Chip Seal	Chip Seal
Façade Correction	+2.5 dB(A)	+2.5 dB(A)

Noise modelling was carried out for noise received within the development for current traffic volumes and road alignment to calibrate the noise model.

Advice has been provided by WAPC, MRWA and City of Kwinana that there is to be a major upgrade of Anketell Road in the future. This upgrade will likely align the road closer to the development boundary. Advice was also sought on the projected future traffic volumes, with the values shown in Table 4.1 above.

Based on the above information the following scenarios have been considered:

Scenario 1 – Future road alignment with future traffic volumes, no noise control (Appendix B Figure B1).

Design on the future alignment was provided by MRWA, hence has been used for the above scenarios.

Note: The noise modelling has included the built form of the commercial building on the lot in the north west corner of the proposed development, however, as the location and design of the dry recreation centre has not been finalised, this building has not been included in the noise model.

5. TRAFFIC NOISE ASSESSMENT

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

Living and Work Areas $L_{Aeq(Day)}$ of 40 dB(A) Bedrooms $L_{Aeq(Night)}$ of 35 dB(A)

The results of the noise modelling are shown in Figure 1 as an overall noise contour plot.



FIGURE 1 – FUTURE NOISE CONTOUR PLOT

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

For reference, it is noted that noise received at some residential lots would exceed the "Noise Target". Hence, some lots would require noise amelioration in the form of "Quiet House" design and/or Notifications on Titles. These requirements would need to be determined once the Lot layout has been finalised.

Finally, it is noted that with the orientation of the closest residential lots to Anketell Road being such that they would face Anketell Road, the residences themselves would act as a barrier to the back yards (and the other residence behind). Hence compliance with the external criteria, for at least one outdoor area to comply with the "Noise Target" would be achieved.

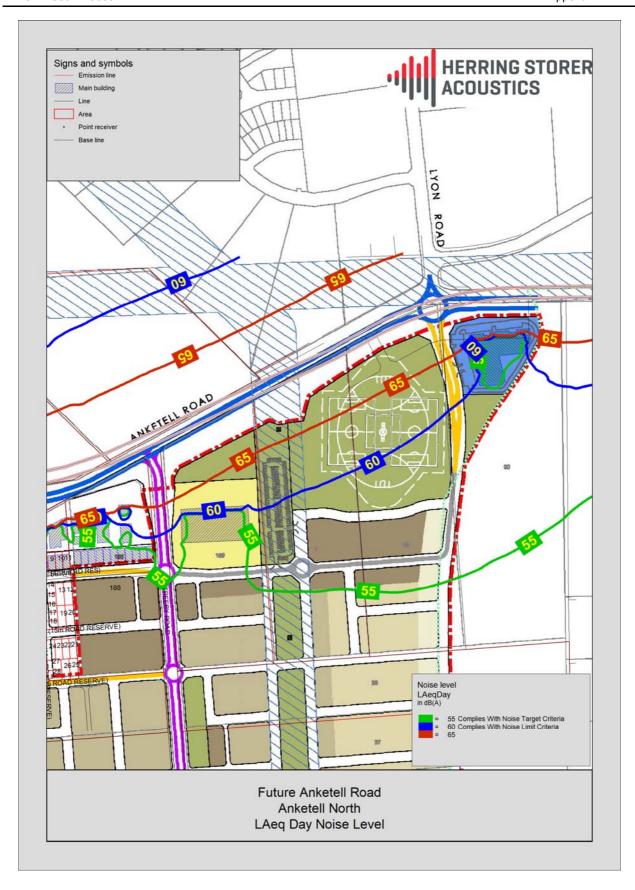
APPENDIX A

FIGURE A1 – SITE LAYOUT



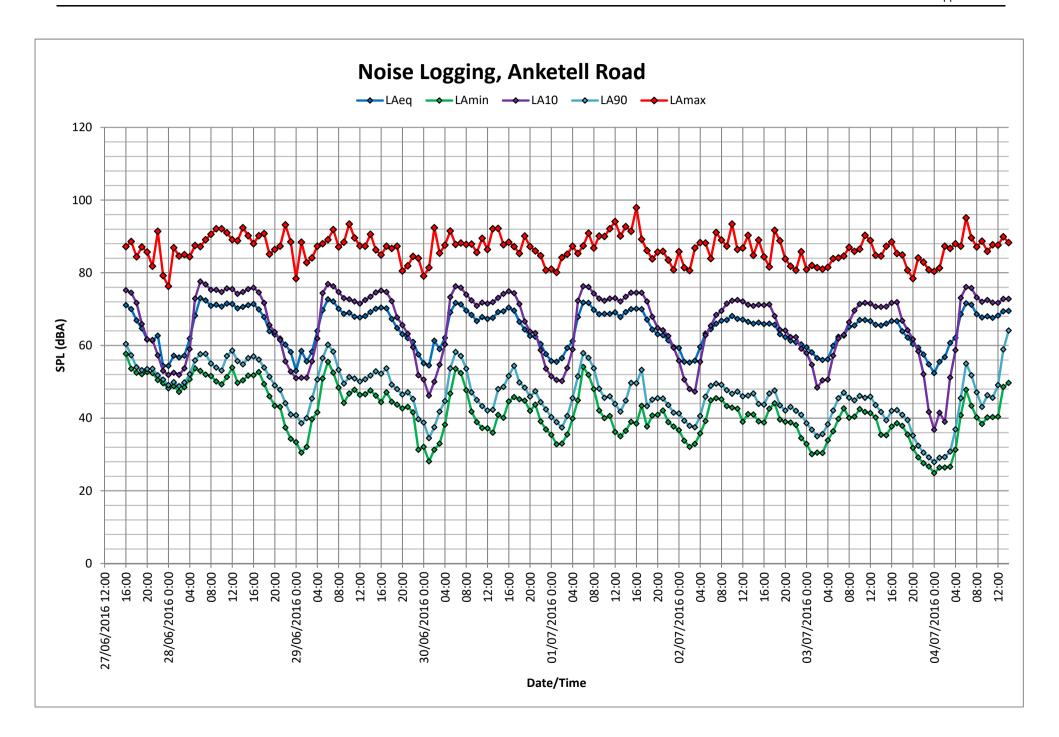
APPENDIX B

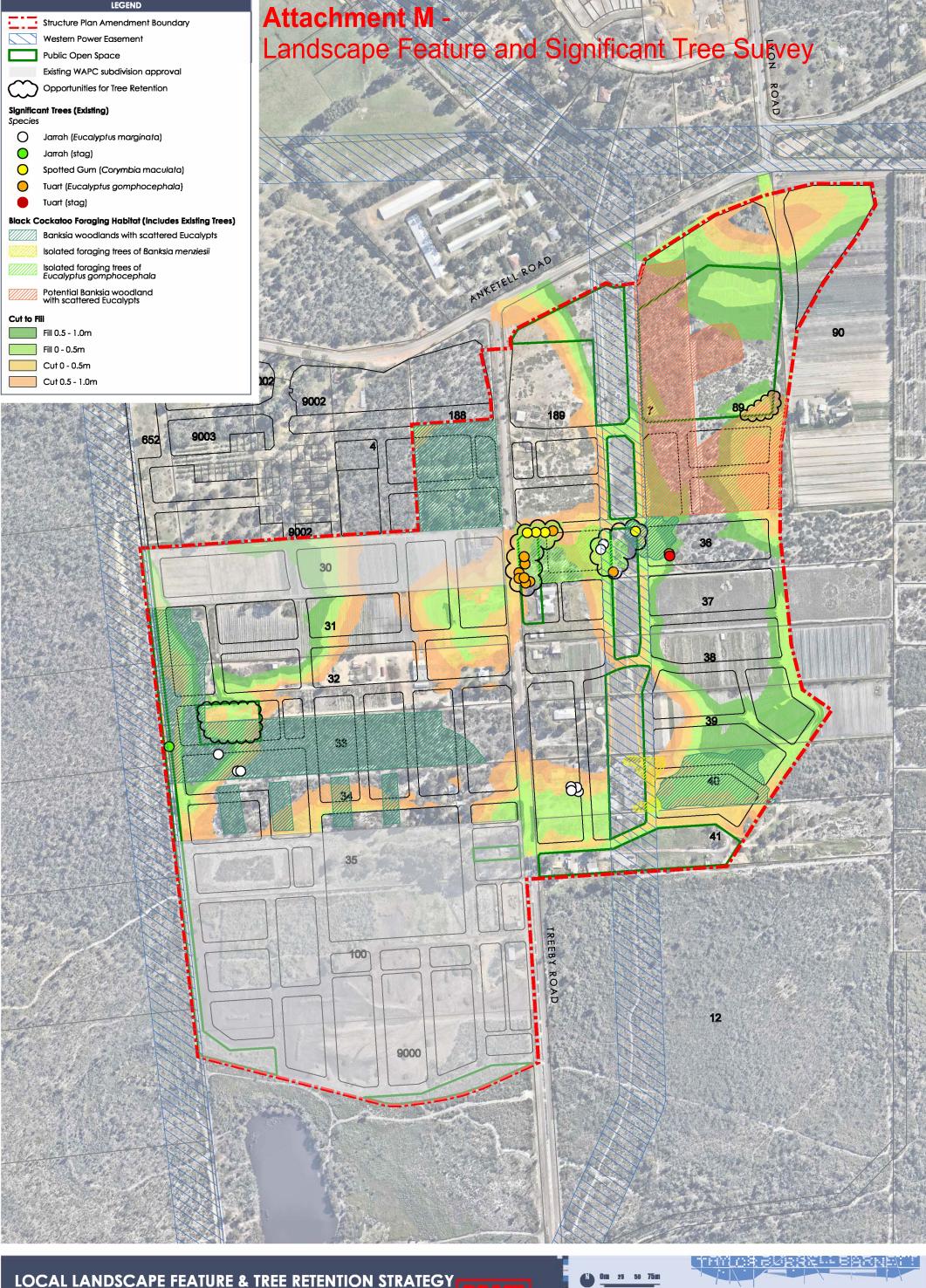
NOISE CONTOURS PLOT



APPENDIX C

NOISE MONITORING RESULTS







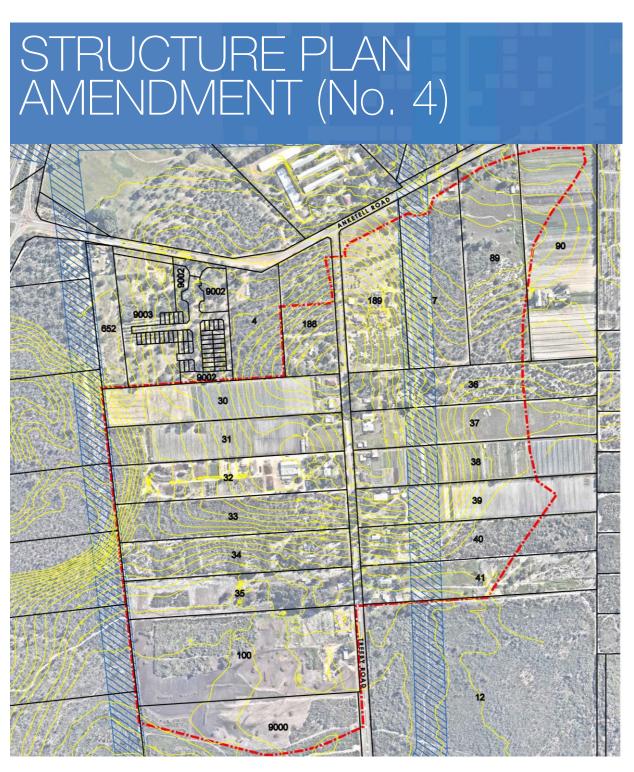


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Attachment N



Anketell North

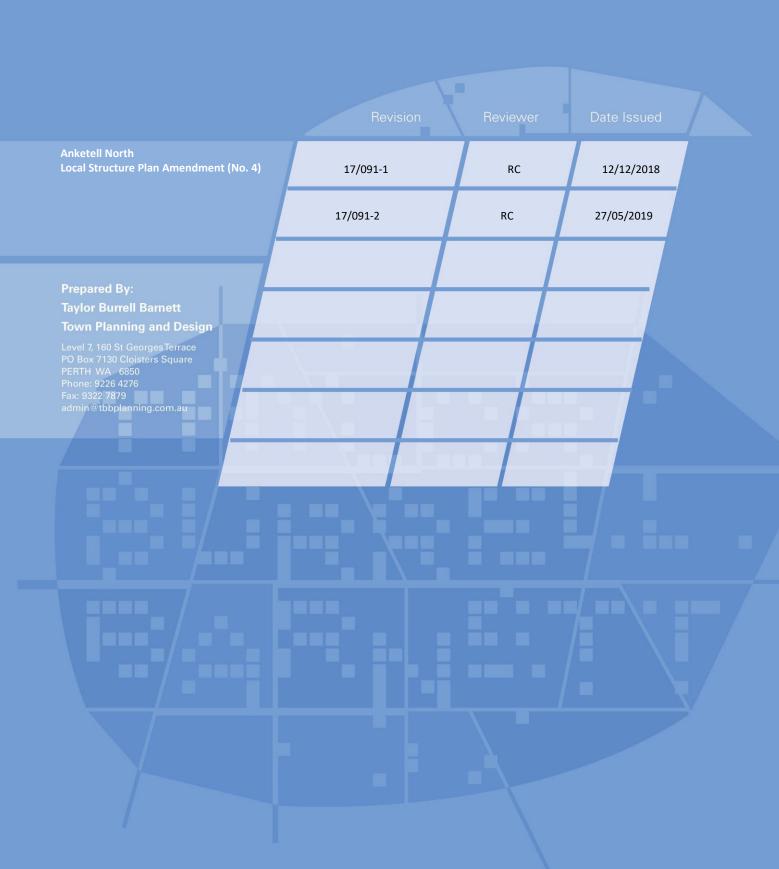


Prepared for Acumen Development Solutions on behalf of Sanpoint Pty Ltd and RPoint Land Pty Ltd

Prepared by Taylor Burrell Barnett

May 2019

DOCUMENT HISTORY AND STATUS



CERTIFICATION OF APPROVED STRUCTURE PLAN

This Structure Plan is prepared under the provisions of the **City of Kwinana Local Planning Scheme No. 2** and in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015.*

IT IS CERTIFIED THAT THIS STRUCTURE PLAN AMENDMENT (No.4) WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

Date
Signed for and on behalf of the Western Australian Planning Commission
An officer of the Commission duly authorised by the Commission pursuant to section 16 of the <i>Planning and Developmen</i>
Act 2005 for that purpose, in the presence of:
Witness
Date

17 December 2025 - Date of Expiry of this Structure Plan

Anketell North Local Structure Plan Amendment

TABLE OF AMENDMENTS

AMENDMENT NO.	SUMMARY OF AMENDMENT	AMENDMENT TYPE	DATE APPROVED BY WAPC
1	 Structure Plan modifications including: Lifting of the 'Investigation Area 1' boundary over Lots 2 & 3 Anketell Road to provide for residential and commercial land uses; and Minor modifications to residential density (R-Coding) and road layout within predominantly Lots 2 & 3 Anketell Road. 		
2	Structure Plan modifications including: Minor modifications to the road network and residential density (R-Coding) within Lot 652 Anketell Road and Lot 188 Treeby Road.		
3	 Structure Plan modifications including: Lifting of the 'Investigation Area 1' boundary over Lot 4 Anketell Road to provide for residential and commercial land uses; and Minor modifications to the road layout, residential density (R-Codes) and public open space. 		
4	 Structure Plan modifications including: Relocation of District Open Space; Introduction of land designated for Service Commercial; and Modifications to the road layout, residential density (R-Codes) and public open space. 		

TABLE OF DENSITY PLANS

Each time a density plan is approved, the plan is to be recorded in the table of density plans at the front of the Structure Plan.

DENSITY PLAN NO.	AREA OF DENSITY PLAN APPLICATION	DATE ENDORSED BY WAPC

EXECUTIVE SUMMARY

This Structure Plan has been prepared as an amendment to the Western Australian Commission (WAPC) endorsed Anketell North Local Structure Plan (ANLSP) approved on 18 December 2015 (approved Structure Plan). The ANLSP area is located south of Anketell Road, bordered by Bush Forever Site 270 to the west and south, and Jandakot Groundwater Mound to the east.

The ANLSP amendment (Amendment 4) was originally submitted to the City of Kwinana (City) in December 2018, and proposed the following modifications:

- 1. Adjusting the LSP boundary to include the additional area of land in the north-east corner, and exclude Lots 2 and 3 (now subdivided), 4, and 652 fronting Anketell Road which are subject to separate structure plan amendments. The northern portion of Lot 90 has been included to ensure the development of the future north-south road (Lyon Road extension) connecting to Anketell Road. The modified boundary decreases the overall ANLSP area from 98.4ha to 86.0ha.
- 2. Designating a 3.07ha portion of land along Anketell Road as Service Commercial.
- 3. Relocating the District Open Space (DOS) to the north eastern portion of the LSP area, south of the proposed Service Commercial area, and co-located with the proposed Community Purpose Site.
- 4. Retention of the existing Treeby Road reserve alignment, with the realignment no longer required due to the modified DOS location.
- 5. Minor changes to the residential density codes.

Amendment 4 was advertised by the City for public comment for a period of 21 days during February - March 2019. Through the City's assessment of Amendment 4 and comments provided during the public advertising process, concerns were raised in relation to the extent of Service Commercial land and potential noise impacts on future residential lots in close proximity to Anketell Road.

Based on this feedback, Amendment 4 has been modified to address these concerns, as follows:

- 1. LSP map updated to reduce the extent of Service Commercial land to a single 1.21ha site within the north-east corner of the ANLSP area, moving the DOS north towards Anketell Road, and allocating the remaining land south of the DOS for residential purposes. These minor modifications affect Lots 7 and 89 only. No other modifications to the originally submitted (and advertised) Amendment 4 proposal are proposed.
- 2. Provision of an acoustic assessment to determine the potential impacts of noise from the Anketell Road future freight route on residential properties within the ANLSP area.
- 3. Provision of market advice to confirm the extent and location of Service Commercial zoned land is viable and will not prejudice the future development of the nearby Wandi District Centre.

The updated LSP map and additional reporting is included as part of this updated Amendment 4 report. Part One – Implementation has been prepared to replace the entire Part One in the approved ANLSP, while Part Two – Explanatory Information has been prepared to explain this Amendment, highlighting changes to the approved ANLSP, but does not replace Part Two in the approved ANLSP.

The following is a summary of the key statistics of the ANLSP, as modified by this Amendment.

STRUCTURE PLAN SUMMARY

ITEM	DATE	STRUCTURE PLAN REF. (SECTION NO.)
Total area covered by the Structure Plan	87.17 ha	1.2.2
Area of each land use proposed: Residential Service Commercial Community Facility Educational/Institutional	42.37 ha 1.21 ha 1.65 ha 4.00 ha	3.3
Total Estimated Lot Yield	1,397 residential lots 1 service commercial lots	3.3
Estimated No. of Dwellings	1,397 dwellings	3.3
 Urban Site Density (dwellings per gross hectare of urban zoned land) Residential Site Density (dwellings per resdiential site hectare – excludes non residential uses and roads) 	16 Dwellings per ha 32 Dwellings per ha	3.3
Estimated Population	3,912 people @ 2.8 persons per dwelling (single residential)	3.3
No. of Primary Schools	1	3.1.0
Estimated Commercial Floor Space	6,072m² nett lettable area (based on approximately 50% of site designated Service Commercial)	3.3.2
Estimated area and percentage of Public Open Space given over to: District Open Space Neighbourhood Parks Local Parks Linear Park	10.0689ha Creditable (13.47%) 4.9 ha 4.0 ha 0.14 ha 4.01 ha *Includes drainage & POS within easement	3.4

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PART ONE IMPLEMENTATION

1 STRUCTURE PLAN AREA

This Structure Plan shall apply to the land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan Map.

2 OPERATION

This Structure Plan comes into effect on the day it is approved by the Western Australian Planning Commission (WAPC).

3 STAGING

Initial development is likely to be within the northern portion of the structure plan area due to the availability of sewer connections in Anketell Road. Staging of development for the remaining land will be dictated by the proposed pumping station and outfall of sewer being built within the Structure Plan area.

4 SUBDIVISION AND DEVELOPMENT REQUIREMENTS

- a) The Structure Plan Map defines the broad residential density ranges that apply to different areas within the Structure Plan. Lot specific residential densities, generally in accordance with the defined residential density ranges, are to be assigned in accordance with a Residential Density Code Plan determined by the WAPC.
- b) A Residential Density Code Plan is to be submitted at the time of application for subdivision approval to the WAPC and shall indicate the residential density code to each lot within the proposed subdivision. The Residential Density Code Plan shall be generally consistent within the residential density ranges identified in the Structure Plan.
- c) The Residential Density Code is to include a summary of the dwelling yield of the proposed subdivision.
- d) Determination of the Residential Density Code Plan shall be undertaken at the time of determination of a subdivision application by the WAPC. An approved Residential Density Code Plan shall then form part of the Structure Plan and be used for the determination of future development applications and building permit applications.
- e) Variations to the Residential Density Code Plan will require the approval of the WAPC. A revised Residential Density Code shall generally be consistent with the approved plan of subdivision issued by the WAPC. The revised Residential Density Code Plan shall be consistent with residential density ranges identified on the Structure Plan Map.
- f) A revised Residential Density Code Plan, consistent with clause (e) above will replace, wholly or partially, the previously approved Residential Density Code Plan, and shall form part of the Structure Plan as outlined in clause (d) above.
- g) A Residential Density Code Plan is not required if the WAPC considers that subdivision is for one or more of the following:
 - i. amalgamation of lots;
 - ii. consideration of land for 'super lot 'purposes to facilitate land assembly for future development;
 - iii. the purposes of facilitating the provision of access, services or infrastructure; or
 - iv. land which by virtue of its zoning or reservation under the Structure Plan cannot be developed for residential purposes.

- h) The residential density ranges are:
 - i. R10-R20
 - ii. R25-R40
 - iii. R40-R60
- i) Where density code ranges are depicted on the Structure Plan, the designation of R-Codes shall be in accordance with the criteria outlined below:
 - i. R10-R20 provides for larger lot types along the eastern edge of the Structure Plan as an appropriate interface with adjacent Rural-Water Protection zone and a transition from residential to rural residential land uses. Single detached housing with front access are to be provided within this density code range.
 - ii. R25-R40 is the main density code range to accommodate a variety of traditional and smaller sized lots with front access. It will provide for a range of opportunities for future housing by incorporating residential densities which offer flexibility for traditional homes which are likely to be built by project home builders.
 - iii. R40-R60 provides for a variety of lot types to achieve single, grouped and multiple dwellings with front or rear access adjacent areas of amenity including POS and the Primary School. Detached, semi-detached and attached housing (terrace) can be provided for within this density code range.
- j) Land use permissibility within the Structure Plan area shall accord with the corresponding land use classification in the City of Kwinana Local Planning Scheme No. 2 (LPS 2).
- k) Public Open Space is to be provided in accordance with the Structure Plan Map.
- I) This Structure Plan is supported by a Bushfire Management Plan (BMP), Bushfire Management Plan Anketell North (May 2019) prepared by Strategen. Any land falling within 100 metres of a bushfire hazard identified in the BMP is designated as a Bushfire Prone Area for the purpose of the Building Code of Australia.
- m) Notification on Title

The Council shall recommend to the WAPC that a condition be imposed on the grant of subdivision approval; for a notification to be placed on the Certificate of Title to suitably respond to the following:

- i. The Bushfire Management Plan for lots with a bushfire attack level (BAL) rating of 12.5 or higher; and
- ii. Existence of transport noise where noise levels exceed the outdoor noise criteria as per the State Planning Policy 5.4 Road and Rail (draft).
- n) Management Plans

The Council shall recommend to the WAPC that a condition be imposed on the grant of subdivision approval to respond to the following as identified by the Structure Plan:

- i. The preparation, approval and implementation of a wetland interface management plan providing for the protection of the adjoining wetland located in Bush Forever Site 270;
- ii. A mosquito and midge management plan;
- iii. A Fauna Management Plan.

6 LOCAL DEVELOPMENT PLANS

Local Development Plan(s) are to be prepared for lots with one or more of the following attributes:

- a) smaller than 260m²;
- b) rear vehicle access;
- c) with frontages less than 10.5 metres; and
- d) abutting POS.

7 OTHER REQUIREMENTS

7.1 DEVELOPMENT CONTRIBUTION ARRANGEMENTS

Under the City of Kwinana Town Planning Scheme No. 2, the following development contribution arrangements apply:

- a) Development Contribution Area 9 for the funding of community infrastructure; and
- b) Development Contribution Area 4 for the funding of standard / hard infrastructure.

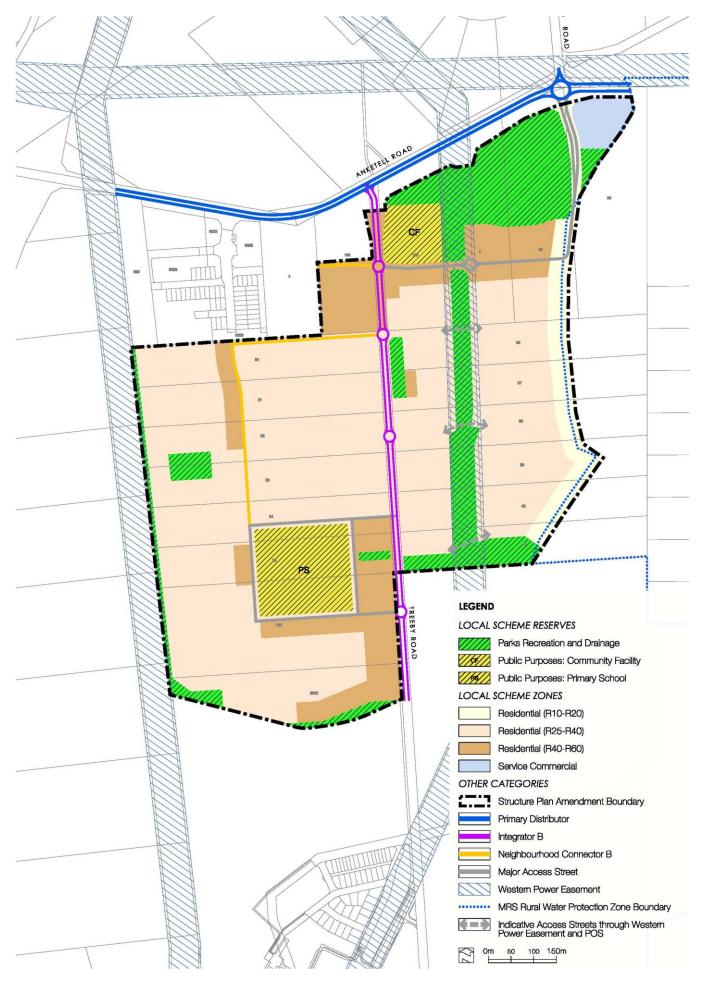


Figure 1 Anketell North Local Structure Plan

PART TWO EXPLANATORY INFORMATION

1 PLANNING BACKGROUND

1.1 INTRODUCTION AND PURPOSE

The Anketell North Local Structure Plan (ANLSP) was endorsed by the Western Australian Planning Commission (WAPC) on 18 December 2015 (approved Structure Plan). Since the endorsement of the ANLSP, there have been minor amendments to the LSP, as well as several subdivision approvals:

- Modifications to the ANLSP for Lots 2 (west of Lot 652) and 3 Anketell Road (east of Lot 4) (Lots 2 and 3 have now been subdivided), Lot 4 Anketell Road and Lots 188 and 652 Anketell Road.
- Subdivision of Lots 35, 100 and part of Lot 9000 (subdivision and works have commenced).
- Subdivision approval over Lot 30 Treeby Road.

The proposed modifications to the approved Structure Plan which form part of this Amendment are summarised below:

- Relocate the District Open Space (DOS) to the north eastern corner, adjacent the Lyon / Anketell Road intersection, co-located with the proposed Community Purpose Site;
- Retention of the existing Treeby Road reserve alignment, with the realignment no longer required due to the modified DOS location;
- Extension of the LSP boundary to include land in the north east corner and designate this land as Service Commercial and a minor extension of land eastward to ensure the development of the future road along the western boundary;
- Minor changes to the residential density codes.

This report provides the planning framework and rationale to support the Structure Plan amendment.

Following approval of this Amendment, it is proposed to consolidate all of the approved Amendments into one comprehensive ANLSP.

The proposed amendment is the outcome of several pre-lodgement discussions with the City of Kwinana (City) and Department of Planning, Lands and Heritage (DPLH) to ensure that fundamental concerns were addressed prior to lodgement and the concept plan received preliminary support.

The proposed amendment will provide for a more efficient use of land within the structure plan area, providing for a range in housing densities, contributing to the City's infill target in accordance with Perth and Peel @ 3.5 million. The structure plan amendment will not have an adverse impact on the surrounding land uses, and is consistent with proper and orderly planning.

1.2 LAND DESCRIPTION

1.2.1 LOCATION

The LSP area is located within the metropolitan south west corridor, in the City of Kwinana local government area. The LSP area is approximately 31 kilometres south of Perth CBD, approximately 200 metres east of the Kwinana Freeway and approximately 11 kilometres north east of the Kwinana Town Centre.

The ANLSP Amendment area is located south of Anketell Road, bordered by Bush Forever Site 270 to the west and south, and Jandakot Groundwater Mound to the east.

Figure 2 outlines the subject land.

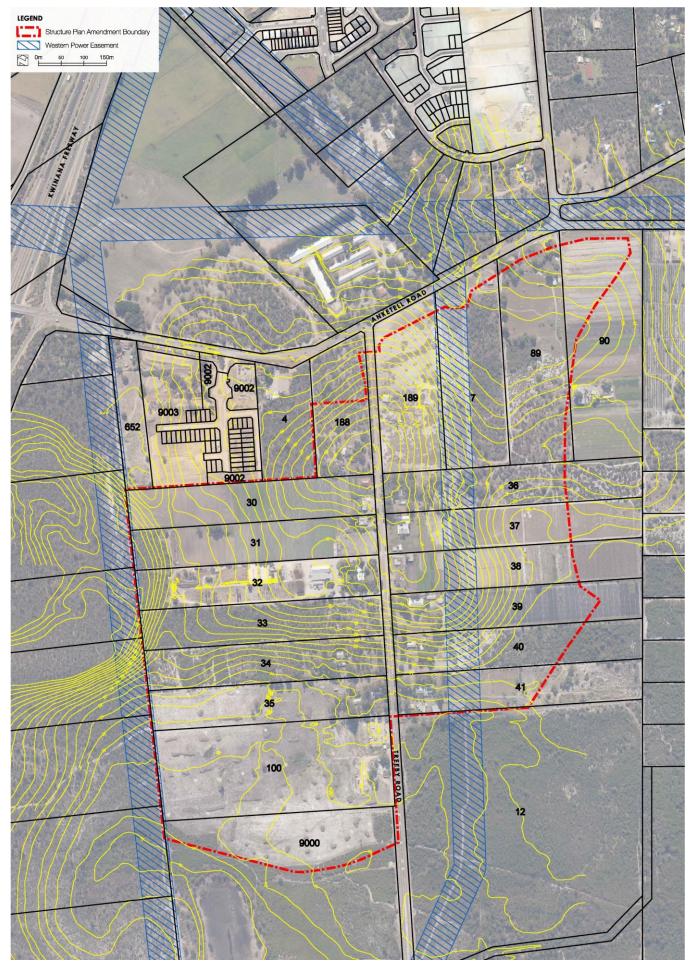


Figure 2 Location Plan

1.2.2 AREA AND LAND USE

The approved ANLSP comprises 98.4 hectares and is currently being utilised for agricultural purposes such as grazing, market gardening and horse agistment.

The revised ANLSP boundary comprises 86.0 hectares. The modified boundary excludes lots fronting Anketell Road being Lots 2 and 3 (now subdivided), 4, and 652, which are subject to separate structure plan amendments. The proposed LSP boundary now includes a portion of Lot 90 Anketell Road and a greater portion of Lot 89 Anketell Road. **Figure 3** outlines the existing LSP boundary and the proposed LSP boundary.

There are existing dwellings located within the LSP area, with associated outbuildings, fences and other structures. The majority of existing improvements are intended to be demolished and removed for future development, with the exception of an existing residential dwelling on Lot 30 Treeby Road. It is understood that there is a legal agreement to retain this development on Lot 30.

Surrounding land uses are also predominately rural properties. Western Power easements run along the eastern portion of the structure plan area and externally along the western boundary.



Figure 3 Existing and Proposed Anketell North Local Structure Plan Boundary

1.2.3 LEGAL DESCRIPTION AND OWNERSHIP

The proposed Structure Plan comprises of nineteen (19) allotments outlined in the ${f Table\ 1}$ below.

Table 1 Legal Description and Ownership

LOT NUMBER	STREET ADDRESS	PLAN/DIAGRAM NO.	LAND OWNERSHIP
7	734 Anketell Road, Anketell	P004746	ANKETELL PROPERTY INVESTMENTS WA PTY LTD
30	36 Treeby Road, Anketell	D032446	GUCCE HOLDINGS PTY LTD
31	48 Treeby Road, Anketell	D032446	RPOINT LAND PTY LTD
32	56 Treeby Road, Anketell	D032446	SANPOINT PTY LTD
33	N/A	D032446	NAARAH PTY LTD VACATION INVESTMENTS PTY LTD
34	74 Treeby Road, Anketell	D032446	GLENBROOK CIVIL ENGINEERING CONTRACTORS PTY LTD
35	82 Treeby Road, Anketell	D032446	BAZZO, TINA MICHELLE
36	35 Treeby Road, Anketell	D032446	TELFER, KENNETH BRUCE
37	49 Treeby Road, Anketell	D032446	WHITE, PETER WAYNE
38	55 Treeby Road, Anketell	D032446	SU, KUOHOA SU, FAN JYH SU, CHIOU YUEH LIN
39	63 Treeby Road, Anketell	D032446	SPRING PARK PTY LTD
40	73 Treeby Road, Anketell	D032446	DORN, KEVIN WILLIAM
41	83 Treeby Road, Anketell	D032446	COMLEY, KENNETH JOHN
89	748 Anketell Road, Anketell	D092985	TING, CHEN CHEE AEK YEN ASHLEE TERRA AEK-LING
90	758 Anketell Road, Anketell	D092984	MINCHA PTY LTD
100	96 Treeby Road, Anketell	D089861	WELL HOLDINGS PTY LTD TREVALLY INVESTMENTS PTY LTD
188	28 Treeby Road, Anketell	P025096	CHAI, SHUEN SHIUNG MESHGIN, QUMARS HOA ,THUY TIEN
189	19 Treeby Road, Anketell	P025097	GRILLO, ANTONIO
9000	N/A	P408966	WELL HOLDINGS PTY LTD

This Amendment has been prepared for Acumen Development Solutions on behalf of the owners of Lots 31 and 32 Treeby Road and Lots 36-38 Treeby Rd. The owners of Lots 33 & 34 have also participated in this Structure Plan Amendment process.

1.3 PLANNING FRAMEWORK

1.3.1 ZONING AND RESERVATIONS

The majority of the land within the LSP area is zoned Urban under the Metropolitan Region Scheme (MRS), and Development under the City of Kwinana Local Planning Scheme No. 2 (LPS 2). Anketell Road, to the north of the LSP area is identified as Other Regional Road under the MRS. The amended LSP boundary includes a minor portion of land zoned Rural — Water Protection under the MRS and Rural Water Resource under the City's LPS 2, only for the purpose of providing a road interface (no urban development).

Land to the north of the Structure Plan is zoned Urban under the MRS and Development under the City's LPS 2. Surrounding land is zoned Parks and Recreation under the City's LPS 2, Rural and Rural-Water Protection under the MRS. Land to the south of the Structure Plan is zoned Rural A under the City's TPS 2 and Rural Water Resource to the east of the LSP area. A Water Catchment area lies south east of the structure plan area under the City's TPS 2.

Refer **Figure 4** for an extract of the Metropolitan Region Scheme map and **Figure 5** for an extract City of Kwinana Local Planning Scheme 2 map.

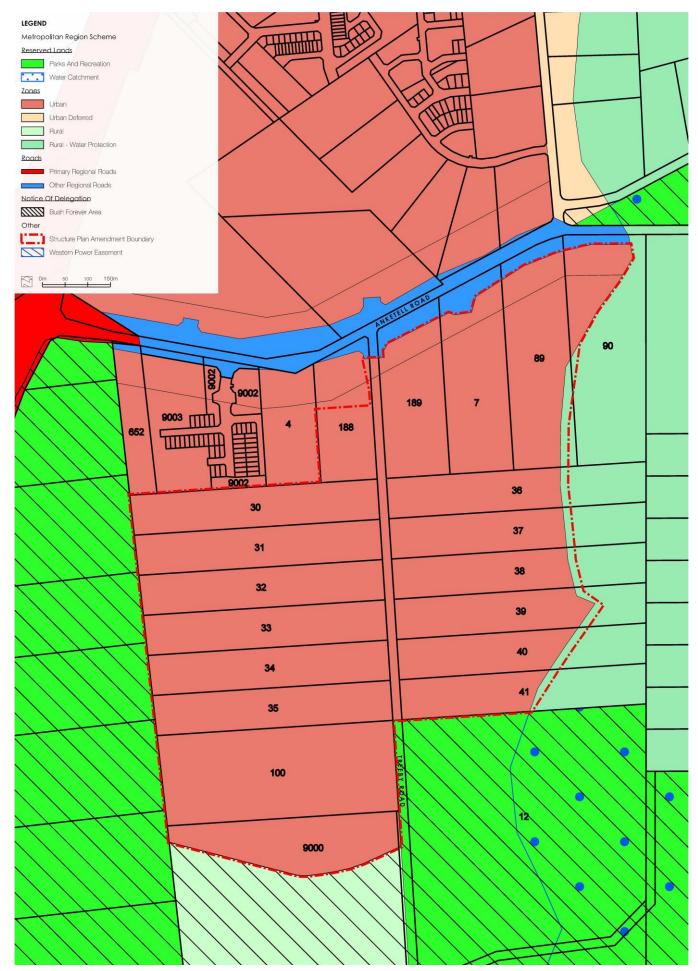


Figure 4 Metropolitan Region Scheme (extract)

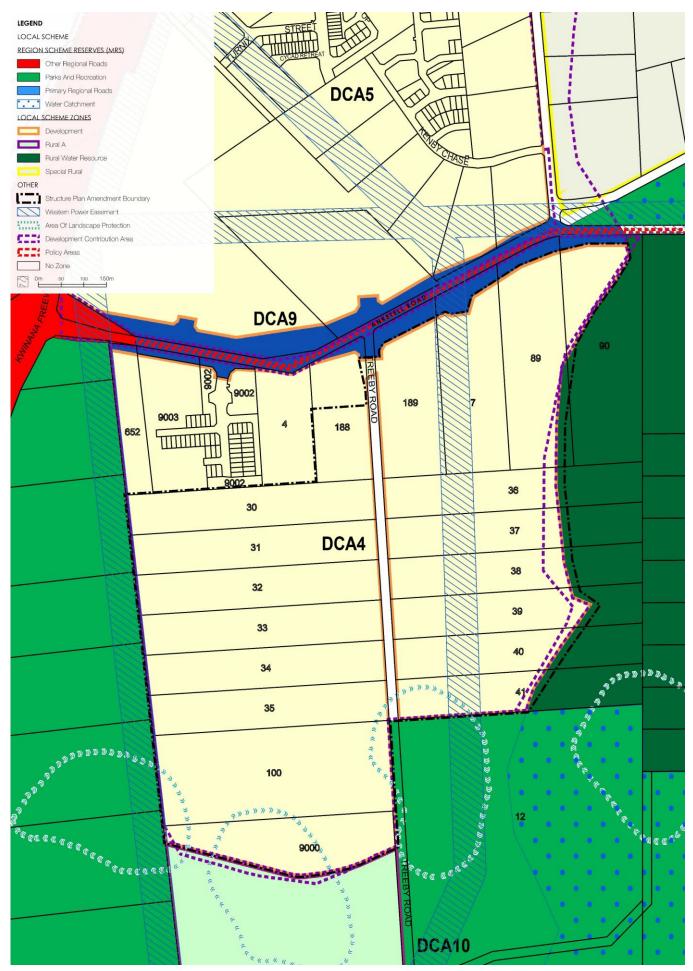


Figure 5 City of Kwinana Town Planning Scheme No. 2 (extract)

1.3.1.1 BUSH FOREVER

No Bush Forever sites are located within the LSP area. Bush Forever Site 269 abuts the structure plan area to the east and Bush Forever Site 270 is located south of the structure plan area (refer **Figure 4**).

1.3.2 REGIONAL AND SUB-REGIONAL STRUCTURE PLAN

1.3.2.1 PERTH AND PEEL @ 3.5 MILLION & SUB-REGIONAL PLANNING FRAMEWORK

The South Metropolitan Peel Sub-Regional Planning Framework was released by the Western Australian Planning Commission in March 2018 and forms part of the suite of documents supporting the Perth and Peel @ 3.5million land use planning and infrastructure frameworks. The South Metropolitan Peel Sub-Regional Planning Framework aims to establish a long-term, integrated planning framework for land use and infrastructure to guide future growth across the sub-region.

In accordance with the South Metropolitan Peel Sub-Regional Planning Framework the City of Kwinana has a target to plan for the provision of 1,370 additional dwellings by 2050 to support a total Perth metropolitan population of 3.5 million. The ANLSP supports this infill target and assists in providing housing diversity in a highly accessible location due to its proximity to the Kwinana freeway and areas of employment in Kwinana.

The Kwinana Freeway and Anketell Road are identified as Primary Freight Roads within the South Metropolitan Peel Sub-Regional Planning Framework. The Framework outlines that the freight network corridors are to be protected from encroachment of sensitive and incompatible land uses. The amended Structure Plan proposes land zoned for Service Commercial directly abutting Anketell Road, with residential development proposed well setback from Kwinana Freeway and Anketell Road.

1.3.2.2 EASTERN RESIDENTIAL INTENSIFICATION CONCEPT (ERIC)

The draft District Structure Plan, Eastern Residential Intensification Concept (ERIC) was prepared by the City of Kwinana in 2005 to provide strategic direction for future urban areas identified under the Jandakot Structure Plan. Whilst ERIC has not been adopted by Council, it provides a framework to the preparation of structure plans within the urban corridor.

ERIC identifies the following land uses within the ANLSP area:

- Residential (R20);
- Residential (R25 and higher);
- Local Open Space;
- Primary School; and
- Special Residential associated with the Western Power easement.

It is noted that state strategic planning principles and objectives have been updated since the preparation of ERIC in 2005, however the proposed amendment has been prepared with due regard to the land use recommendations of ERIC, where appropriate.

1.3.3 PLANNING POLICIES

1.3.3.1 STATE PLANNING POLICIES

State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7)

The intent of SPP 3.7 is to implement effective, risk-based land use planning and development to preserve life and reduce impact of bushfire on property and infrastructure. The accompanying Guidelines for Planning in Bushfire Prone Areas provide advice on how bushfire risk is to be addressed when planning, designing or assessing a planning proposal within a designated bushfire prone area. As discussed further in **section 2.5** (and included as **Appendix B**), a Bushfire Management Plan has been prepared by Strategen to inform this structure plan amendment and future subdivision in accordance with SPP 3.7.

Draft State Planning Policy 5.4 Road and Rail (SPP 5.4)

The key objective of draft SPP 5.4 is to minimise the impact of road and rail noise on noise-sensitive land uses; and protect the State's key transport corridors. In accordance with SPP 5.4, future residential development and educational establishments are considered noise-sensitive land uses. Accordingly, consideration needs to be given to the proximity of these uses to Anketell Road and the Kwinana Freeway, being Primary Regional and Other Regional Roads, and any mitigation measures required. In accordance with Table 1 of SPP 4.2, the trigger distance for consideration of potential road noise from Anketell Road, being an 'Other Regional Road' (under the MRS) is currently 200m.

An Acoustic Assessment has been undertaken by Herring Storer Acoustics (refer **Appendix C**) to determine the level of noise received within the ANLSP Amendment area. The assessment is based on the future alignment of Anketell Road, with future traffic volumes, and assuming no noise control along the road reserve, but including the built form of development within the Service Commercial zone, which provides a barrier to the residential lots behind. The results of the noise modelling indicates that the 'Noise Limit' (as stipulated under SPP 5.4) is met for all residential lots within the ANLSP Amendment area. Some residential lots within the northern portion of the area closest to Anketell Road may exceed the 'Noise Target', thus requiring noise amelioration in the form of quiet house design and/or Notifications on Titles. The extent of any noise control requirements would need to be determined once the lot layout has been finalised (i.e. at subdivision stage). Any noise sensitive land uses proposed within the Service Commercial zone would need to demonstrate that suitable noise levels are able to be achieved through appropriate design techniques at development application stage.

Land closest to the north-west of the ANLSP Amendment area was excluded from the approved Structure Plan as a result of noise impacts associated with Anketell Road. These lots abutting Anketell Road are currently subject to an amendment to the ANLSP (refer Section 1.3.5). It is understood that Acoustic Reports have been prepared to support these LSP amendments (Amendment 1-3).

State Planning Policy Activity Centres for Perth and Peel (SPP 4.2)

Under SPP 4.2, the Wandi District Centre has been identified as a key centre serving this Urban Corridor. The Wandi District Centre is proposed to be located to the north of Anketell Road.

This LSP Amendment (along with other recent Amendments) proposes Service Commercial development on the south side of Anketell Road and is considered to provide complementary land uses to support the Wandi District Centre. The extent of Service Commercial zoned land has been informed by market advice provided by Taktics4 (refer **Appendix D**), which concludes that an area of approximately 1.5ha of Service Commercial land is capable of accommodating a freight transport related commercial activity hub. This potential activity type would benefit from significant exposure to freight transport by virtue of its location on the future Anketell Road freight route, without creating any direct competition with the broader Wandi District Centre.

1.3.3.2 LOCAL PLANNING POLICIES

Local Planning Policy No.1 Landscape Feature and Tree Retention

LPP 1 seeks to ensure an appropriate level of information concerning significant trees and landscape features is provided at each stage of the planning framework and retention of significant trees and landscape features are optimised through the strategic and statutory planning framework to retain the character of an area.

LPP 1 states that "this policy is not intended to be applied retrospectively in areas where local structure plans and subdivisions have been approved prior to the adoption of the policy." Regard has been given to LPP 1 in the preparation of this Amendment, in the context of mapping of significant trees and vegetation, with opportunities for tree retention within POS identified (refer to **section 2.1**). This Amendment does not increase the extent to which significant trees and landscape features are retained within the ANLSP. Furthermore, it is noted that the policy has limited relevance by virtue of the existence of the approved ANLSP.

Local Planning Policy No. 2 Streetscapes (LPP 2)

LPP 2 aims to enhance the character of local streets through the delivery of an urban street tree canopy and to encourage attractive streetscapes and enhance neighbourhood amenity. The policy sets out minimum requirements relating to street trees, landscaping, footpaths, visitor parking for laneway lots / embayment parking, fencing and built form.

In accordance with LPP 2, a Landscape Masterplan (LMP) has been prepared by LD Total to support the LSP amendment (refer to section 3.5 where further information is provided on the landscape strategy for the structure plan area).

Local Planning Policy Planning for Bushfire Protection Guidelines

The Planning for Bushfire Guidelines Policy aims to provide an appropriate level of protection to life and property from bush fires and avoid inappropriately located or designed land uses, subdivision and development on land where bush fire risk is identified. LPP 2 adopts the current Planning for Bush Fire Protection Guidelines (edition 2) as prepared by the WAPC.

The WAPC SPP 3.7 has been discussed in Section 1.3.4.1 and addressed in the Bushfire Management Plan in Appendix B.

Local Planning Policy Public Open Space

The Public Open Space policy requires structure plans to identify areas of regional, district and neighbourhood open space in accordance with the City's Community Infrastructure Plan and to include notional locations of local open space areas in addition to other land use elements usually contained in structure planning documents. This Amendment proposed minimal changes to the areas and location of local parks and depicts the location of district open space in the north eastern portion of the structure plan. A minimum of 10% public open space is provided within the amended structure plan, consistent with the approved structure plan. The location and distribution of POS is discussed in Section 3.3.4.

The City's Public Open Space policy outlines that the preferred location of district open spaces (DOS) is to abut distributor roads and be no further than 1 kilometre from a residential area. The proposed relocation of the DOS abuts Anketell Road, a Primary Distributor road and directly abuts residential land, consistent with the policy requirements.

Local Planning Policy No. Designing Out Crime (LLP 8)

LPP 8 sets out design guidelines to reduce the likelihood of crime and anti-social behaviour within the City. The objectives of LPP 8 are to encourage urban development within the City to incorporate 'designing out crime principles'; provide guidance in relation to built form outcomes that support the reduction in actual and perceived crime and anti-social behaviour; and guidance on design and assessment of planning proposals.

Regard has been given to the five principles outlined within the LPP in the preparation of this structure plan Amendment, particularly in relation to the allocation of land uses, roads and the location of POS to maximise opportunities for surveillance. The preparation of Local Development Plans (LDPs) at the subdivision stage will enable such matters as building orientation and fencing to be addressed to further maximise opportunities for surveillance of street and open space.

Local Planning Policy No. 7 Uniform Fencing (LPP 7)

LPP 7 states Council's position regarding the provision of uniform fencing in new residential estates and developments within the City and sets out the Council's minimum requirements for uniform fencing.

The policy requirements and criteria can be addressed as a condition of subdivision / development requiring the construction of uniform fencing in key areas.

1.3.4 OTHER APPROVALS AND DECISIONS

This proposed amendment is one of four amendments to the ANLSP. It is understood that the three Structure Plan Amendments are with the DPLH awaiting a final determination by WAPC. The other three amendments relate to the following lots:

- Lots 2 and 3 Anketell Road (now subdivided);
- Lot 4 Anketell Road (to the west of Lot 188 Anketell Road); and
- Lot 188 (to the east of Lot 4) and 652 Anketell Road (to the west of Lot 2 Anketell Road).

These three proposed amendments are located north of our proposed ANLSP Amendment area, abutting Anketell Road. Other than a portion of Lot 188, the lots subject to the abovementioned amendments have been excluded from our proposed LSP Amendment boundary due to the isolated nature of the amendments and stage in which they have reached in the approval process. It is anticipated that a determination by the WAPC on the abovementioned Amendments will be made sometime during the progress of this amendment. This proposed structure plan Amendment can be updated to reflect the outcome of the three amendments to ensure a consolidated plan is available for the Anketell North precinct.

It is understood that subdivision approval has been granted over Lots 35, 100 and part of Lot 9000 (subdivision and works have commenced) and over Lot 30 Treeby Road. Accordingly, this Structure Plan Amendment does not propose any changes to the designated land uses, density and road network for these lots.

1.3.4.1 SURROUNDING STRUCTURE PLANNING

As shown in Error! Reference source not found. the subject land and surrounding land has been recognised for urban development a nd has been subject to a significant amount of structure planning.

Located directly north of the ANLSP area, Wandi South Structure Plan (SP) was approved in 2012 and has been subject to two minor amendments. The Wandi South SP area proposes only residential development with densities ranging from R20 to R60.

The Anketell South Local Structure Plan (ASLSP) (2014) lies directly south of the ANLSP designates land predominately for residential (densities ranging between R20 to R60) Commercial and Service Commercial uses, with a community facility site fronting Thomas Road. The northern portion of ASLSP, known as Treeby Park, has been the subject of subdivision and an LDP prepared over the site.

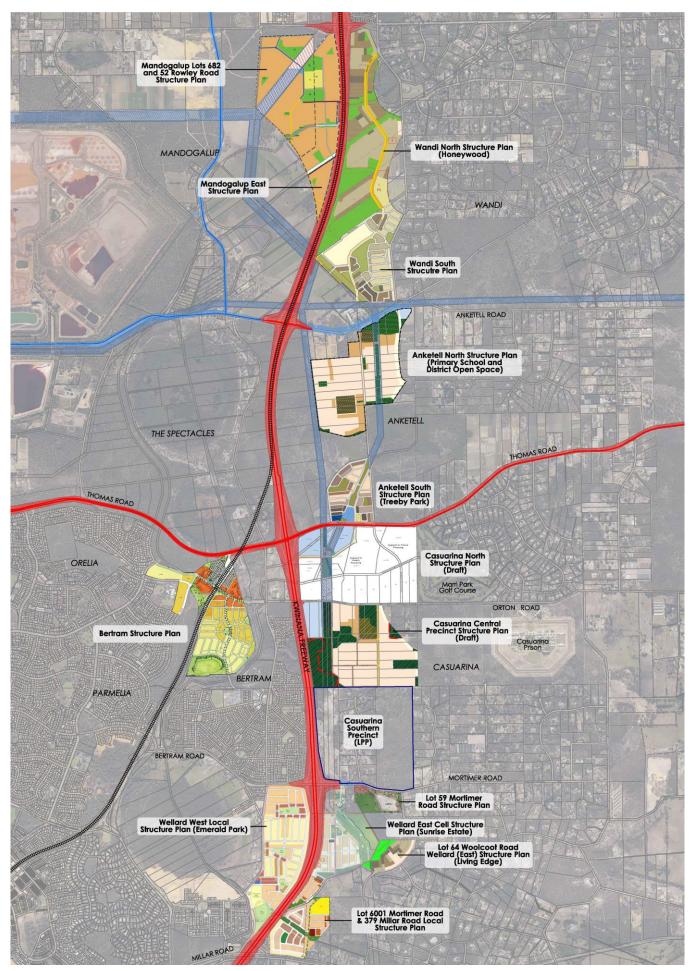


Figure 6 Regional Context - Structure Planning surrounding Anketell North Local Structure Plan Area

1.4 PRE-LODGEMENT CONSULTATION

Table 2 summarises the outcomes of pre-lodgement consultation with the City of Kwinana and Department of Planning, Lands and Heritage during the preparation of the Structure Plan Amendment.

Table 2 Pre-lodgement Consultation

AGENCY	DATE OF CONSULTATION	CONSULTATION METHOD	SUMMARY OF OUTCOMES
City of Kwinana	31 July 2018 1 - 23 August 2018	Meeting Attendees: Rachel Chapman (TBB) Jarrod Rendell (Acumen - LSP proponent) Gary Williams (CoK) Brenton Scambler Nino Scidone (CoK) Phone and email conversations: Rachel Chapman (TBB) Gary Williams (CoK)	 Preliminary meeting to present the proposed Concept Plan to inform discussion of proposed modifications to the Anketell North Structure Plan. TBB and Acumen provided rationale for the proposed LSP amendment and solutions/benefits to the broader Anketell North area in resolving some of the issues arising from the current LSP. Draft Concept Plan was circulated to internal departments within the City of Kwinana. Internal meetings resolved to support a comprehensive LSP amendment to govern a more balanced outcome it will provide over the majority of the Anketell North LSP area. City provided preliminary support for the proposed modifications and modified plan, being a more comprehensive and consolidated amendments that deals with a number of key issues compared to individual amendments. City advised that the LSP Amendment should outline what landowners are represented and the extent of support for the Amendment. Following the meeting, the City reviewed the Concept Plan with the relocated DOS and provided comments in the context of its revised draft CIP. No fatal flaws were identified. TBB advised the City that, on this basis, it would proceed with preparing a comprehensive structure plan amendment including making contact with landowners.
Department of Planning Lands and Heritage	5 September 2018	Rachel Chapman (TBB) Jarrod Rendell (Acumen - LSP proponent) Paul Sewell (DoPLH) Frank Ness (DoPLH) Jason Carr (DoPLH)	Preliminary meeting to present the proposed Concept Plan, outline the landowners represented in the LSP Amendment, concerns with the current structure plan design, considerations for the proposed amendment and the next steps for finalising a proposed LSP Amendment. DPLH officers provided advice in relation to: The use of Service Commercial designation in lieu of Commercial in order to ensure no residential development permitted in the area potentially impacted by road noise; Designation of land as POS over the Western Power easement area (no need to show road reserves in this area); LSP Amendment to balance the risk of bushfire risk and retention of vegetation; Inclusion of a Context Plan to show how the LSP Amendment fits in with the surrounding area.
Department of Planning Lands and Heritage	24 October 2018	Rachel Chapman (TBB) Alice Brown (DoPLH) Arran Sutherland (DoPLH)	Briefing on the proposed Anketell North Structure Plan Amendment (following staff changes at DPLH).

City of Kwinana	October - November 2018	Meeting/phone calls Tanya Moran (GTA) Gary Williams (CoK) Nino Scidone (CoK)	 Regarding status of other proposed LSP amendments and their potential impact on overall vehicle access. City confirmed that they did not support the current proposal by Transcore for the Right Turn In at the first access between Kwinana Freeway and Treeby Road, however was currently still with the WAPC. Requested feedback on the Lyons Road New Roundabout
City of Kwinana	9 April 2019 April - May 2019	Meeting Attendees: Rachel Chapman (TBB) Jarrod Rendell (Acumen - LSP proponent) Paul Neilson (CoK) Alison Trotta (CoK) Phone and email conversations: Rachel Chapman (TBB) Gary Williams (CoK) Paul Neilson (CoK) Alison Trotta (CoK)	 Subsequent meeting to discuss the proposed LSP amendment lodged with the City in December 2018, including the City's assessment comments and concerns raised through public consultation undertaken in March - April 2019. Key matters discussed related to the extent of Service Commercial zoned land, acoustic considerations for properties in close proximity to Anketell Road, and the proposed location of the district playing fields. Suggested modifications to the LSP amendment were presented by TBB to address these concerns. It was agreed that Acumen would seek further expert advice on the extent of Service Commercial land and the acoustic impacts of Anketell Road noise. Following the meeting, a revised LSP concept plan, Service Commercial market advice and an acoustic assessment was provided to the City to assist in finalising its assessment of the LSP Amendment. Various phone and email conversations occurred between TBB and the City following this meeting to resolve any outstanding matters and confirm the timing and path forward for the LSP Amendment.

2 SITE CONDITIONS AND CONSTRAINTS

2.1 ENVIRONMENTAL CONSIDERATIONS

An Environmental Report was completed by 360 Environmental in 2010 for the approved ANLSP. An Environmental Assessment Report (2019) (EAR) has now been prepared by Strategen Environmental to support this ANLSP Amendment (refer **Appendix A**).

Information regarding the existing environment, topography, soils and acid sulfate levels has been addressed within the 2019 EAR which has largely not changed from the 2010 EAR.

2.1.1 ENVIRONMENTAL ASSETS AND CONSTRAINTS

Historically, most of the site has been cleared for market garden and horticulture activities. There are pockets of remnant vegetation which have been identified as potential Local Natural Areas which will be a priority for retention in the ANLSP Amendment.

Two site surveys have been conducted across the subject land in which the vegetation condition ranged from Very Good – Good in the pockets of remnant vegetation to Completely Degraded across the portions of the land cleared for market gardening and horticulture.

The Environmental Assessment Report (EAR) prepared by Strategen identifies the following environmental constraints for the subject land:

- Matters of National Environmental Significance, including:
 - o 9.6 ha of Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (TEC)
 - 6.7 ha of potential Banksia woodlands (area not assessed)
 - o 9.6 ha of Black Cockatoo foraging habitat
 - o 6.7 ha of potential Black Cockatoo habitat (area not assessed)
- 27 potential Black Cockatoo breeding trees (>500 mm diameter at breast height), which are delineated as:
 - o 17 Tuarts
 - Eight Jarrah
 - Two Corymbia maculate (planted)
- A Conservation Category Wetland (CCW) (UFI 15290 and 14148) intersects with the southern portion of the subject land, however, subdivision approval exists across Lots 35, 100 and part of Lot 13 Treeby Road. The southern boundary of Lot 41 Treeby Road intersects with the CCW and will have management requirements as part of any subdivision approval.

The development of land within the ANLSP will result in the clearing of Banksia TEC, potentially at thresholds requiring referral to the Department of Environment and Energy (DEE) for significant impacts. All considerations for referrals for potential significant impacts to TECs, will be conducted at development stage by the landholder in response to site conditions.

Black Cockatoo foraging habitat and significant tree retention provide the most appropriate outcome for habitat provision within the ANLSP. The best quality foraging habitat and future potential habitat trees are retained within POS, and the placement of POS retains connectivity with the surrounding Bush Forever 270 and the CCW which also provide foraging and breeding habitat (this is further discussed within section 3.4).

2.2 GROUNDWATER AND SURFACE WATER

2.2.1 GROUNDWATER

Regional groundwater contours (historical average maximum) indicate that the groundwater flows generally in a west to south west direction and ranges from approximately 30 mAHD to 15 mAHD. The depth of groundwater ranges from approximately 20.5 m below ground level (mbgl) to 5.8 mbgl across the site.

2.2.2 SURFACE WATER & WETLANDS

The site is located within the Peel-Harvey Coastal Catchment, the Peel subdrain is located approximately 270 m south of southern boundary of the subject land (part Lot 9000 Treeby Road).

There are no Ramsar wetlands or Directory of Important Wetlands on the site. The nearest Directory of Important Wetlands site is located approximately 1.2 km to the west of the site and is known as "Spectacles Swamp".

Regional geomorphic mapping indicates that there is a Conservation Category Wetland (CCW) (sumpland; UFI 15290 and 14148) which occurs across the southern section of the subject land. Advice from the Environmental Protection Agency (EPA) states that all CCWs be protected and that an appropriate buffer of 50 metres be applied to separate development activities from the CCW. Lots 35, 100 and part of Lot 9000 Treeby Road already have subdivision approval and therefore, CCW buffer requirements are extinguished across these lots.

2.3 VEGETATION AND FAUNA

A site survey was completed by Bennet Environmental in 2009 in accordance with EPA (2004) guidance and reported within the existing ANLSP. Due to the level of disturbance within the approved ANLSP area, a significant portion of vegetation was recorded as Degraded to Completely Degraded condition. Pockets of remnant vegetation (particularly in Lots 33 and 34) were in Very Good and Good condition.

Further to the Bennet Environmental survey, Strategen completed a supplementary reconnaissance survey (2018) for the site with a focus on Lots 36 and 40 Treeby Road. At the time of the survey, access to Lots 7 and 89 Anketell Road was not permitted/granted.

A vegetation assessment by Strategen concluded that there are no state listed TEC or PEC within the subject land; however federally listed Banksia woodlands TEC is present within the subject land.

Vegetation condition ranged from Very Good to Completely Degraded with the majority of Lots 36 and 40 in Completely Degraded condition. Past and current land uses, including historical clearing and housing along with the dominance of weeds have contributed to overall vegetation condition, and have caused significant fragmentation of the vegetation. Firebreaks and informal tracks have also impacted the vegetation. Non-endemic and planted vegetation was also present at the site.

2.4 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas mapping surrounds the western and southern boundary of the site, with mapping slightly extending into Lots 35, 100, part 13 and 41 Treeby Road (WALGA, 2017). ESA mapping across this area is to be associated with the known presence of the CCW and BF 270 located adjacent to the subject land. The ANLSP design has considered the implications of the CCW and BF site to Lot 41 and included POS along the southern boundary to maintain appropriate setback distances. Lots 35, 100 and 900 are already the subject of subdivision approval, therefore the proposed amendment does not propose any modifications to the land within these lots that alter the impact on the adjacent CCW or Bush Forever Site 270.

2.5 BUSHFIRE HAZARD

The majority of the subject land is designated as bushfire prone on the WA Map of Bushfire Prone Areas (DFES 2018). A Bushfire Management Plan (BMP) has been prepared by Strategen in order to address the requirements under Policy Measures 6.2 and 6.3 of SPP 3.7 Planning for Bushfire Prone Areas. The BMP has been prepared in accordance with section 5.2.5 of Guidelines for Planning for Bushfire Prone Areas, which requires Structure Plan's to be accompanied by a BMP that includes the results of a strategic level Bushfire Hazard Level (BHL) assessment (refer **Appendix B**). Aside from the preparation of future BMPs to accompany future subdivision and development applications where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Following development works, the land within the ANLSP area will be predominately cleared and therefore will contain land with Low and Moderate Bushfire Hazard Level (BHL). As a result, the predominant bushfire hazard to the development is associated with Bush Forever site 270 to the west, south and south-east of the project area. There is also potential for bushfire occurrence through Class B woodland to the east within private landholdings. The vegetation adjacent to the ANLSP area is fragmented in areas, by agricultural land uses, major roads and tracks that would reduce the ability for fire spread and significant bushfire escalation at the development interface.

Management measures outlined in Section 5.2 of the BMP will ensure that on completion of development, all developable land will comprise either a low or moderate BHL and a rating of BAL-29 or lower will be achieved through provision of appropriate setbacks to any post development classified vegetation. The presence of perimeter roads and managed POS at the bushfire hazard interfaces will assist in achieving the required separation.

On the basis of the information contained within the BMP, Strategen considers the bushfire hazards within and adjacent to the ANLSP and the associated bushfire risk is readily manageable through standard management responses outlined in the Guidelines and AS 3959. Strategen considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

The BMP outlines the detailed information required for future BMPs required at subdivision and development application stages.

2.6 HERITAGE

The DPLH Aboriginal Heritage Inquiry System (2018) was searched, which identified there are no registered places within or adjacent the subject land. Additionally, there are no other heritage places within the subject land. The boundary for Mandogalup Swamp/ Spectacles (site ID 3427) resides within a small section of Anketell Road reserve and is known for Mythological, Hunting Place and Water source approximately 870 metres to the west.

Additionally, Treeby Road Lake (ID 3555) is located approximately 600 metres south of the LSP boundary within Bush Forever site 270. The Heritage Council (2018) inHerit database identified no current sites within the ANLSP area.

3 STRUCTURE PLAN

3.1 DESIGN PRINCIPLES

3.1.1 SITE ANALYSIS

An opportunities and constraints analysis was undertaken to inform the design considerations over the site. **Figure 7** summaries the key opportunities and constraints. Of particular note, the relocation of the District Open Space (DOS) minimises earthworks, fill and retaining in comparison to the approved location. It also allows the existing Treeby Road reserve alignment to be retained and provides the opportunity to integrate the DOS with the community facility.

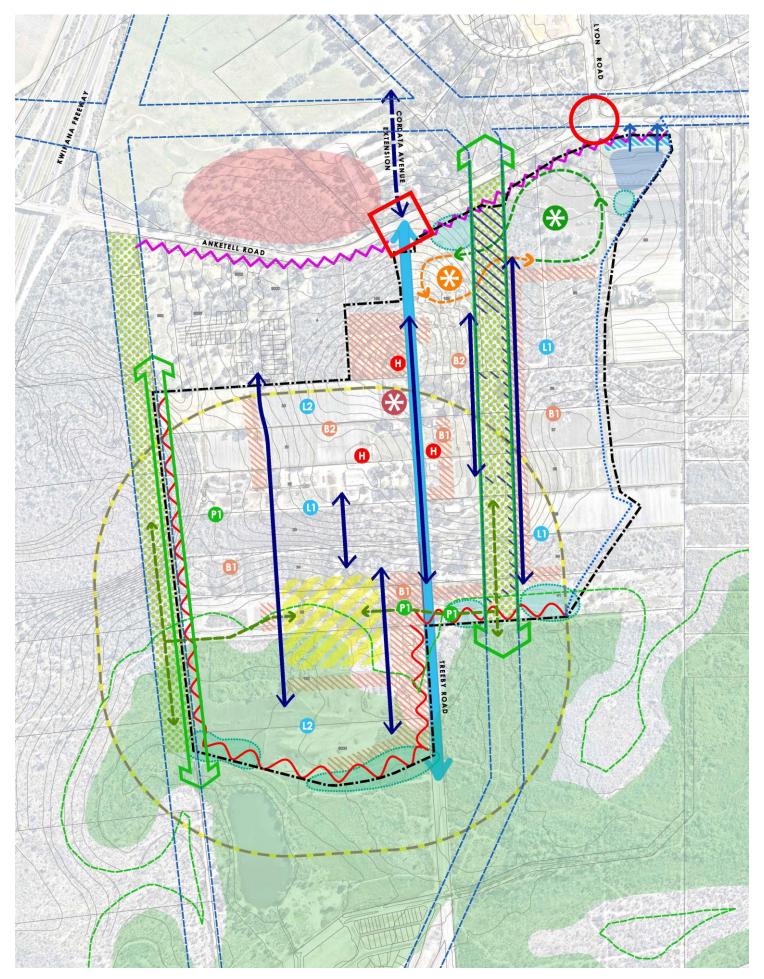


Figure 7 Opportunities and Constraints Analysis

LEGEND



Proposed Amended Structure Plan Boundary

PUBLIC REALM

Opportunities



Utilise Western Power Easement areas for public open space.



Provide areas of public open space in locations that maximise identified existing trees worthy of retention.



Primary School and associated oval generally located centrally to maximise pedestrian catchment.



Provide north-south and east-west linear public open space linkages maximising pedestrian movement throughout the Structure Plan area.



Retain existing topography as much as practicable utilising lower areas for drainage catchments within public open space areas.



District Open Space located on area that is generally level minimising earthworks, fill and retaining requirements.

Constraints



Possible retention of trees will set site levels at these (higher) locations.

MOVEMENT

Opportunities



Potential to provide full movement opportunity at the intersection of Anketell and Lyon Roads.



Provide full movement opportunity at the intersection of Honeywood Avenue, Anketell and Treeby Roads.



Retain existing Treeby Road reserve in current alignment.



Utilise Western Power Easement area for future access roads and car parking to maximise development opportunity.



Provide east-west public open space linkages to Primary School and proposed north-south public open spaces.



Proposed Primary School easily and conveniently accessed with proposed roads to all four sides.

Constraints



Potential noise attenuation requirements for any residential proposed in close proximity to Anketell Road.



Access and egress to land uses adjacent Anketell Road limited to side streets.

LANDUSE

Opportunities



Optimise residential density within close proximity to areas of higher amenity, Primary School, and Community Facility.



Service Commercial located adjacent high exposure to movement economy along Anketell Road.

Utilise Western Power Easement areas for public open space, future access roads and car parking to maximise development opportunity.

.....

Opportunity to utilise lower areas for drainage catchment and conveyance to minimise disturbance to the existing landform.



Future planned District Centre

Constraints



Existing high points require careful consideration through development scheme.



Existing Western Power Easement areas constrains and dissects residential development.



Development edge constrained by existing MRS Rural Water Protection Zone boundary (road only to be provided within this area).



Fragmented landownership constrains development efficiencies and staging.



Existing subdivision approval over Lots 30, 35, 100 & 9000



Conservation Category Wetland and buffer (50m) to be incorporated into POS (regard to be given to existing subdivision approvals on Lots 35, 100 & 9000)

BUILT FORM

Opportunities



Service commercial to orientate to Anketell Road.



Opportunity for the Community Facilities site to be designed and integrated with district open space site.



Optimise built form density within close proximity to areas of higher amenity, Primary School, and Community Facility.



North-south streets to respond to site topography and optimise potential for solar access.



Opportunity to provide a variety of housing types and densities.

Constraints



Existing home to be retained.



Management of demolition important to avoid creating further contamination.



Potential bushfire attenuation specifications required for homes in close proximity to existing bushland/Bush Forever.

3.2 DEVELOPMENT CONCEPT PLAN

The Development Concept Plan in **Figure 8** has been prepared to provide an illustration of the development intent for the amended ANLSP. Whilst this graphical representation is indicative only, it indicates the integration of landscaping within the ANLSP area and how the road layout, streetscapes, development will occur.

The Development Concept Plan has been prepared based on the following key design considerations:

- Structure Plan Boundary the extension of the structure plan boundary introduces Service Commercial land appropriately located along Anketell Road and ensures the extension of Lyon Road. Additionally, the amended boundary south of Anketell Road excludes lots subject to separate structure.
- Public Open Space the DOS has been relocated where the natural surface area level difference requires comparatively little
 earthworks compared to the approved ANLSP location to create a useable space for playing fields, and is co-located with the
 proposed Community Purpose Site. The remaining public open space has focused on the best quality vegetation across the
 ANLSP area.
- Road Structure the modified DOS location allows for the retention of the existing Treeby Road reserve alignment providing
 a more direct route and efficient use of land.
- Interface to Rural Water Protection zone the Development Concept provides an appropriate interface and transition to the existing rural groundwater protection lands immediately abutting the ANLSP area to the east. This is achieved through the provision of a boundary road along the eastern residential area, and the incorporation of an additional area of Parks Recreation and Drainage immediately south of the Service Commercial site.
- Residential Development the Development Concept provides for a variety of housing choices through the density ranges of R10-R20, R25-R40 and R-40-60 density coding's. The range of lot sizes and housing types is achieved based the proposed arrangements appropriate to the current market.
- **Service Commercial** the introduction of Service Commercial land within the north east corner of the ANLSP supports the Wandi District Commercial Activity Centre located on the north western side of Anketell Road.
- Integration the Development Concept Plan demonstrates, as best to our understanding, an appropriate integration with the land parcels north of the ANLSP area that are subject to separate Structure Plan Approvals. The Development Plan also demonstrates that the proposed development will not prejudice surrounding land parcels, or the planned upgrade of Anketell Road.
- Existing Subdivision Approvals & Development Restrictions it is understood that there are existing subdivision approvals over Lots 30, 35, 100 and 9000 and therefore no modifications to the existing ANSLSP over these lots are proposed. It is also understood that the existing house on Lot 30 is required to be retained and therefore only residential land is proposed over Lot 30 in accordance with this requirement.

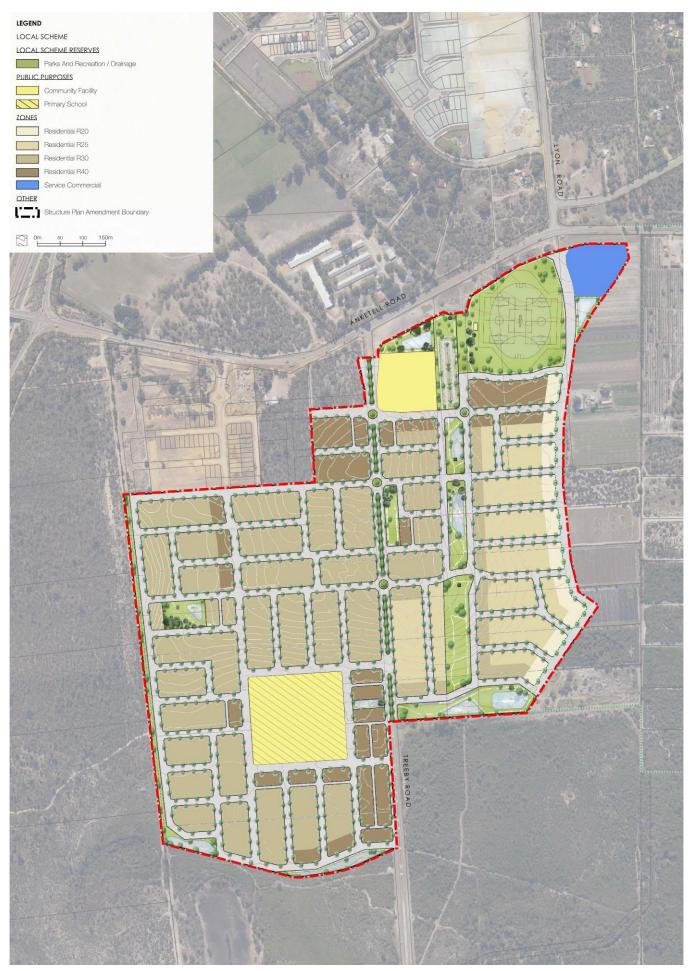


Figure 8 Proposed Anketell North Concept Plan

3.3 LAND USE

The amended ANLSP proposes a minor increase to the existing density, introduces Service Commercial zoned land in the north east corner of the ANLSP area and proposes an increase in land zoned for Parks and Recreation. The proposed amendments to land uses within the ANLSP are summarised in **Table 3.**

Table 3 Land Use Summary

LAND USE	CURRENTLY APPROVED YIELD / AREA	PROPOSED AMENDMENT YIELD / AREA
Residential R10	21 lots	N/A
Residential R20	N/A	33 lots
Residential R25	164 lots	209 lots
Residential R30	607 lots	837 lots
Residential R40	202 lots	318 lots
Residential R60	72 lots	N/A
Community Facility	1.66ha	1.65ha
Primary School	4.00ha	4.00ha
Service Commercial	N/A	1.2ha (6,072m² estimated NDA)
Parks and Recreation / Drainage	12.4ha	13.04ha
Total	1,066 lots	1,397 lots/dwellings

3.3.1 RESIDENTIAL

The proposed Development Concept suggests a potential yield of 1,397 residential lots, an additional 331 lots from the approved ANLSP. The amended Concept Plan no longer proposes residential land zoned R10 and R60, and introduces R20 lots. The amended ANLSP proposes an increased number of lots zoned R25, R30 and R40 lots to reflect the current market demand.

The amended ANLSP achieves an average residential density of 16 dwellings per gross urban zoned land and 32 per residential zoned land. This is consistent with Liveable Neighbourhoods requirements, which stipulates a minimum average of 15 dwellings per gross urban hectare and 26 dwellings per residential site hectare, as originally outlined in *Directions 31 and Beyond*.

3.3.2 COMMERCIAL

The introduction of Service Commercial land abutting Anketell Road, provides for complementary commercial land uses to the proposed Commercial and Service Commercial land also proposed in the three structure plan amendments currently before DPLH, as well as the proposed Wandi District Commercial Activity Centre (as identified in SPP 4.2) and the *South Metropolitan Sub-Regional Planning* Framework. The proposed Service Commercial land is strategically located adjacent Anketell Road which has been identified as a future freight route and therefore will appropriately accommodate the associated traffic generated by the Service Commercial land uses. This also provides flow-on benefits in providing a 'buffer' between freight traffic on Anketell Road and residential uses within the ANLSP area, assisting in the reduction of acoustic impacts on residential properties.

The total area of Service Commercial zoned land is 1.2 hectares, with an estimated net developable area (NDA) of 6,072m² based on a maximum site coverage of approximately 50% of the gross area. This extent has been informed by advice provided by Taktics4 on the suitability and sustainability of a Service Commercial zone in this particular location (refer to **Appendix D**). To ensure the Service Commercial land does not prejudice the development potential of the nearby Wandi District Centre, the market advice suggests this site is best suited to a freight transport related commercial activity hub, accommodating a range of uses such as a petrol filling station, truck wash facilities and fast food outlets, geared predominantly to large freight vehicles rather than cars. This activity in the proposed Service Commercial area would benefit from significant exposure to freight transport by virtue of the road alignment, depth of the site and high visibility created by the recreation fields, and the site's access to two road frontages.

3.3.3 COMMUNITY FACILITY

This amendment does not ultimately propose any modifications to the location of the Community Facility as per the approved ANLSP. A Neighbourhood Park is to be located adjacent to the Community Facility, providing for informal active recreation with public amenities available such as picnic facilities. As per the approved Landscaping Plan, public open space north of the community facility provides a buffer between the community facility and Anketell Road.

In accordance with the approved structure plan, the location of the community Facility was determined by the following design considerations:

- The high accessibility afforded by the signalised intersection to allow for pedestrian and cycling movements between the Wandi and Anketell LSP Areas;
- Its location within close proximity to the retail core and bus routes;
- The land intensive nature of the use and the ability to maximise the residential population within a 400m walkable catchment of the Wandi District Centre, with its location south of Anketell Road;
- The ability to utilise sterilised land within the easement for parking;
- The opportunity to provide a built form statement to the Anketell North LSP area at a prominent intersection, and
- The opportunity to provide a land use buffer to Anketell Road for residential uses within the LSP area.

3.4 PUBLIC OPEN SPACE

A POS calculation has been prepared in accordance with Liveable Neighbourhood, as detailed in and is accompanied by a Public Open Space plan (refer Figure 9). A total of 10.07 hectares (13.47%) of credited POS is provided within the proposed ANLSP. The proposed POS provides for a variety of purposes and sizing including district open space (district playing fields), neighbourhood parks, local parks and linear park.

The POS will be provided in accordance with the Structure Plan and POS Schedule and will be landscaped by the developer to a standard commensurate to, or above LN requirements and to the satisfaction of the City of Kwinana. The Landscape Masterplan (Appendix E) provides a graphical representation of the public realm vision and indicative streetscapes for the ultimate development of the site.

PUBLIC OPEN SPACE SCHEDULE Anketell - Treeby Road Precinct May 2019 (17/091/008E)		
Site Area (ha) (excluding Treeby Road Reserve) (Gross Site Area - 87.1703 ha)		85.0356
Portion of Lot7		5.3162
Lot 30		4.8396
Lot 31		4.8033
Lot 32		4.7652
Lot 33		4.7220
Lot 34		4.6888
Lot 35		4.6346
Portion of Lot 36		3.5593
Portion of Lot 37		3.5812
Portion of Lot 38		3.6340
Portion of Lot 39		3.8951
Portion of Lot 40		3.4521
Portion of Lot 41		2.8428
Portion of Lot 89		6.1938
Portion of Lot 90		2.2203
Lot 100		10.3224
Portion of Lot 188		2.1171
Portion of Lot 189		4.4622
Portion of Lot 9000		4.9856
Deductions		
Primary School	4.0000	
Service Commercial	1.2144	
Drainage (1:1yr) (excluding Basins within Power Easement)	0.6648	
Western Power Easements (excl. Road Reserves)	4.3986	
Total Deductions		10.2778
Net Subdivisible Area		74.7578
Required Public Open Space (10%)		7.4758
Public Open Space Requirements		
Unrestricted public open space - minimum 80%	5.9806	
Restricted public open space - maximum 20%	1.4952	
Total		7.4758
PUBLIC OPEN SPACE PROVISION		
Credited Unrestricted Public Open Space		

0.4101	
0.4101	
4.9005	
0.4018	
0.3843	
0.0815	
0.0630	
0.0503	
0.1642	
1.6514	
	8.1071
0.7633	
0.3198	
0.5155	
0.3632	
	1.9618
	10.0689
	13.47%
	0.4018 0.3843 0.0815 0.0630 0.0503 0.1642 1.6514 0.7633 0.3198 0.5155

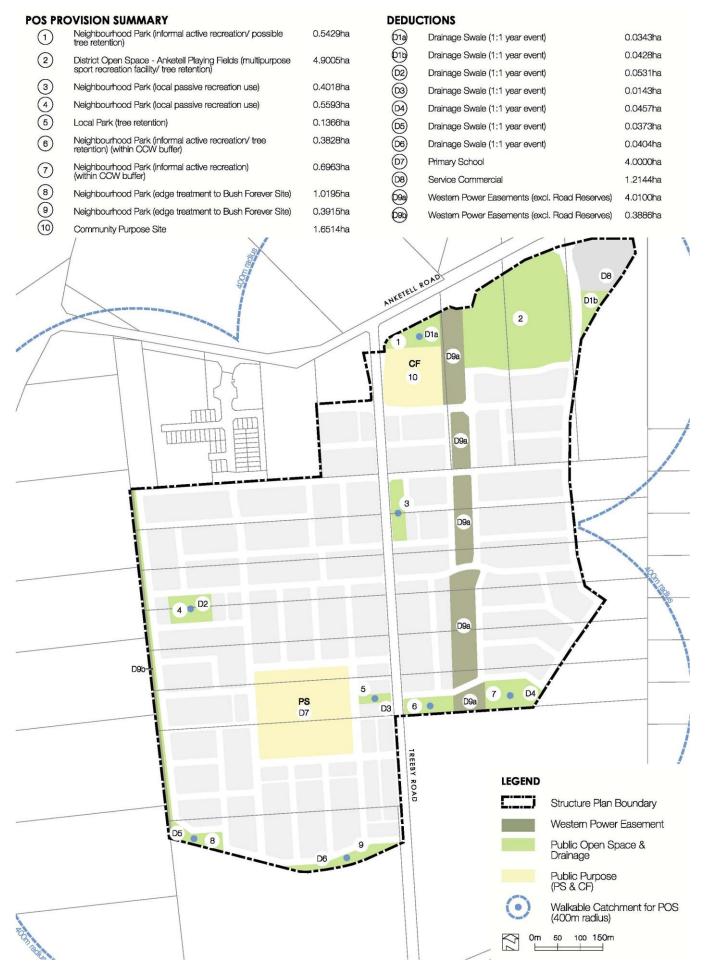


Figure 9 Public Open Space Plan

The amendment proposes to relocate the DOS to the north eastern corner of the ANLSP area, which is then co-located with the approved Community Facility. The DOS has been identified to facilitate a Local Sporting Ground with Community Facility Building A in accordance with the City's Draft Community Infrastructure Plan 2011-2031.

The approved location of the DOS has a gradient of up to 6% (1 in 16) and level difference across the site of 12 metres which would require significant re-contouring across a number of existing properties in order to provide viable gradients for the DOS playing fields. The proposed DOS location sits in an area where the natural surface level difference is in the order of three metres, requiring comparatively little earthworks to create a useable space for sports fields.

The location of the remaining POS within the proposed ANLSP is largely similar to the approved Structure Plan. The POS distribution has focused on the best quality vegetation across the subject site and connectivity with the conservation value of Bush Forever 270 and the CWW. POS placement along the boundary of the ANLSP, provides suitable separation to development activities and conservation areas, whilst contributing to ecological connectivity. Although the DOS has been relocated, the linear park remains located within the Western Power Easement linking with the Neighbourhood Park adjacent the Community Facility and DOS.

3.5 LANDSCAPE DESIGN

A Landscape Masterplan has been prepared by LD Total in order to inform open space development, the LWMS (refer **Appendix F**) and Bushfire Hazard Assessment (refer **Appendix B**). The Landscape Masterplan is indicative only and subject to detailed design at subdivision stages.

As demonstrated in the Landscape Masterplan the proposed ANLSP will ensure each lot frontage will be streetscaped with a minimum of one street tree to promote ecological connectivity across the ANLSP and regional area. Additionally, Treeby Road will be constructed with a median strip which will be vegetated with endemic species to further increase ecological connectivity across the site. The position of POS has considered the significant trees identified within the ANLSP area to ensure maximum retention across the site.

3.5.1 EVIRONMENTAL CONSIDERATIONS

The amended ANLSP has been strategically designed to utilise as much Completely Degraded and cleared land as practicable, although development of the site will necessitate the clearing of native vegetation ranging from Very Good – Excellent to Completely Degraded.

The completion of vegetation mapping has informed the placement of POS to capture the best quality habitat and retain connectivity with Bush Forever 270 and the CCW. The amended ANLSP design has focused on retention of the best quality Banksia TEC and vegetation across the site. POS locations across the ANLSP has considered the Black Cockatoo foraging habitat significant trees and TEC locations to maximise the retention of the best quality vegetation and reduce impacts to Black Cockatoos and TECs. Furthermore, POS placement has considered topographical features and some area of POS are located on high points in the landscape to increase the visual amenity of the POS across the site.

3.6 WATER MANAGEMENT

3.6.1 LOCAL WATER MANAGEMENT STRATEGY

A Local Management Plan Strategy (LWMS) was prepared in 2014 to support the existing approved ANLSP. A revised LWMS (2019) has been prepared by Bioscience in support of the Structure Plan amendment (refer **Appendix F**). The LWMS has been developed to establish the concepts and broad level design measures for flood mitigation and stormwater management for the ANLSP area. The intention of the LWMS is to guide the general stormwater management principles (location and size of stormwater basins). To ensure the pre-development peak discharges are maintained, a number of retention basins have been incorporated into the design to meet the requirements of the one, five and 100 year ARI events.

The LWMS provides the necessary water management strategies to guide the subsequent Urban Water Management Plan (UWMP) required at subdivision stage.

The LWMS indicates that the peak discharges for the 100 year ARI event at the Legal Point of Discharge (LDPs) are:

- LPD 1: 103 l/s (to be infiltrated directly in the soakage area) Note that LPD1 is not applicable to the proposed LSP. No discharge from the LSP area will occur to this discharge point.
- LPD 2: 145 l/s (Discharge north towards the Peel Sub R Drain).
- LPD 3: 371 l/s (culverts under Thomas Road).

Development of the subject land will result in a significant increase in impervious surfaces and therefore runoff volumes leaving the site. To ensure the pre-development peak discharges are maintained, drainage infrastructure will include bioretention areas, soakwells, overland flows and detention basins.

The effectiveness of the basins in maintaining the pre-development discharge flows for the 1% AEP event has been assessed. The post development basins are capable of maintaining the pre-development peak discharge for the critical storm duration for the design events with outflows regulated to those proposed in the Department of Water (DoW (former DWER) DWMP.

A treatment train has been devised for the development that employs industry standard Best Management Practices (BMPs) and will ensure the development does not result in any adverse impacts for the downstream receiving water bodies and ecosystems. The DoW Jandakot DWMP indicates that the department is currently developing water quality targets and in the interim, treatment trains should be based on the methodology established in the Stormwater

Management Manual for Western Australia. Surface water quality should be managed through:

- On site retention of 63% AEP 1 hour event flows;
- Bioretention systems sized as 2% of the connected impervious areas, and
- Non-structural measures to reduce applied nutrient loads.

3.7 WETLANDS AND BUFFERS

3.7.1 CONSERVATION CATERGORY WETLANDS

As mentioned previously, a Conservation Category Wetland (CCW) occurs across the southern portion of the ANLSP. At present, subdivision approval exists over Lots 35, 100 and part of 9000 Treeby Road, therefore CCW, mapping within these lots are no longer applicable. The CCW boundary is located along the southern boundary of Lot 41 Treeby Road.

Impacts to the CCW have been mitigated by the provision of POS within the 50 metre buffer along the southern boundary of Lot 41. Subdivision approval is likely to require the development of a Wetland Management Plan (WMP) which will include measures such as:

- revegetation within the CCW buffer
- weed control
- site water containment

The modified LSP design has retained an appropriate buffer from the CCW to ensure adequate separation from the development and the CCW. With the development of the WMP, impacts on the CCW can be managed to ensure the CCW retains it high conservative value. Further subdivision approval will result in conditions which ensure development construction protects the conservation value of CCW and Bush Forever site 270.

3.8 MOVEMENT NETWORK

The Transport Impact Assessment (TIA) (2019) prepared by GTA consultants (refer **Appendix G**) to support this amendment concludes that the proposed amendment will have an acceptable impact on the surrounding roads and intersections with no major network changes required to the external transport network over and above what is proposed as part of this amendment.

Overall, traffic volumes expected to be generated by the development is to be approximately 15,150 vehicle trips per day (vpd). Most of the vehicle trips are expected to access the ANLSP area via the future Anketell Road / Treeby Road signalised intersection, with remaining trips equally distributed between the future western Road 1 and the Lyon Road / Anketell Road roundabout.

The extension of the ANLSP boundary and the introduction of Service Commercial land use is not considered to compromise the traffic network as the daily traffic volumes are supported by the proposed Lyon Road / Anketell Road roundabout in addition to the Treeby Road / Anketell Road signalised intersection that was previously assessed for the potential traffic generation. Assessment of the proposed traffic and transport network has shown that the proposed connectivity will function adequately when the area is fully developed, which has been assumed and estimated to be by 2031. Therefore, in comparison to the existing ANLSP, no daily adverse traffic impacts on external roads is expected in terms of overall traffic volume.

3.8.1 PROPOSED MODIFICATIONS TO THE EXISTING ROAD NETWORK

Anketell Road is currently approved for a left in / left out intersection at Road 1 (the westernmost intersection to the ANLSP area between Kwinana Freeway and Treeby Road). An amendment to introduce a right turn into Road 1 from Anketell Road was submitted, however the City has indicated that it did not support this access, although the outcome will be determined by the WAPC. As requested by the City, it has been assumed that it will remain as a left in / left out intersection.

Based on information provided at officer level from a Development Engineer from the City of Kwinana via email on 19 November 2018, Anketell Road is proposed to be upgraded to a Primary Distributor Freight Route road as part of the Westport project, led by the State Government. As part of this, Main Roads WA (MRWA) have prepared a design for a roundabout at the Lyon Road / Anketell Road intersection. It was noted that the only full movement intersections would be Lyon Road / Anketell Road and Treeby Road / Anketell Road. All other access points would remain as left-in / left-out, unless otherwise approved. However, it was noted by the officer that it would be unlikely for MRWA to support any changes to this network described above.

3.8.2 ACCESS

Given the ANLSP proposes predominately residential land use, it is not expected any capacity issues will occur at junctions and that uncontrolled priority and roundabout intersections will be sufficient to accommodate the expected demand.

Outlined below is the access arrangements to/ from subject to this Structure Plan Amendment, including:

- Access 1 a Left in / Left out (LILO) on Anketell Road to the north-west of the site (already approved).
- Access 2 a full movement signalised intersection at Anketell Road / Treeby Road to the north of the site (already approved).
 This intersection is currently configured as a priority-controlled T-section and will connect to the City's planned extension of Cordata Avenue to Anketell Road in the future.
- Access 3 a 4-way roundabout access at the Lyon Road Anketell Road intersection to the north-east of the ANLSP.
- Access 4 a full movement T-intersection at Treeby Road / Thomas Road south of the site. The City's online Intramaps website confirms that Treeby Road will ultimately be extended to for a T-intersection with Thomas Road.

The locations of the proposed access intersections and road connections are shown within the TIA.

3.8.2.1 ROAD HIERARCHY

The following sections summarise the amended road hierarchy within the proposed ANLSP area based on the revised Concept Plan. The revised road hierarchy has been based on the modelling undertaken by GTA consultants (2019).

The proposed road hierarchy has been developed using the guidelines and indicative daily traffic volume limits set out in *Liveable Neighbourhoods*, together with the overall design principles and aims of the ANLSP amendment.

Primary Distributor - Anketell Road

Anketell Road is identified as a Primary Distributor. A full movement signalised intersection at Anketell Road / Treeby Road to the north of the SP amendment is approved and will remain so. Other intersections on Anketell Road are proposed to operate as a left in / left out and a roundabout to the west and east respectively.

Integrator B - Treeby Road

Consistent with the approved LSP, Treeby Road is proposed as an Integrator B. The existing width of Treeby Road in 20m-22m (various along sections). This key north-south road is being proposed as a boulevard design within the already approved 25.2m indicative road reservation width. To avoid the unnecessary controlled cap roads previously identified along Treeby Road, a road cross-section similar to that of Honeywood Avenue, Honeywood (north of Anketell Road in the City of Kwinana) is appropriate with 4 metres wide carriageway widths 6 metres wide median island restricting driveway movements to left -in / left out, shared use pathways on both sides of verge and roundabouts supplemented by occasional median breaks designed for u-tuns where roundabouts are distanced apart. This is an excellent design outcome for Treeby Road in lieu of undesirable cap roads. Drainage swale in the central median will be limited to areas where the Treeby Road grades are flatter; however, this does not prohibit this boulevard concept being used.

Roundabouts are suggested along the realignment of Treeby Road to maintain safe speeds and facilitate traffic movements. This also applies to the intersections adjacent to the community facility and the commercial areas to provide effective circulation for traffic accessing these lots.

In order to support development within the structure plan area, and as identified in DCA 4 construction and upgrading of Anketell Road and Treeby Road is required. It is understood that Anketell Road will be upgraded to a dual carriageway in the future which is expected to accommodate up to 20,000 vpd, consistent with an Integrator B. Treeby Road between Anketell Road and Thomas Road is either not constructed or constructed to a rural standard. It is proposed that Treeby Road will also be required to be upgraded or constructed. The upgrade of Anketell and Treeby Roads will largely be funded through developer contribution enforced by DCA 4. The portion of Treeby Road between Anketell North LSP and Anketell South LSP will be subject to developer contribution fees for the upgrading and construction which is not included within DCA 4. Majority of the internal roads will be developed as part of the ANLSP area.

Neighbourhood Connector B

The streets abutting the western service commercial lots (outside of the amendment area) where the westernmost left in / left out to Anketell Road is located, are recommended to be constructed to a width of 18 metres to allow for on-street parking plus shared path on one verge.

Access Roads

The remainder of the local road network is classified as Access Street B, C and D or laneways with 16.5m – 14.2m road reserve. Access streets adjoining the primary school and DOS are recommended to be constructed as Access Street B (16.5m-18m) to allow for onstreet parking on both sides of the street.

3.8.3 PEDESTRIAN AND CYCLING NETWORK

The ANLSP amendment has been designed in accordance with Liveable Neighbourhood and is cognisant of achieving walkable catchments and high pedestrian amenity. All streets are recommended to be provided with a footpath on at least one side and a wider footpath is appropriate adjacent to the primary school to enhance the safety of the access to the school.

Shared paths are recommended along Integrator B and Neighbourhood Connector roads, as well as along the Western Power Easement and the eastern side of the ANLSP area, providing a cycling connection between the Primary School and DOS.

Local access streets with daily traffic flows lower than 3,000 vehicles per day will provide sufficient opportunity for pedestrians to cross without experiencing delays. The Neighbourhood Connectors, designed as boulevards will provide greater opportunity for pedestrians to cross safely.

The Neighbourhood Connector roads are suited to on-street cycling as per the (physically separated from cars / trucks), and/or with a shared path on the verge. On 27 April 2016, WA's laws were changed to allow cyclists of all ages to use footpaths, unless otherwise signed. The amendment to the Road Traffic Code 2000 brought WA's bicycle laws into line with the rest of Australia, making it legal for parents to cycle alongside their children on footpaths, improving safety.

3.9 PUBLIC TRANSPORT

There remains to be no bus routes servicing the ANLSP area. In accordance with the Transport Assessment (October 2015) prepared by Transcore, bus route 537 will run along the Treeby Road north-south connection and serve Wandi and Anketell cells and provide a good connection between Aubin Grove station and Kwinana station. Another service is planned in the future to service the SP areas to the south of Thomas Road, and provide connection to the Kwinana train station and bus interchange facility.

3.10 EDUCATION FACILITIES

In accordance with ERIC, and as approved in the existing ANLSP, one primary school is proposed within the amended ANLSP. The amendment does not ultimately propose any modifications to the approved location of the future primary school.

The provision of one primary school is also consistent with the catchment requirements under Liveable Neighbourhoods, which stipulates an average of one primary school per 1,500 lots. Based on current planning, it is anticipated the Anketell North and South LSP areas have the potential to yield up to 1,500 lots combined.

3.11 INFRASTRUCTURE COORDINATION, SERVICING AND STAGING

An Engineering Report has been prepared by TABEC Pty Ltd to support the proposed amendment to the ANLSP (refer **Appendix H**). Engineering matters were discussed as part of the approved ANLSP and therefore the report focuses on engineering related matters that have changed in the period between January 2015 and May 2019 and the impact of the changes contemplated by the proposed amendment

3.11.1 STORMWATER DRAINAGE

West of Treeby Road, drainage infiltration basins remain the same as the approved ANLSP. East of Treeby Road, the drainage catchment areas remain similar to the approved ANLSP however some of the basins have changed size due to different land use within some of the sub-catchments. In order to optimise land use, there will be a focus to utilise the power transmission line easement for infiltration of stormwater within shallow depth, unfenced basins that would minimise length of time of standing water as far as practical.

Conveyance from source to the swales / basins would be via a pit and pipe system constructed to the City's requirements. Future lots within the ANLSP area will be responsible for containing stormwater on-site for events up to 18% Annual Exceedance Probability (AEP) (1:5 ARI).

3.11.2 WASTEWATER

The initial stage of development within the ANLSP area is dictated by the requirement for a gravity outfall consisting of a 225mm diameter PVC pipe in Anketell Road that discharges to Thompson Lake Pump Station located east of Kwinana Freeway approximately 700 metres north of Anketell Road.

The remainder of the LSP amendment area has a planned gravity sewer discharge through to a recently completed sewer pumping station (PS174-04) located within the Anketell South Local Structure Plan area. However, the proposed sewer servicing of the southern portion of the ANLSP area is dependent on an outfall sewer constructed between the southern end of the subject land and PS174-04 adjacent to the wetland that separates Anketell North from Anketell South. This outfall is required to be funded by a developer, or developers within the catchment.

The 250mm diameter pressure main that transfers effluent from PS174-04 runs through the ANLSP area, within the Treeby Road reserve.

3.11.3 WATER SUPPLY

With the recent development south of Anketell Road, north of the proposed Structure Plan area, water mains that will ultimately service the whole ANLSP area have already been built within Anketell Road and Albina Avenue. This comprises 250mm diameter mains in Lyon Road and Anketell Road.

Within the ANLSP area, a 200mm diameter water main is proposed within Treeby Road. There are also two north-south directional 150mm diameter mains proposed, one either side of Treeby Road. There rest of the mains within the area will consist of 100mm diameter pipework.

All water supply network within the ANLSP area will be developer funded.

3.11.4 POWER SUPPLY

There is capacity within Western Power's network to service the development.

Although there are transmission lines that traverse the site parallel to and east of Treeby Road, there is no direct connection to these lines. Instead, power to the proposed ANLSP will be sourced from the existing High Voltage power lines in Treeby Road. These power lines in Treeby Road will be converted to underground supply as part of the roll out of development.

Other than accommodating the power transmission line easements and physical clearance to towers etc power supply does not represent an impediment to development within the area.

All roads constructed within the ANLSP area will have lighting installed to the satisfaction of the City, Western Power and relevant Australian Standards.

3.11.5 TELECOMMUNICATIONS

Recent subdivision works at Albina Avenue, off Anketell Road is included in the NBNCo rollout map therefore expansion of the NBNCo rollout to the immediate surrounding area is considered to be a logical extension that would not require any extraordinary charges (other than the current \$600 per lot fee) to be levied on the developer. However, under this arrangement, the developer is responsible for the design and construction of a pipe and pit network in accordance with NBNCo requirements.

3.11.6 GAS SUPPLY

Recent subdivision works at Albina Avenue, off Anketell Road has bought a gas supply pipe network to the immediate area. It is therefore expected that developers within the ANLSP area will work with Atco to allow for the gas network to be extended into proposed development areas.

Under current arrangements, the developer will provide a trench in which Atco will install their pipe network. This is considered to be standard practice for subdivision works.

3.11.7 ROADWORKS

All roads within the ANLSP are required to be constructed in accordance with the City's requirements. It is expected that all roads will have asphalt wearing surface with concrete kerb edge restraints.

4 TECHNICAL APPENDICES

4.1 TECHNICAL APPENDICES INDEX

APPENDIX	DOCUMENT TITLE	AUTHOR	APPROVAL STATUS
А	Environmental Assessment Report	Strategen Environmental	
В	Bushfire Management Plan	Strategen Environmental	
С	Acoustic Assessment	Herring Storer Acoustics	
D	Service Commercial Market Advice	Taktics4	N/A – for information
E	Landscaping Plan	LD Total	
F	Local Water Management Strategy	Bioscience	
G	Traffic Impact Assessment	GTA Consultants	
н	Engineering Servicing Report	TABEC	

APPENDIX A ENVIRONMENTAL ASSESSMENT REPORT



Anketell North Local Structure Plan (Amendment)

Environmental Assessment Report

Prepared for RPoint Land Pty Ltd (C/- Acumen Development Solutions) by Strategen

May 2019



Anketell North Local Structure Plan (Amendment)

Environmental Assessment Report

Strategen is a trading name of Strategen Environmental Consultants Pty Ltd Level 1, 50 Subiaco Square Road Subiaco WA 6008 ACN: 056 190 419

May 2019

Limitations

Scope of services

This report ("the report") has been prepared by Strategen Environmental Consultants Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: RPoint Land Pty Ltd (C/- Acumen Development Solutions)

Report Version	Revision	Purpose	Strategen	Submitted to Client	
Report Version	No.	Fulpose	author/reviewer	Form	Date
Draft Report	Α	Client review	K Cooper C Lehman / D Newsome	Electronic	30/11/2018
Final Report	0	For submission	W Oversby	Electronic	07/12/2018
Final Report	1	For re-submission	J Hyatt	Electronic	20/05/2019

Filename: ADS18136.01 R001 Rev 1 - 20 May 2019

Executive Summary

Acumen Development Solutions is proposing to amend some design aspects of the existing Anketell North Local Structure Plan, which is located approximately 28km south of the Perth Central Area within the City of Kwinana. The current Local Structure Plan (WAPC endorsed 18/12/2015) comprises approximately 98.4 hectares currently accessed by Treeby Road, which runs parallel to the Kwinana Freeway and connects to Anketell Road along the northern boundary of the Anketell North LSP area (the site).

The site is currently zoned 'Urban' under the Metropolitan Region Scheme and 'Development' under the City of Kwinana's Town Planning Scheme and comprises rural properties ranging in size from approximately 3 hectares through to 6 hectares; which are currently being utilised for agricultural purposes such as grazing, market gardening and horse agistment.

Historically most of the site has been cleared for market garden and horticulture activities, there are pockets of remnant vegetation which have been identified as potential Local Natural Areas which will be priority for retention in the Local Structure Plan.

Regional vegetation association mapping indicates one association occurs within the site, 1001 Medium very sparse woodland; jarrah, with low woodland; banksia and casuarina, of which <10% is remaining with the IBRA and 30-40% remaining within the City of Kwinana. Bassendean Complex Central South is mapped within the Local Structure Plan and it is estimated that approximately 26% of the pre-European extent remains.

Two site vegetation surveys have been conducted across the site in which the Vegetation condition across the site ranged from Very Good – Good in the pockets of remanent vegetation to Completely Degraded across the portions of the site cleared for market gardening and horticulture.

A Level 3 PEC (Low lying *Banksia attenuata* woodlands or shrublands) was confirmed as occurring on the site through a PATN analysis undertaken by Bennett Environmental.

The Environmental Assessment Report has identified the following environmental constraints for the site:

- Matters of National Environmental Significance, including;
 - 9.6 ha of Banksia Woodlands of the Swan Coastal Plain (SCP) Threatened Ecological Community (TEC)
 - o 6.7 ha of potential Banksia woodlands (area not assessed)
 - o 9.6 ha of Black Cockatoo foraging habitat, which can be further defined as
 - 6.7 ha of potential Black Cockatoo habitat (area not assessed)
- 27 potential Black Cockatoo breeding trees (> 500 mm DBH), which are delineated as;
 - o 17 Tuarts
 - o 8 Jarrah
 - o 2 *Corymbia maculate (planted)
- A CCW (UFI 15290 and 14148) intersect with the southern portion of the site; however, a subdivision approval already occurs across Lots 35, 100 and part of Lot 13 Treeby Rd, therefore, constraints for this portion of the site have been mitigated within that approval. The southern boundary of Lot 41 Treeby Rd intersects with the CCW and will have management requirements as part of any future subdivision approval

A Local Water Management Strategy (LWMS) has been developed for the site which has been used to guide the location and size of stormwater retention basins. To ensure the pre-development peak discharges are maintained a number of retention basins have been incorporated into the design to meet the requirements of the one, five and 100 year ARI events.

POS location has focused on the best quality vegetation across the site and connectivity with the conservation value of Bush Forever 270 and the CCW. POS placement along the boundary of the LSP, provided suitable separation of development activities and conservation values, whilst contributing to ecological connectivity.

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The environmental assessment identified a CCW along the southern Boundary of Lot 41 Treeby Rd. Impacts to the CCW have been mitigated by the provision of POS within the 50 m buffer; subdivision approval is likely to require the development of a Wetland Management Plan (WMP)

The development of the site will result in the clearance of Banksia TEC, potentially at thresholds requiring referral to the Department of Environment and Energy (DEE) for significant impacts. All considerations for referrals for potential significant impacts to TECs, will be conducted at the development stage by the landholder in response to site conditions.

Black Cockatoo foraging habitat and significant tree retention provide the best outcome for habitat provision within the LSP. The best quality foraging habitat and future potential habitat trees are retained within POS; furthermore, the placement of POS retains connectivity with the surrounding Bush Forever 270 and the CCW which also provide foraging and breeding habitat.

Fire run through intact vegetation exist to the southwest of the project area through predominantly intact Class B woodland; there is also potential for bushfire occurrence through woodland to the east.

Bushfire risk can be appropriately managed through implementation of the BMP which supports this EAR

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Appendix 2 EPBC Act Protected Matters Search (DEE)

Appendix 3 Flora and Vegetation Assessment (Bennett Environmental Consulting 2009)



1. Introduction

1.1 Overview

Acumen Development Solutions are proposing to amend some design aspects of the existing Anketell North Local Structure Plan (LSP; the site). The LSP area is located approximately 28km south of the Perth Central Area within the City of Kwinana (CoK). The site is generally bounded by Anketell Road to the north, rural development in the east and Bush Forever sites within the Southern and Western sections of the site (Figure 1).

The current LSP (WAPC endorsed 18/12/2015) comprises approximately 98.4 hectares currently accessed by Treeby Road, which runs parallel to the Kwinana Freeway and connects to Anketell Road along the northern boundary of the site (Rowe Group, 2015). The site is currently zoned 'Urban' under the Metropolitan Region Scheme (MRS) and 'Development' under the City of Kwinana's Town Planning Scheme (TPS).

All property boundaries within the site range in size from approximately 3 hectares through to 6 hectares. All properties are rural and are currently being utilised for agricultural purposes such as grazing, market gardening and horse agistment. There are existing dwellings located within the LSP area, with associated outbuildings, fences and other structures. These are intended to be demolished and removed as development progresses on site (Rowe Group, 2015).

Currently, the Anketell North Local Structure Plan (ANLSP) excludes lot 90 Anketell Rd and most of Lot 89 Anketell Rd, the exclusion was the result of concerns raise by the WAPC relating to anticipated noise levels resulting from the traffic along Anketell Rd. All concerns have been addressed and this plan seeks to include all of Lot 89 and a portion of Lot 90 Anketell Rd; furthermore, the amended structure plan removes all of Lot 3 and Lot 2 Anketell Rd from the structure plan boundary.

1.2 Planning and Environmental Overview

1.2.1 Planning

Since the endorsement of the LSP (Rowe Group 2015), there have been minor amendments to the LSP and Western Australian Planning Commission (WAPC) subdivision approvals:

- Minor North Anketell LSP amendment for Lot 188 Treeby Road and Lot 65, Lot 652 and Lot 4
 Anketell Road, Anketell and involves an extension of the Structure Plan boundary and change to
 the zoning (CDP, 2018)
- Subdivision of Lots 35, 100 and part Lot 13 Treeby Road, (Subdivision works have commenced)
- Subdivision of approval Lot 30 Treeby Road
- Lots 2 and 3 Anketell Road (now subdivided).

Refer to Figure 2 for the amended Structure Plan.

1.2.2 Environment

An Environmental Assessment Report was completed by 360 Environmental for the original approved LSP (Rowe Group 2015).



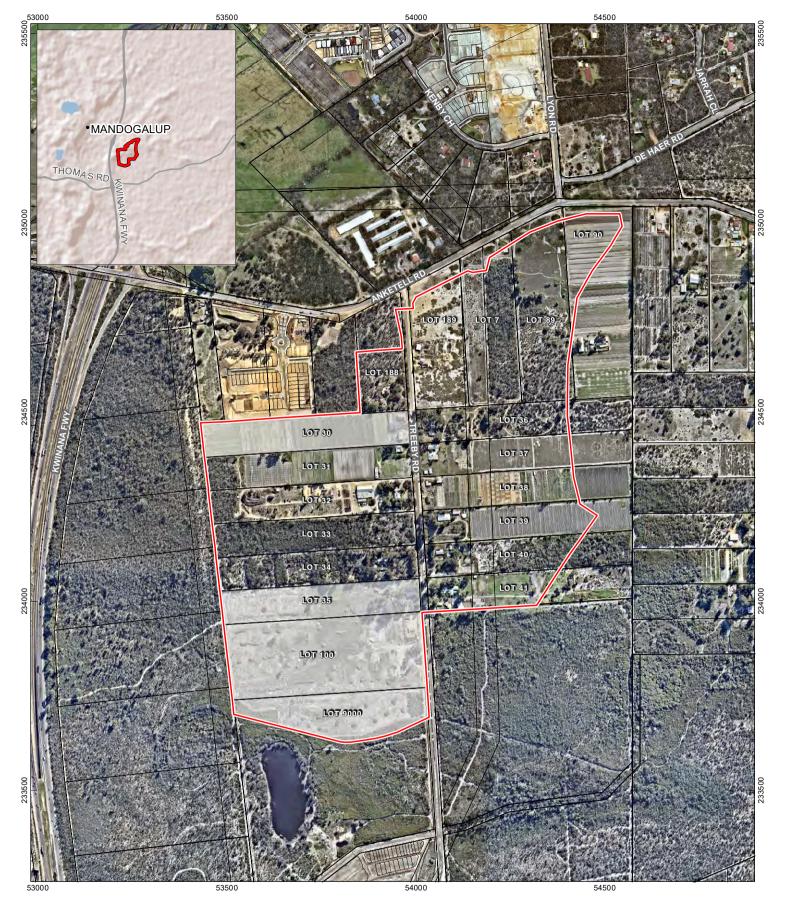


Figure 1: Site Location



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Figure 2: Anketell North Structure Plan Amendment



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2. Environmental legislation, policies and guidelines

2.1 Federal

2.1.1 Environment Protection Biodiversity and Conservation Act

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is administered by the Department of the Environment and Energy (DEE). The EPBC Act aims to protect and manage nine Matters of National Environmental Significance (MNES) throughout Australia including:

- World Heritage Properties
- National Heritage Places
- · wetlands of international importance (listed under the Ramsar Convention)
- · listed threatened species and ecological communities
- · migratory species protected under international agreements
- Commonwealth Marine Areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines).

Potential MNES applicable for the site is listed threatened species and ecological communities:

- Potential Banksia Woodlands of the Swan Coastal Plain (Banksia woodland) Threatened Ecological Community (TEC)
- Black Cockatoo foraging habitat and potential breeding trees.

Under the EPBC Act an action that could be a significant impact on any MNES in accordance with the Significant Impact Guidelines 1.1-Matters of National Significance (Department of the Environment, Water, Heritage and the Arts, 2013) should be referred to the DEE for assessment by the minister.

The referral decision (EPBC 2018/8145-10 April 2018) was not a controlled action.

2.1.2 Policy, recovery plans and conservation advice

The recovery plans and conservation advice relevant to the structure plan (SP) include the following (Table 1).

Table 1: Federal policies and guidance

Policy, recovery plan/advice	Description/Objective	Regulatory authority	Relevance
Conservation advice for the Banksia Woodlands of the Swan Coastal Plain ecological community (2016)	To mitigate the risk of extinction of the Banksia Woodlands of the Swan Coastal Plain ecological community, and help recover its biodiversity and function.	DEE, OEPA, DBCA, Department of Water and Environmental Regulation (DWER) CoK	Removal and protection/restore TEC.
Carnaby's Cockatoo (Calyptorhynchus latirostris) Recovery Plan (2013)	To stop further decline in the distribution and abundance of Carnaby's cockatoo by protecting the birds throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range, ensuring that the reproductive capacity of the species remains stable or increases.	DEE, OEPA, DBCA and DWER CoK	Removal of significant fauna habitat.



Policy, recovery plan/advice	Description/Objective	Regulatory authority	Relevance
Forest Black Cockatoo (Baudin's Cockatoo Calyptorhynchus baudinii and Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) Recovery Plan (2008)	To stop further decline in the breeding populations of Baudin's Cockatoo and the Forest Redtailed Black Cockatoo and to ensure their persistence throughout their range in the south-west of Western Australia.	DEE, OEPA, DBCA and DWER CoK	Removal of significant fauna habitat.
Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy (2012)	To compensate for the residual adverse impacts of an action on the environment.	DEE, CoK	

The application of management measures and recommendations as specified within the above are discussed in Section 4.

2.2 State

Applicable legislation includes *Environmental Protection Act 1986*, the *Planning and Development Act 2005* (PD Act) *and Planning and Development (Local Planning Schemes) Regulations 2015* (PD Regulations). Under the PD Regulations the City must seek comments in regard to proposed SP from any public authority or service provider that the City considers appropriate.

Other legislation relevant to the management of the SP are outlined in Table 2.

Table 2: Other relevant legislation

Legislation	Description	Regulatory authority	Relevance
Aboriginal Heritage Act 1972	Protection of amendment sites of Aboriginal heritage significance, both known and as yet unknown.	Department of Planning, Lands and Heritage (DPLH)	Disturbance to Aboriginal sites.
Bush Fires Act 1954	Minimising dangers resulting from bush fires, and the prevention, control and extinguishment of bush fires.	Department of Fire and Emergency Services (DFES)	Fire management.
Conservation and Land Management Act 1984	Preservation and conservation of flora and fauna.	Department of Biodiversity, Conservation and Attractions (DBCA)	Removal of threatened flora or TECs/priority ecological communities (PECs).
Contaminated Sites Act 2003	Regulation of matters relating to the identification, assessment, recording, management and clean-up of contaminated land.	Department of Water and Environmental Regulation (DWER)	Contamination (Market garden/hobby farm), acid sulfate soils.
Rights in Water and Irrigation Act 1914	Protection and licensing of water resources.	DWER	Development within the Perth Groundwater Area.
Wildlife Conservation Act 1950 (WA) Note: This Act will eventually be replaced by the Biodiversity Conservation Act 2016	Conservation and protection of wildlife (flora and fauna). Special provisions and schedules apply to the protection and management of gazetted rare flora and fauna.	DBCA	Removal of threatened flora or TECs/PECs and fauna.

In addition to the above legislation, there are several policy and guidance documents which relate to specific environmental factors that are relevant to the development of the SP area.



Table 3: Policies and guidance statements

Statement No.	Title	Application	Relevance to project
Policy			
Peel-Harvey EPP	Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992	Environmental quality objectives for the Estuary catchment which id achieved will rehabilitate the estuary and protect it from further degradation	Water quality- phosphorus inputs and export within the catchment area
Guidance State	ments		
33	Environmental Guidance for Planning and Development.	Provides guidance on the environmental protection process in respect of the land use planning and development process.	Land use planning.
Technical Guida	ance/guidelines		
Technical Guidance	Flora and vegetation surveys for Environmental Impact Assessment (EPA, 2016).	Provides guidance on the assessment on the biodiversity implications of vegetation clearing.	Clearing of vegetation, or impact to threatened vegetation or flora species.
Technical Guidance	Sampling methods for terrestrial vertebrate fauna (EPA, 2010).	Provides guidance on the assessment on the biodiversity implications of vegetation clearing on fauna habitat.	Clearing of vegetation, or impact to threatened fauna species.
Technical Guidance	Terrestrial fauna surveys (EPA, 2004).	Provides direction and information on general standards and protocols for terrestrial fauna surveys for environmental impact assessment.	Clearing of vegetation, or impact to threatened fauna species.
Policies			
State Planning Policy 2	Environment and Natural Resources Policy (WAPC 2003).	Provides guidance on planning developments to conserve the natural environment.	Environmental management.
State Planning Policy 2.1	Peel-Harvey Coastal Plain Catchment (WAPC 2003)	Ensures that land use changes within the Peel-Harvey estuarine system likely to cause environmental damage	Considered when the site rezoned from Rural to Urban Deferred (February 2006) and when deferment lifted on December 2009 (360 Environmental, 2010).
State Planning Policy 2.8	Bushland Policy for the Perth Metropolitan Region (WAPC 2010).	Provides guidance to ensure bushland protection in the Perth Metropolitan Region in the respect of land use planning.	Clearing of vegetation within Bush Forever sites and Local Natural Areas.
State Planning Policy 2.9	Water Resources (WAPC 2006).	Provides guidance on how to protect, conserve, enhance and manage sustainable use of water resources of environmental value.	Impact on hydrological regime Urban water management.

2.3 Local

The following local government policies, may be applicable to the SP area.



Table 4: Local Planning Policy and guidelines

Policy No.	Title	Application	Relevance to project
1	Landscape Feature and Tree Retention (2016)	This policy applies to all land within the City of Kwinana (City) Town Planning Schemes No. 2 and 3 (TPS 2 and TPS 3) and is to be implemented during the preparation and assessment of: a) District structure plans b) Local structure plans c) Local development plans d) Subdivision applications for 10 lots or more (where there is no adopted structure plan or where the adopted structure plan was approved prior to the commencement of this policy); e) Subdivision applications in areas of Landscape Protection as designated by TPS 2 f) Development applications on sites 1 hectare or greater.	City of Kwinana (2016:1) states that "This policy is not intended to be applied retrospectively in areas where local structure plans and subdivisions have been approved prior to the adoption of the policy". There is an existing approved SP for the area and this application is to amend Public Open Space location and Treeby road realignment. It is on this basis that due regard has been given to LPP No. 1 however, its application is not applicable.



3. Existing Environment

3.1 Topography, geology and soils

3.1.1 Topography

The natural topography of the site ranges from approximately 41mAHD in the northern section to approximately 20mAHD in the south west section.

3.1.2 Geology

The site is within the Bassendean Dune System which typically consists of low hills of quartz sand with sandy swamps in dune depressions (Gozzard, 2007). Regional environmental geology mapping indicates that the site consists of the following units:

- S7: Sand pale yellowish brown, medium to coarse-grained sub-angular quartz, trace of feldspar, moderately sorted, of residual origin
- S8: Sand- vey light grey at the surface, yellow at depth, fine to medium-grained sub-rounded quartz moderately sorted of eolian origin.
- MS5: Sandy silt- dark brownish grey silt with disseminated fine-grained quartz sand, firm variable clay content (Gozzard 1983) (Figure 3).

There are several soil units within the site mapped and described by the Department of Agriculture and Food Western Australia (DAFWA) as:

- Spearwood 211Sp__S2a Moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils.
- Bassendean 212Bs__B6: Deep or very deep grey siliceous sands
- Bassendean 212Bs_B2: Deep bleached grey sands with a pale yellow B horizon or a weak ironorganic hardpan 1-2 m.
- Bassendean 212Bs__B1: Deep bleached grey sands sometimes with a pale yellow B horizon or a
 weak iron-organic hardpan at depths generally greater than 2 m.
- Bassendean 212Bs_B3: Moderately deep, bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam (Figure 4).

3.1.3 Acid Sulfate Soil Risk

A search of the Swan Coastal Plain Acid Sulfate Soil (ASS) regional risk mapping (DWER 2018) indicates that a significant portion of the SP area has a no known ASS with a Moderate to Low ASS disturbance risk (<3m from surface) (Class 2) in the north-eastern section, refer to Figure 5.



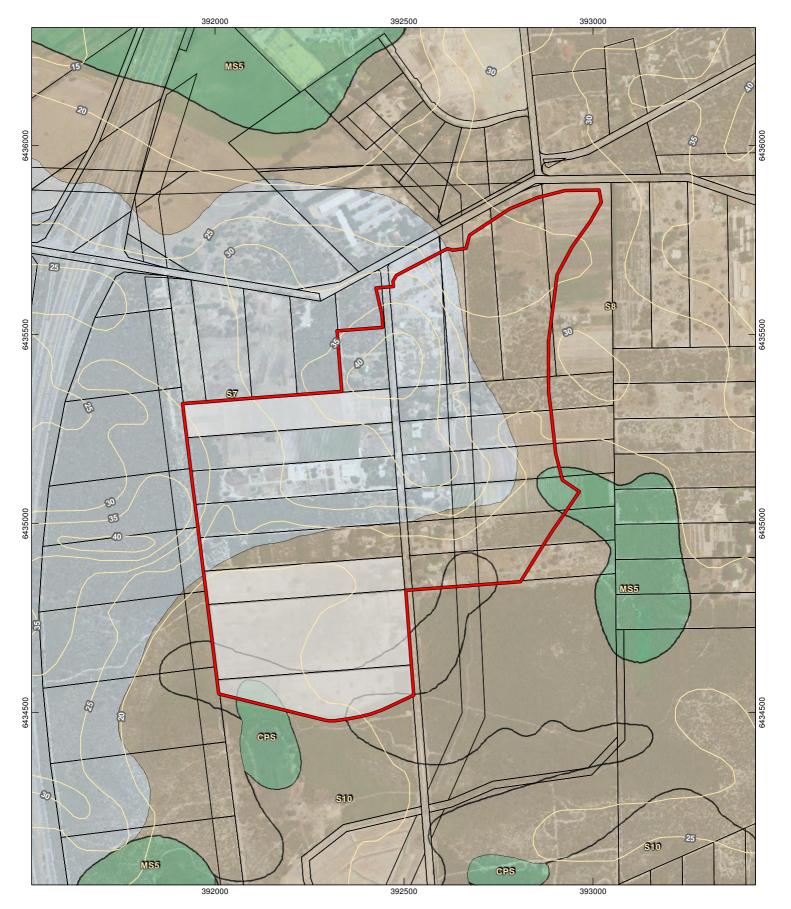
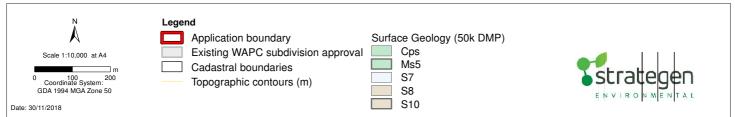


Figure 3: Topography and Geology



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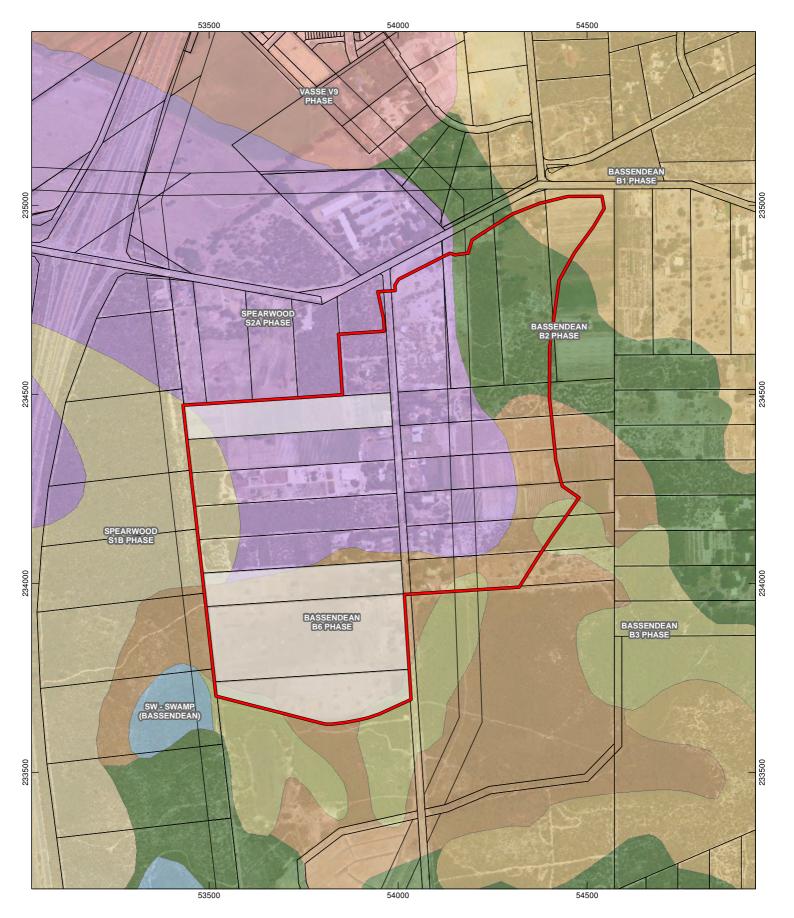
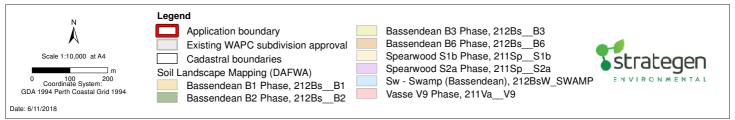


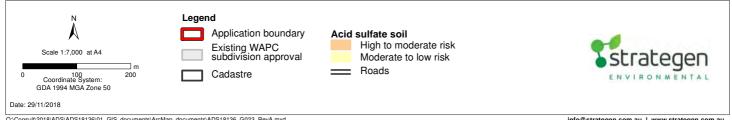
Figure 4: Soil Units



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Figure 5: Acid sulfate soil risk



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3.2 Hydrology

3.2.1 Overview

Underlying the LSP area, three aquifers are present which lie within the name of the major geological unit in which the aquifer occurs (DWER 2017). In descending order of depth from natural surface they are:

- Superficial Aquifer (unconfined)-Allocation available
- · Leederville Aquifer (confined)- Limited information
- Yarragadee North (confined)- Limited information.

Regional groundwater contours (historical average maximum) indicated that the groundwater flow generally in a west to south west direction and ranges from approximately 30 mAHD to 15 mAHD. The depth of groundwater ranges across the from approximately 20.5 m below ground level (mbgl) to 5.8 mbgl across the site (Figure 6).

3.2.2 Groundwater availability

Table 5 below detail the groundwater licences within the site.

Table 5: Groundwater licences and allocation

Licence No.	Lot No./ Applicant	Expiry	Allocation (Perth- Superficial Swan)
55440	Lot 2 and 3 Anketell Rd /Sanctum Holdings Pty Ltd	14/06/2028	3,400KL
48225	677 Lyon Road/ Lot 90 on diagram 92984, Volume 2134 Folio 248, 768 Anketell Road	23/02/2024	120,650KL
180329	Lot 30 Treeby/ Gucce Holdings Pty Ltd	19/12/2024	68,000KL
101078	Lot 32 Treeby/ Fiore, Frank	06/06/2026	10,350KL
48228	Lot 34 Treeby/ Glenbrook Civil Engineering Contractors Pty Ltd	05/05/2026	19,950KL
160839	Lot 100 Treeby Rd/ Well Holdings Pty Ltd	27/11/2026	8,000 KL
160331	Lot 38 Treeby /Su, Chiou Yueh Lin, Su, Fan Jyh; Su, Kuo Hoa	01/03/2026	30,000KL
179454	Lot 39 Treeby/ Spring Park Pty Ltd	10/12/2024	61,150KL
58529	Lot 41 Treeby/ Alanna Joy Comley, Comley, Kenneth John	19/02/2027	9,200KL

3.2.3 Surface water and wetlands

The site is located within the Peel-Harvey Coastal Catchment, the Peel subdrain is located approximately 270 m south of southern boundary of the site (part Lot 13 Treeby Road).

There are no Ramsar wetlands or Directory of Important Wetlands on the site (DEE, 2018). The nearest Directory of Important Wetlands site is located approximately 1.2 km to the west of the site and is known as "Spectacles Swamp".

Regional geomorphic mapping indicates that there is a Conservation Category Wetland (CCW) (sumpland; UFI 15290 and 14148) which occurs across the southern section of the site (Figure 6). Currently, WAPC subdivision approval exists for Lots 35, 100 and part Lot 13 Treeby Road, therefore, the CCW mapping within these lots are no longer applicable. The CCW (UFI 13506) boundary is located along the southern boundary of Lot 41 Treeby Road.



Advice from the Environmental Protection Agency (EPA) states that all CCWs be protected and that an appropriate buffer of 50 m be applied to separate development activities from the CCW. Lots 35 and 100 already have sub division approval and therefore, CCW buffer requirements are extinguished across these Lots. POS has been applied along the southern boundary of Lot 41 within the LPS (Figure 2), which adequately applies the 50 m buffer requirements for the CCW; section 4 discusses this further.

The site is adjacent to the Jandakot Public Drinking Water Source Area (PDWSA) Priority 2 zone (Figure 6). The Department of Water (DoW) (2016:3) defines the following Priority zones as:

 P2- managed to maintain or improve the quality of the drinking water source with the objective of risk minimisation. P2 areas occur within PDWSAs where the land is zoned rural and the risks need to be minimised.

A PDWSA does not occur within the site.



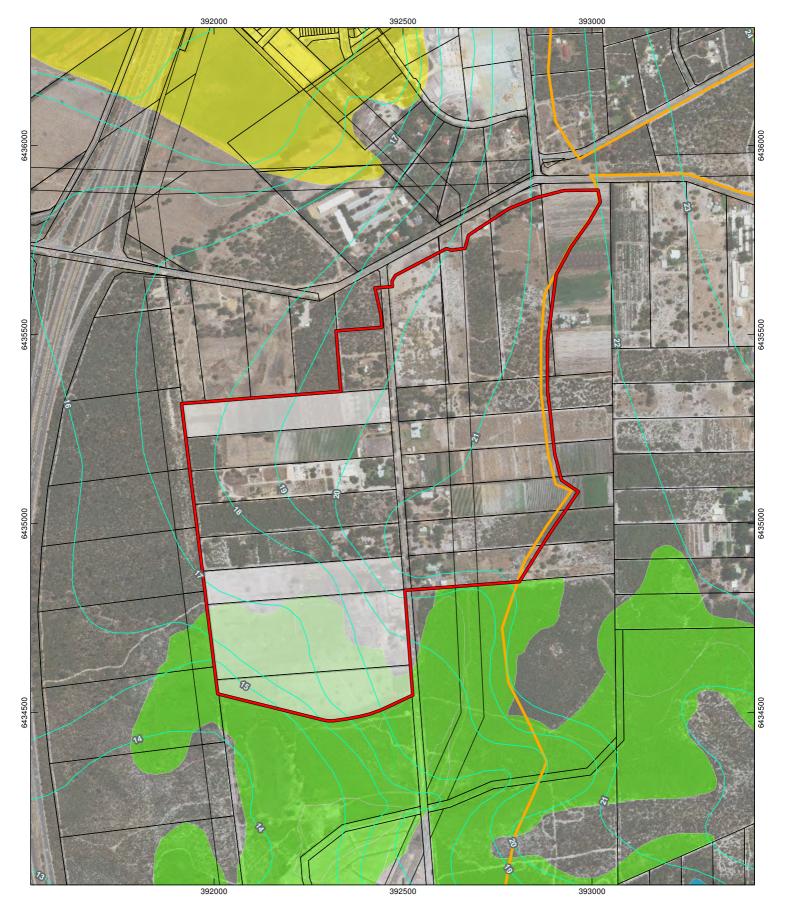
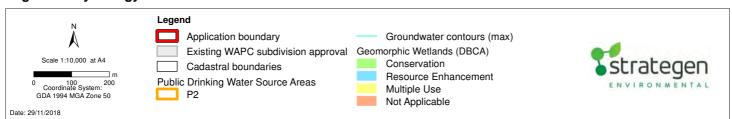


Figure 6: Hydrology



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3.3 Vegetation and flora

3.3.1 Vegetation

Regional vegetation association mapping (Beard, 1981) identified one association mapped as occurring within the site:

1001 Medium very sparse woodland; jarrah, with low woodland; banksia and casuarina.

WALGA (2018) reports that <10% of this association is remaining with the IBRA region (SCP Perth-SWA02) region and approximately 30-40% remaining within the CoK.

Board scale vegetation mapping indicates one vegetation complex to occur within the site:

Bassendean Complex Central South.

Bassendean Complex Central South is characterised by woodland of jarrah-sheoak-banksia on the sand dunes, to a low woodland of *Melaleuca spp.*, and sedgelands on the low-lying depressions and swamps. It includes the transition area of jarrah and pricklybark in the vicinity of Perth. *B. attenuata, B. grandis* and *B. menziesii* are common on the upper slopes; with *B. menziesii* decreasing southwards as it reaches the southern limit of its range near Mandurah. *B. ilicifolia, B. littoralis and M. preissiana* are common on the low-lying moister soils, where marri replaces jarrah in dominance. Other plant species include *Kunzea vestita, Hypocalymma angustifolium, Adenanthos obovatus* and Verticordia spp. (Heddle et al. 1986). Approximately 26% of the complex is estimated to remain compared to the pre-European extent (DBCA, 2017).

Historically a significant portion of the site has been progressively cleared, to support market garden horticulture activities, as a result, several small pockets of remnant vegetation occurs across several lots. Areas of remnant vegetation within the site has been identified as Local Natural Areas (LNA). LNA are part of the Perth Biodiversity Project to identify areas for land holders to prioritise retention during development considerations. Upon completion of the sub development stage, remaining LNA usually become the responsibility of the Local Government management (Del Marco et al. 2004). The LNA mapped by WALGA (2018) within the SP area are shown in Figure 7.

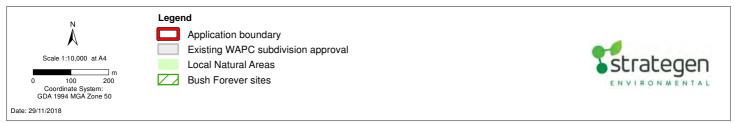
Bush forever (BF) site 270 occurs directly adjacent to the site (Figure 7). BF 270 is defined as an ESA and recognised as a regional ecological linkage as it forms connection with the Anketell and the Jandakot Regional Park.

According to Del Marco et al. (2004) the importance of ecological linkage is to connect natural areas, preferably with continuous corridors of native vegetation, which assists in fauna movement between the areas and to access resources and habitats. The protection, management and buffering of existing natural areas within an ecological linkage is a higher priority than revegetation of cleared portions of the link. Vegetation within the site has been identified within the Perth Regional Ecological Linkage network (Figure 7).





Figure 7: Bush Forever sites, Local Natural areas and ecological linkages



The DBCA NatureMap (Appendix 1) and Department of Environment and Energy (DEE) EPBC search tool databases were searched with 1km buffers (Appendix 2). The following significance flora species have been recorded within the vicinity of the site due to habit occurring within the area (Table 6).

Table 6: Likelihood of Threatened and Priority Flora species and Threatened Ecological Community occurring within SP area

Conservation status		- Habitat	Likelihood of presence	
Species	WC Act	EPBC Act	- парітат	within Survey Area
Andersonia gracilis (Slender Andersonia)	Т	Т	Found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as <i>Calothamnus hirsutus</i> , Verticordia densiflora and <i>Kunzea recurva</i> over sedges (DEE, 2018).	Unlikely Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000 and not recorded within the City of Kwinana (FloraBase, 2018). Habitat not present on site- too dry.
Caladenia huegelii (Grand Spider Orchid)	Т	Е	Mixed woodland of jarrah (Eucalyptus marginata), candlestick banksia (Banksia attenuata), holly banksia (B. ilicifolia) and firewood banksia (B. menziesii) with scattered sheoak (Allocasuarina fraseriana) and marri (Corymbia calophylla) over dense shrubs of blueboy (Stirlingia latifolia), Swan River myrtle (Hypocalymma robustum), yellow buttercups (Hibbertia hypericoides), buttercups (H. subvaginata), balga (Xanthorrhoea preissii), coastal jugflower (Adenanthos cuneatus) and Conostylis species, from just north of Perth to the Busselton area, usually within 20 km of the coast. Throughout its range the species tends to favour areas of dense undergrowth. Soil is usually deep grey-white sand usually associated with the Bassendean sand-dune system (DEC, 2009).	Unlikely Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000).
Cyathochaeta teretifolia	P3	-	Grey sand, sandy clay. Swamps, creek edges (FloraBase, 2018).	Unlikely Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000). Habitat not present on site- too dry
Diuris micrantha	Т	V	Brown loamy clay. Winter-wet swamps, in shallow water (FloraBase, 2018).	Unlikely Lack of winter wet swamps on site - no mapped geomorphic wetlands. Not recorded within Bush Forever site 270 (WAPC, 2000) Habitat not present on site- potentially too dry
Diuris purdiei	Т	Е	Grey-black sand, moist. Winter-wet swamps (FloraBase, 2018).	Unlikely Lack on winter wet swamps on site - no mapped geomorphic wetlands. Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000) or within City of Kwinana. Habitat not present on site- potentially too dry



	Conservation			Likelihood of presence within Survey Area
Species WC EP	EPBC Act	- Habitat		
Dodonaea hackettiana (Hackett's Hopbush)	P4	-	Sand. Outcropping limestone (florabase, 2018)	Possible Recorded within Lot 4 Anketell Road (pgv Environmental, 2015),
Drakaea elastica (Glossy-leaved Hammer Orchid)	Т	E	White or grey sand. Low-lying situations adjoining winter-wet swamps (florabase, 2018).	adjacent to SP area. Unlikely Lack on winter wet swamps on site - no mapped geomorphic wetlands. Not recorded within Bush Forever site 270 (WAPC, 2000)
Drakaea micrantha	Т	V	White-grey sand (FloraBase, 2018). Usually found in cleared fire breaks or open sandy patches that have been disturbed, and where competition from other plants has been removed and occurs in infertile grey sands, in Banksia, Jarrah (<i>Eucalyptus marginata</i>) and Common Sheoak (<i>Allocasuarina fraseriana</i>) woodland or forest (Department of the Environment, Water, Heritage and the Arts 2008)	Unlikely Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000) or within the City of Kwinana area (FloraBase, 2018). Habitat not present on site- potentially too dry
Lepidosperma rostratum	Т	E	Peaty sand, clay (FloraBase, 2018) and grows in sandy soil among low heath in a winter wet swamp Department of the Environment, Water, Heritage and the Arts (2008a)	Unlikely Not recorded within 2010 survey or Bush forever site 270 (WAPC, 2000) or within the City of Kwinana area (FloraBase, 2018).
Banksia Woodlands of the Swan Coastal Plain TEC	-	E	The Banksia Woodlands ecological community mainly occurs on deep Bassendean and Spearwood sands. The Banksia Woodlands ecological community mainly occurs on deep Bassendean and Spearwood sands	Present

3.3.2 Site survey

Previous Surveys

A site survey was completed by Bennett Environmental in Spring 2009 in accordance with EPA (2004) guidance and reported within the original LSP (Rowe Group, 2015). Site mapping was conducted by Bennett Environmental (2010) in which four vegetation units were recorded Across the current LSP area, Map 2 of Appendix 3 illustrates the four vegetation types across the site, these are described below:

- Hh: Low Forest A of Banksia attenuata, Banksia menziesii and Allocasuarina fraseriana over Open Scrub of Kunzea glabrescens over Heath B dominated by Hibbertia hypericoides in grey sand.
- Af: Open Low Woodland A of *Banksia attenuata and Banksia menziesii* occasionally with Allocasuarina fraseriana over Dense Thicket of *Kunzea glabrescens* over Herbs of *Dasypogon bromeliifolius* and *Philotheca spicata* in grey sand.
- Em: Open Tall Woodland of *Eucalyptus marginata subsp marginata* occasionally with scattered trees of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* in grey sand.
- Bi: Low Woodland A of Banksia attenuata, Banksia ilicifolia and Nuytsia floribunda over Thicket of Kunzea glabrescens and Melaleuca thymoides over Low Heath D dominated by Scholtzia uberiflora and Aotus procumbens on a slight rise in grey sand with scattered limestone (360 Environmental, 2010) (Appendix 3).



Due to the level of disturbance on site, a significant portion of vegetation was recorded in Degraded to Completely Degraded condition. Pockets of remnant vegetation (particularly in Lots 33 and 34) were in Very Good to Good condition (Appendix 3).

Bennett Environmental (2010) reported that a Level 3 PEC (Low lying *Banksia attenuata* woodlands or shrublands) was confirmed as occurring on the site through a PATN analysis undertaken on the results of the flora and vegetation data collected.

During the survey conducted by Bennett Environmental (2010) a total of 58 vascular plant families, 125 genera and 167 taxa across the site. No Threatened flora species were recorded as occurring on the site. *Jacksonia gracillima*, a Priority 3 Flora species, was recorded outside of the LSP site within the Bush forever site No. 270 (Bennett Environmental 2009) and approximately 20 plants were recorded from each location. 360 Environmental (2010) reports that a DRF had previously been recorded within Lot 35, an extensive search was undertaken but was unable to locate this species; currently, Lot 35 has WAPC subdivision approval.

Updated survey

Further to the 2010 survey undertaken by Bennett Environmental, Strategen completed a supplementary reconnaissance survey for the site with a focus on Lots 36 and 40 Treeby Road (Strategen 2018a); at the time of survey, access to Lot 7 and 89 Anketell Road was not permitted/granted. The outcome of the reconnaissance flora assessment of Lot 36 and Lot 40 is discussed below and presented in Figure 8 and Figure 9.

Flora

A total of 30 native vascular taxa from 15 plant families were recorded within the site (Table 7), the dominant plant families were Myrtaceae (six taxa) and Proteaceae (six taxa).

Table 7: Native plant taxa recorded in the site

Family	Species
Asparagaceae	Sowerbaea laxiflora
Azioaceae	Carpobrotus edulis
Campanulaceae	Lobelia sp.
Casuarinaceae	Allocasuarina fraseriana
Colchicaceae	Burchardia congesta
Cyperaceae	Mesomelaena pseudostygia
Dilleniaceae	Hibbertia hypericoides
Ericaceae	Conostephium pendulum
Fabaceae	Acacia saligna
	Bossiaea eriocarpa
	Hardenbergia comptoniana
	Jacksonia furcellata
	Jacksonia sternbergiana
Haemodoraceae	Conostylis aculeata
	Dianella revoluta
Loranthaceae	Nuytsia floribunda
Myrtaceae	Agonis flexuosa
	Chamelaucium unicatum
	Eucalyptus gomphocephala
	Eucalyptus marginata
	Hypocalymma robustum
	Kunzea glabrescens
Proteaceae	Adenanthos cygnorum
	Banksia attenuata
	Banksia ilicifolia
	Banksia menziesii



Family	Species
	Petrophile linearis
	Stirlingia latifolia
Xanthorrhoeaceae	Xanthorrhoea preissii
Zamiaceae	Macrozamia riedlei

A total of 15 introduced flora taxa were recorded in the site, as follows:

- Arctotheca calendula (Cape Weed)
- Avena barbata (Wild Oats)
- *Briza maxima (Blowfly Grass)
- Carpobrotus edulis (Pigface)
- *Ehrharta calycina (Perennial Veldt Grass)
- *Ehrharta longiflora (Annual Veldt Grass)
- *Eragrostis curvula (African Lovegrass)
- *Euphorbia terracina (Geraldton Carnation Weed)
- *Freesia alba x Leichtlinii (Freesia)
- *Fumaria capreolata (Fumitory)
- *Gladiolus caryohyllaceus (Pink Gladiolus)
- *Hypochaeris glabra (Smooth Cat's Ear)
- *Lupinus angustifolius (Narrowleaf Lupin)
- *Oxalis pes-caprae (Soursob)
- *Ursinia anthemoides (Ursinia)

Vegetation

A total of six vegetation types comprising native vegetation were recorded in Lots 36 and 40 (Figure 8), which included:

- EmBa: Open forest of *Eucalyptus marginata* over low open woodland of *Banksia attenuata*, *Banksia menziesii* and *Allocasuarina fraseriana* over shrubland of *Xanthorrhoea preissii* and *Jacksonia sternbergiana* over low shrubland of *Bossiaea eriocarpa* and *Conestephium pendulum* over *Mesomelaeana pseudostygia* herbland/grassland on sandy soils (0.37 ha).
- AcNf: Tall shrubland of Adenanthos cygnorum with occasional Nuytsia floribunda over a weedy grassland on sandy soils (1.26 ha).
- KgXp: Thicket of *Kunzea glabrescens* and *Xanthorrhoea preissii* over mixed weeds on sandy soils (0.3 ha).
- EmKg: Isolated trees of Banksia menziesii over mixed weeds on sandy soils (1.16 ha).
- Eg: Scattered trees of *Eucalyptus gomphocephala* and *Agonis flexuosa* over grassy weeds on sandy soils (1.13 ha)
- Bm: Isolated trees of Banksia menziesii over mixed weeds on sandy soils (0.23 ha).

A vegetation assessment consulted be Strategen concluded there are no state listed TECs or PECs within the site; however, federally listed Banksia woodlands TEC is present within the site, further discussion is available below in section 3.3.3.

Vegetation condition ranged from Very Good to Completely Degraded with the majority of Lots 36 and 40 in Completely Degraded condition (3.91 ha) (Figure 9). Past and current land uses, including historical clearing and housing along with the dominance of weeds have contributed to overall vegetation condition, and caused significant fragmentation of the vegetation. Firebreaks and informal tracks have also impacted the vegetation. Non-endemic and planted vegetation was also present at the site.



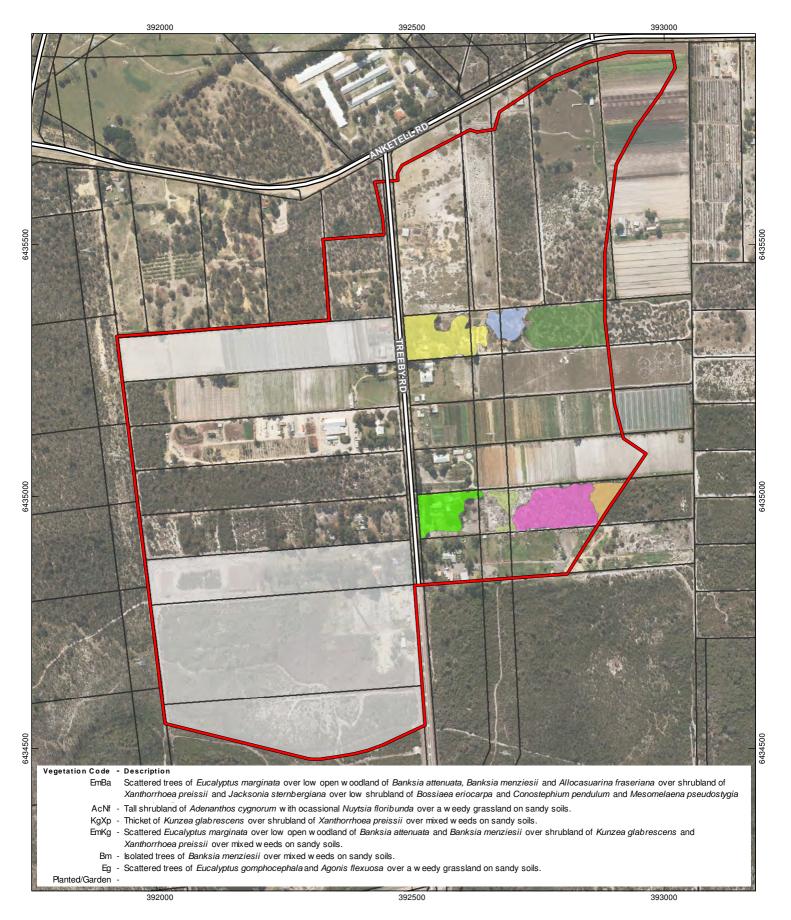
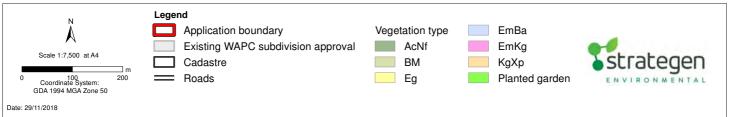
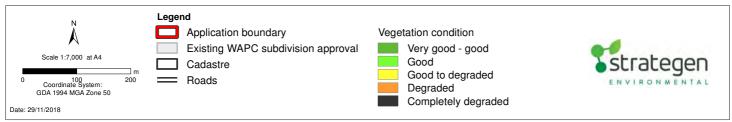


Figure 8: Vegetation types



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Figure 9: Vegetation condition



3.3.3 Banksia Woodland TEC

Overview

In 2016, Banksia Woodlands of the SCP (Banksia woodlands) were listed as a TEC under the EPBC Act with a conservation advice issued for reference which identifies key diagnostic characteristics to determine whether the remnant vegetation on site is considered to be the Banksia woodlands TEC. Four vegetation types delineated by Bennett Environmental (2009) are likely to align with the Banksia woodlands TEC (Hh, Bi, and Af) based on vegetation quadrat data sampled within these vegetation types.

The Banksia woodland in vegetation types Hh, Bi and Af within Lots 31, 32, 33, 34 and 188 are considered to be representative of FCT 28 which has a Low Risk conservation status (Gibson et al. 1994). This community is not listed as a state Priority Ecological Community, however it represents the federally listed Banksia Woodland TEC.

Site Assessment

The supplementary reconnaissance survey conducted by Strategen, identified two additional vegetation types, EmBa and EmKg which comprise Banksia woodland ranging from Good to Very Good condition in Lots 36 and 40.

The WALGA (2018) environmental tool indicates that Banksia woodlands TEC is likely to occur within the site. Vegetation (which was available to access) within the site was assessed against the key diagnostic criteria for the Banksia woodlands TEC (TSSC 2016). Remnant vegetation (Hh, Af, EmBa and EmKg) within the site, meet the diagnostic criteria provided in the approved conservation advice for the Banksia woodlands TEC.

Banksia Woodland was identified as occurring in Lot 188 by Bennett Environmental (2010) and was mapped as vegetation type 'Hh' in Very Good – Good condition. While access to this Lot was not granted for the Strategen (2018) survey, observations from current aerial imagery and additional observations made from the roadside, indicate that the condition of the vegetation may have significantly declined since the 2009 survey. Vegetation condition appears to now potentially range from Good to Completely Degraded within Lot 188 and as a result it has been mapped as 'Potential Banksia Woodland TEC' (Figure 10) based on the data and mapping from Bennett Environmental (2009).

Access was also not permitted for Lot 34 in the Strategen (2018) survey, and therefore, vegetation within Lot 34 has been mapped as 'Potential Banksia Woodland TEC' (Figure 10) based on mapping and data collected from Bennett Environmental (2009).

The key diagnostic characteristics that classify the Banksia woodlands TEC provided in Table 8 is based on the data provided in Bennett Environmental (2009) (Appendix 3) and Strategen (2018) supplementary reconnaissance survey.

Table 8: Characteristics of the Banksia woodland within the SP area compared to the key diagnostic criteria as per TSSC (2016)

Key diagnostic criteria (TSSC 2016)	Banksia woodlands within the SP area	
Location: Occurs in the Swan Coastal Plain or Jarrah Forest IBRA bioregions.	Yes. Banksia woodlands within the site occur on the Swan Coastal Plain.	
Soils and landform: Occurs on: • well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands	Yes. site is located within the Bassendean Dune System and consists of Spearwood/Bassendean soil types. Refer to Section 3.1.	
sandy colluviums and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau		
 transitional substrates and sandflats. 		



Key diagnostic criteria (TSSC 2016)	Banksia woodlands within the SP area	
Structure: Low woodland to forest with: • a distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the banksia species identified below • emergent trees of medium or tall (>10 m) height. Eucalyptus or Allocasuarina species may sometimes be present above the banksia canopy • an often highly species-rich understorey.	 Yes. Vegetation Units consist of: Hh: Low Forest A of Banksia attenuata, Banksia menziesii and Allocasuarina fraseriana over Open Scrub of Kunzea glabrescens over Heath dominated by Hibbertia hypericoides in grey sand. Af: Open Low Woodland A of Banksia attenuata and Banksia menziesii occasionally with Allocasuarina fraseriana over Dense Thicket of Kunzea glabrescens over Herbs of Dasypogon bromeliifolius and Philotheca spicata in grey sand (Bennett, 2010). EmBa: Open forest of Eucalyptus marginata over low open woodland of Banksia attenuata, Banksia menziesii and Allocasuarina fraseriana over shrubland of Xanthorrhoea preissii and Jacksonia sternbergiana over low shrubland of Bossiaea eriocarpa and Conestephium pendulum EmKg: Scattered Eucalyptus marginata over low open woodland of Banksia attenuata and Banksia menziesii over shrubland of Kunzea glabrescens and Xanthorrhoea preissii over mixed weeds 	
Composition: Contains at least one of the following species: 1. Banksia attenuata 2. Banksia menziesii 3. Banksia prionotes 4. Banksia ilicifolia.	Yes. Banksia woodlands within the survey area contain <i>Banksia attenuata</i> , <i>Banksia menziesii</i> and <i>Banksia ilicifolia</i> .	
Condition (Keighery 1994): 'Pristine': no minimum patch size 'Excellent': 0.5 ha 'Very Good': 1 ha 'Good': 2 ha.	Yes, based on vegetation condition mapping from Bennett Environmental (2009) and the Strategen (2018), supplementary reconnaissance survey, vegetation containing Banksia woodland ranges from Good to Very Good.	

Table 9: Additional Information to characterise the Banksia TEC

Key diagnostic characteristics	Information	Relevant content to be discussed in the referral (refer to DEE 2016)	Response and Discussion
Location and physical environments	Regional distribution and quality	Quantity/quality of vegetation community in, and in the region around, the site where the proposed action will occur (Section 2.2.2)	The site is located adjacent to Bush forever site 270 (Jandakot Regional Park) the following FCT have been recorded within the Bush forever 270: FCT21a, 21c, 22, 23a, 28 (WAPC, 2000).
Patch condition	Condition thresholds	What is the patch condition using the condition categories outlined in Section 2.2.2 Note: A patch could vary in quality over the range of the patch.	Good (Bennett Environmental 2009).



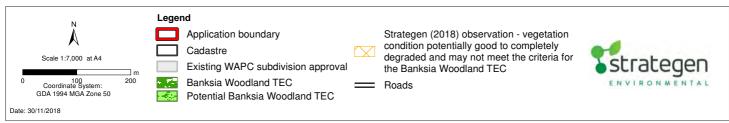
Key diagnostic characteristics	Information	Relevant content to be discussed in the referral (refer to DEE 2016)	Response and Discussion
Patch Size	Patch size in hectares	Is the patch size large enough to meet criteria in Section 2.2.3? Note: Patch boundaries are not limited to the proposal site.	Based on vegetation condition mapping from Bennett Environmental (2009) and Strategen Environmental (2018) confirmed patches of TEC total approximately: • 0.37 ha of Banksia woodland in Good condition in Lot 40 Treeby Road • 6.91 ha of Banksia woodland in Very Good - Good condition in Lot 31, 32, 33 and 40 Treeby Road • 2.019 ha of Banksia woodland vegetation in Very Good condition Lot 188 Anketell Road
	Surrounding buffer	What is the size and vegetation community of the surrounding buffer? (Section 2.2.3) and what is the connectivity to the surrounding vegetation? Note: The assessments of a patch should initially be centred on the area of highest native floristic diversity and/or cover i.e. the best condition area of the patch and one patch could be made up of several subcommunities.	Lots 31-33 Treeby road are adjacent to a Bush forever site and are considered to be within the buffer zone.
Other condition considerations	Presence/absence and spread of Phytophthora cinnamomi (dieback)	If present, how much dieback exists and is the proposed action likely to spread dieback further? (Appendix D5) If not present, can its introduction be prevented?	A formal dieback assessment has not been completed within the LSP area; both Bennett Environmental (2009) and pgv Environmental (2015) report did however suggest that dieback could be present within Lot 35 Treeby Road and Lot 4 Anketell Road due to several Banksia deaths.
	Presence/absence Weeds	Does the patch contain weeds? (Appendix D6) Which species are present and how can they be managed?	Yes, the following weed species were recorded within Lot 33, 36 and 40: * *Arctotheca calendula * *Avena barbata * *Briza maxima * *Briza minor * *Euphorbia terracina * *Ehrharta calycina * *Gladiolus caryophyllaceus * *Hypochaeris glabra * *Oxalis pes-caprae * *Ursinia anthemoides
	Any other notable disturbance to the site where relevant (i.e. fragmentation, fire regimes, bare patches, erosion, feral animals)	What disturbance is present which may degrade the quality of the community or species? (Appendix D) For anyleach form of disturbance, what is the degree of the disturbance? Is there evidence of recruitment of key native plant species following disturbance?	Maintenance of firebreaks, existing tracks, no active management in weed control and uncontrolled access are all notable disturbances to the Banksia woodland in the site.



Key diagnostic characteristics	Information	Relevant content to be discussed in the referral (refer to DEE 2016)	Response and Discussion
	Patch isolation	Is the patch connected to other areas of Banksia Woodland or is it isolated? (Section 2.2)	Lots 31, 32, 33 Treeby Roadare connected to Banksia Woodland west of the survey area Lot 188 Anketell Road is connected to Lot Anketell Road which will be retained as a result of this SP amendment
Sub-community and vegetation unit	Broad scale structural unit (Beard vegetation associations)	Provide the best corresponding Beard vegetation association (s) (Appendix C1)	1001 Medium very sparse woodland; jarrah, with low woodland; banksia and casuarina
	Floristic community types (Gibson et al., 1994; Keighery et al., 2008)	Provide the closest resemblance of floristic community type(s) with reference to those discussed in Appendix C2 of the BWSCP Conservation advice (Appendix C2 and Section 1.3.2) Note: there is potential for multiple sub-communities within a patch.	Statistical analysis conducted by Bennett Environmental (2009), comparing site data with the Swan Coastal Plain dataset (Gibson et al. 1994) assigned the following FCTs to the VTs potential containing Banksia woodland: • Hh-FCT28, 21a • Af-FCT21c, 21a, 23a
Surveying	Timing of the surveying	Ideally surveys should be undertaken in spring with two sampling periods to capture early and late flowering species (Section 2.2.2). When was sampling undertaken at the proposed site? Is there any reason why the vegetation community could not be readily identified (e.g. due to recent disturbance such as fire)? Note: Section 2.2.4 of the BWSCP Conservation advice has guidance on timing/protocols for surveys (e.g. after fire).	Both the Bennet Environmental (2009) and Strategen (2018) surveys were undertaken in spring (early November), which is within the optimal survey period for the region. The data collected from the surveys is considered sufficient in determining whether the vegetation in the site is representative of the Banksia woodland TEC, based on key attributes i.e. dominant species.



Figure 10: Potential Banksia Woodland SCP TEC



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3.4 Fauna and habitat

Overview

A search was undertaken of the DBCA Naturemap database (DBCA 2018) for the site and a 1 km buffer (Appendix 1) and the DEE Protected Matters Search Tool (DEE 2018) for species protected under the EPBC Act (including 1km buffer) (Appendix 2). The results indicated that some significant species or their habitats are likely to occur in the vicinity of the site. These species and the likelihood of their occurrence is discussed in Table 10.

Table 10: Likelihood of Threatened and Priority Fauna species occurring within SP Area

Table 10. Likelinood 01	Conservation status		Habitat	Likelihood of
Species	WC Act	EPBC Act		presence within Survey Area
Calidris ferruginea (Curlew Sandpiper)	-	CE	It mainly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Minister for the Environment, 2015).	Unlikely. Preferred habitat not present within the site.
Calyptorhynchus banksii naso (Forest Red-tailed Black-Cockatoo)	V	V	It inhabits the dense Eucalyptus marginata (Jarrah), E. diversicolor (Karri) and Corymbia calophylla (Marri) forests receiving more than 600mm of annual average rainfall.	Possible to likely. Foraging habitat present within the site and also within the modelled distribution area by DEE (2016).
Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)	E	E	Typically occurs in woodlands and scrubs of semiarid interior of Western Australia, in non-breeding season wandering in flocks to coastal areas, especially pine plantations and Banksia woodlands. Food includes the flowers, nectar and seeds of Banksia, Dryandra, Hakea, Eucalyptus, Corymbia, Grevillea, also seeds of Pinus.	Possible to likely. foraging habitat present within the site and the site is within the modelled distribution for breeding range for the species (DEE, 2016).
Isoodon obesulus (Southern Brown Bandicoot)	P4	-	Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover.	Possible to likely. WALGA (2018) mapped habitat within the site and recorded within Bush Forever Site 270 (WAPC, 2000).



	Conservatio	n status	Habitat	Likelihood of	
Species	WC Act	EPBC Act		presence within Survey Area	
Leipoa ocellate (Malleefowl)		V	Found in some shrublands dominated by acacia, and occasionally in woodlands dominated by eucalypts such as Wandoo E. wandoo, Marri Corymbia calophylla and Mallet E. astringens.	Unlikely. Preferred habitat not present within the site.	
Oxyura australis (Blue- billed Duck)	P4		Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation	Unlikely. Preferred habitat (wetlands) not present within the site.	
Rostratula australis (Australian Painted Snipe)	Е	Е	Occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, claypans, inundated or waterlogged grassland/saltmarsh, dams, rice crops, sewage farms and bore drains, generally with a good cover of grasses, rushes and reeds, low scrub, <i>Muehlenbeckia</i> spp. (Minister for the Environment, 2013).	Unlikely. Preferred habitat not present within the project area.	
Dasyurus geoffroii (Chuditch, Western Quoll)	Т	V	Habitats including forest, mallee shrublands, woodland and desert. Chuditch had not been recorded on the Swan Coastal Plain since the 1930s (DEC, 2012).	Unlikely. Preferred habitat not present within the site.	

Black Cockatoo habitat assessment

Black Cockatoo habitat was assessed during the site assessment for Lots 31, 32, 33, 36 and 40 Treeby Road (Strategen 2018). Any trees meeting the following criteria for potential breeding and foraging habitat were recorded, marked and electronically logged using a handheld Global Positioning System (GPS) unit:

- native trees (e.g. Jarrah, Tuart, Marri)
- diameter at breast height (DBH) > 500 mm (300 mm for Wandoo and Salmon Gum)
- hollows > 120 mm diameter
- evidence of feeding (chewed cones, seed and nut material)
- opportunistic observations of Black Cockatoos in the site.

During the site assessment, no Black Cockatoos were observed or were heard calling.

Foraging Habitat

A total of 9.2 ha of Black Cockatoo foraging habitat was identified at the site (Figure 11); an additional 6.7 ha of vegetation which was not included in the survey due to site access issues was identified as potential Black Cockatoo habitat and will require further investigation prior to subdivision application. The majority of which consisted of Banksia woodland with scattered Jarrah (*Eucalyptus marginata*). The dominant foraging species included *Banksia attenuata*, *Banksia menziesii*, Sheoak (*Allocasuarina fraseriana*), Jarrah and *Xanthorrhoea preissii* (6.56 ha).

The remaining 1.37 ha of Black Cockatoo foraging habitat consisted of isolated foraging tree species including Tuart and *Banksia menziesii*.

No foraging evidence in the form of chewed nuts were recorded in the site (Strategen 2018).



Breeding Habitat

In total, 27 potential breeding trees were observed within the site, 13 were Tuart (*Eucalyptus gomphocephala*), 10 were Jarrah and two were planted, non-endemic trees, **Corymbia maculata*.

Of the 27 potential breeding trees, two were observed to contain hollows with an estimated opening diameter of less than 120mm and were therefore, not large enough to be suitable for use by Black Cockatoos.

No evidence of breeding was recorded at the site (Strategen 2018).



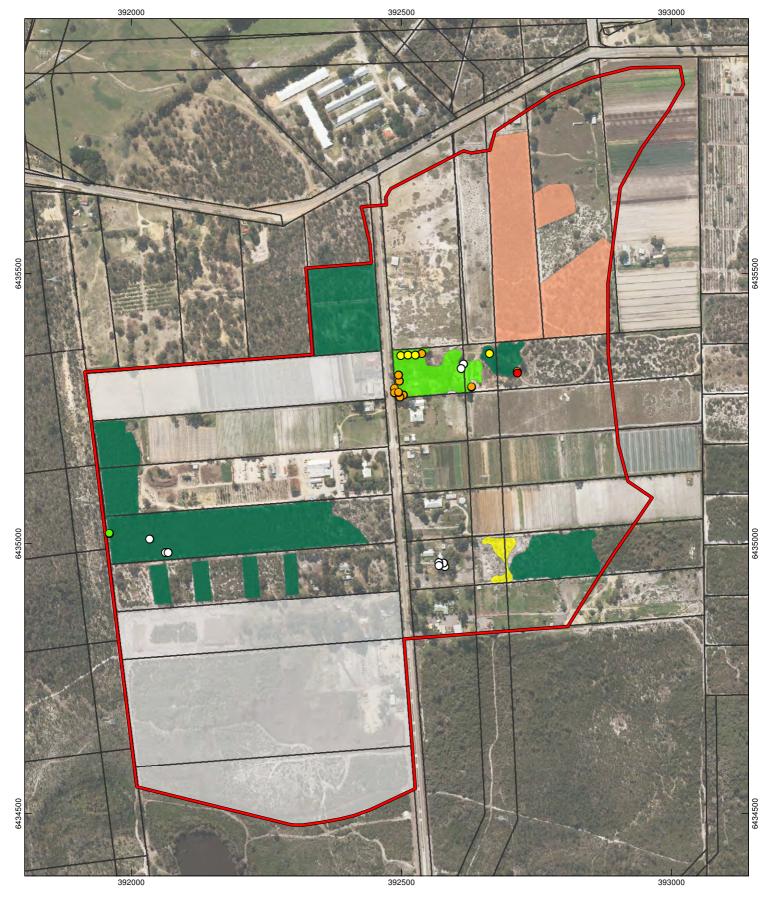


Figure 11: Black cockatoo foraging habitat and potential habitat trees



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3.5 Environmentally sensitive areas

Environmentally Sensitive Areas (ESAs) are areas that have been identified for protection due to their environmental significance as outlined in the Western Australian Environmental Protection (Environmentally Sensitive Areas) Notice 2005, which was gazetted on 8 April 2005.

Exceptions offered for clearing under Regulation 5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply within ESAs. ESAs are protected under the EP Act, and include the following:

- world Heritage areas
- · areas included on the National Estate Register
- · defined wetlands and associated buffers
- · vegetation within 50 m of a listed Threatened species
- TECs.

ESA mapping surrounds the western and southern boundary of the site, with mapping slightly extending into Lots 35, 100, part 13 and 41 Treeby Road (WALGA, 2017). ESA mapping across this area is to be associated with the known presence of the CCW and BF 270 located adjacent to the site (Figure 12). LSP design has considered the implications of the CCW and BF site to Lot 41 and included POS along the southern boundary to maintain appropriate setback distances. Lots 35, 100 and part of Lot 3 are already the subject of subdivision approval and do not form part of this LPS amendment.

3.6 Heritage

The Department of Planning, Lands and Heritage (2018) Aboriginal Heritage Inquiry System was searched, which identified there are no registered places within or adjacent to the site; additionally, there are no other heritage places within the site. The boundary for Mandogalup Swamp/Spectacles (site ID 3427) resides within a small section of Anketell Road reserve an is known for Mythological, Hunting Place and Water source approximately 870 m to the west.

Additionally, another Other Heritage Place site- Treeby Road Lake (ID 3555) is located approximately 600 m south of the LSP boundary within Bush Forever site 270.

The Heritage Council (2018) InHerit database was searched for registered sites, there are currently no sites within the SP area.

3.7 Bushfire Risk

Based on regional Bush Fire Prone Area Mapping (Department of Fire and Emergency Services 2017) the site is mapped within the designated bushfire prone area. A Bushfire Management Plan (BMP) has been prepared by Strategen (2018a) to address requirements under Policy Measure 6.3 of State Planning Policy 3.7 Planning in Bushfire-Prone Areas (SPP 3.7; WAPC 2015) and Guidelines for Planning in Bushfire-Prone Areas (the Guidelines; WAPC 2017).

The BMP should be read in conjunction with this EAR.



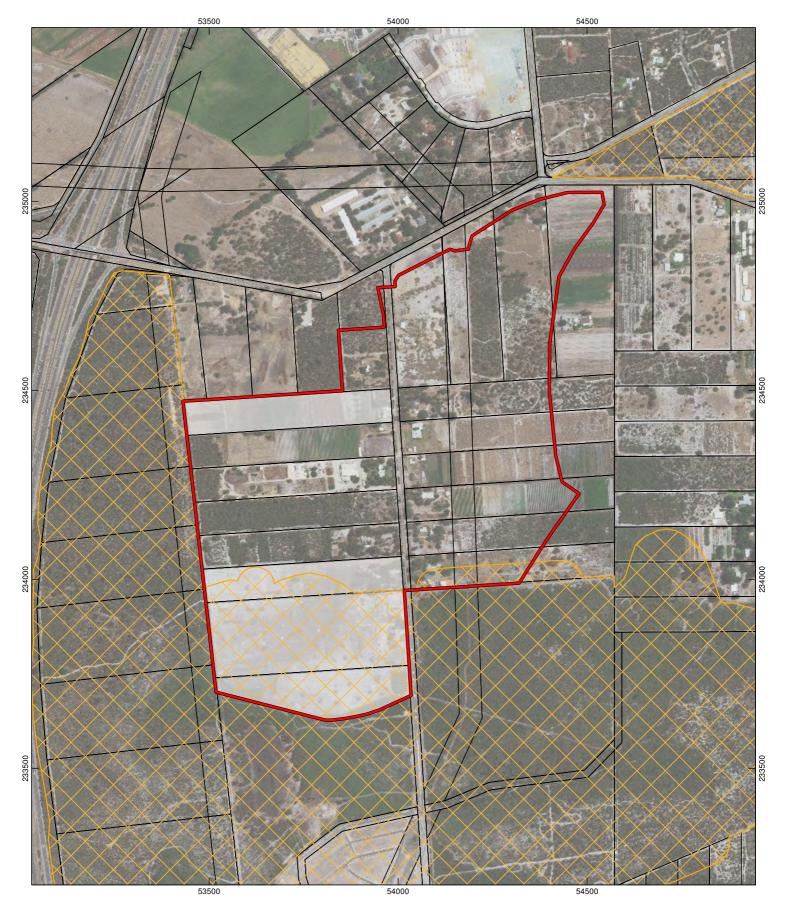


Figure 12: Environmentally Sensitive Areas



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4. Potential impacts and management measures

4.1 Acid Sulfate Soils

As per Section 3.1.3, a high to moderate risk and a moderate to low risk of acid sulfate soils occurring within 3 m from the surface occur within the site. Without careful consideration and appropriate investigations acid sulfate soils may impact the surrounding environment. Prior to the subdivision stage appropriate geotechnical investigations will be conducted across the site to further advise the development of appropriate acid sulfate soil management in consideration of DWER ASS guidelines.

4.2 Hydology

4.2.1 Predicted impacts

Without appropriate consideration and management, the development has the potential to impact upon the pre-development hydrological cycle and water quality, including:

- · groundwater recharge and aquifer levels
- · surface water characteristics
- export of pollutants such as phosphorus and nitrogen to surface or groundwater
- · export of pollution from sewerage.

Development design and construction practices must also take into consideration separation to groundwater to avoid flood damage in developed areas and to prevent erosion of waterways, slopes and banks.

Development of the site will result in a significant increase in runoff volumes and flow rates leaving the site.

4.2.2 Mitigation and management

A Local Water Management Strategy (LWMS) has been developed for the site which has been used to guide the location and size of stormwater retention basins. To ensure the pre-development peak discharges are maintained a number of retention basins have been incorporated into the design to meet the requirements of the one, five and 100 year ARI events.

The environmental assessment identified a CCW along the southern Boundary of Lot 41 Treeby Rd. Impacts to the CCW have been mitigated by the provision of POS within the 50 m buffer; subdivision approval is likely to require the development of a Wetland Management Plan (WMP) which will include measures such as:

- revegetation within the CCW buffer
- weed control
- · site water containment

Proposed management strategies listed below, are designed to maintain the high conservation value of the CCW, surrounding Bush Forever site 270 and ecological linkage through the site. Design considerations have included the following:

- delineation of a suitable wetland buffer associated with Treeby Lake in the form of providing POS along the southern boundary of Lot 41
- maintenance of an appropriate cycle of seasonal inundation within the Treeby Road Lake



- providing an extensive network of pedestrian and bike paths to direct the movement of
 pedestrians and cyclists along constructed tracks and prevent uncontrolled access to sensitive
 wetland and bush habitats. The alignment of the path will be specifically selected to minimise
 direct disturbance of wetland habitat, maintain waterbird habitat and to provide viewpoints (while
 also preventing visual intrusion into areas of high naturalness and scenic value)
- linear biofiltration swales that retain all events <1:1 year recurrence within the swale. Events greater than this will be directed to dampland habitat preferentially to both supplement seasonal flooding of this habitat and promote biofiltration, flood retention and nutrient removal. Discharge from the biofiltration swales will be dissipated via a series of bubble-up pits designed to promote overland flow, as well as minimise scour and erosion
- rehabilitation of any degraded portions of the retained area of CCW
- protection mechanisms between the CCW and the proposed development to ensure the wetland areas are not damaged during or post-construction
- interface treatments such as fencing and signposting between the proposed development and the CCW to prevent inappropriate access and protect against vermin and bushfire
- weed treatment of bushland areas using suitable bio-safe herbicides
- definition of management responsibilities and timeframe/success criteria for handover of future management to Town of Kwinana
- lots will not abut wetland habitats, rather boundary roads, pathways and/or biofiltration swales will
 provide separation between the buffer and development

A Wetland Management Plan (WMP) is likely to be required to support the development of affected lots at the subdivision stage.

4.2.3 Predicted outcome

LSP design has retained an appropriate buffer from the CCW to ensure adequate separation from the development and the CCW. With the development of the WMP, impacts the CCW can be managed to ensure the CCW retains it high conservation value. Furthermore, sub division approval will result in conditions which ensure development construction protects the conservation value of the CCW and Bush forever 270.

Site drainage has ensured appropriate retention of stormwater for nutrient detention within the site.

4.3 Vegetation and flora

4.3.1 Potential impacts

The LSP has been strategically designed to utilise as much Completely Degraded and cleared land as practicable, development of the site will necessitate the clearing native vegetation ranging from Very Good - Excellent to Completely Degraded. Banksia Woodland TEC has been identified across the site totalling 9.6 ha, which will be impacted by the development of the LPS.

Clearing of native vegetation has the potential to impact upon mapped LNAs and ecological linkages, if not appropriately factored into the development design and future management measures. Bush forever site 270 is a conservation significant area and the design of the proposed development has considered this environmentally significant area.

Clearing practices have the potential to result in the spread of *Phytophthora cinnamomi* (Dieback) to retained vegetation and vegetation in areas adjacent to the site, if not managed appropriately.

Without appropriate construction management procedures, clearing practices may also result in accidental clearing of vegetation and trees proposed for retention.



4.3.2 Mitigation and management

LSP design has focused on retention of the best quality Banksia TEC and vegetation across the site. POS locations across the SP has considered the Black Cockatoo foraging habitat significant trees and TEC locations to maximise the retention of the best quality vegetation and reduce impacts to Black Cockatoos and TECs. Furthermore, POS placement has considered topographical features and some POS have been places on high points in the landscape to increase the visual amenity of the POS across the site.

A Landscape Management Plan will be developed for the site, which will ensure each Lot will be streetscaped with a locally endemic tree to promote ecological connectivity across the LSP and regional area; furthermore, Treeby Road will be constructed with a median strip which will be vegetated with endemic species to further increase ecological connectivity across the site.

A significant tree survey has been conducted across the site and the position of POS within the site has considered the significant trees identified onsite to ensure maximum retention across the site.

The development of the site will result in the clearance of Banksia TEC, at thresholds requiring referral to the Department of Environment and Energy (DEE) for potential significant impacts. All considerations for referrals for potential significant impacts to TECs, will be conducted at the development stage by the landholder in response to site conditions.

Retention of these matters within proposed POS areas will be subject to drainage, landscaping, bushfire and engineering requirements and will be finalised during subsequent planning stages i.e. subdivision.

Dieback controls will be imposed during development which includes the delineation and restriction of access to areas of vegetation planned for retention within the site. dieback control measures will be developed as part of the subdivision approval application.

4.3.3 Predicted impacts

POS location has focused on the best quality vegetation across the site and connectivity with the conservation value of Bush Forever 270 and the CCW. POS placement along the boundary of the LSP, provided suitable separation of development activities and conservation values, whilst contributing to ecological connectivity.

Management practices started above adequately protect the high conservation values of the surrounding areas and maintain high quality bushland within the LSP. Further work in the form of referrals for significant impacts to Matters of National Environmental Significance will proceed ahead of the sub development stage; additionally, the sub-division approval will result in conditions associated with key environmental attributes of the site.

Mitigation measures proposed to be employed by the development of the site coupled with the approvals process the development of the site will be subject to, ensures the impacts to vegetation within and adjacent to the site is as minimal as is practicable.

4.4 Fauna

4.4.1 Potential impacts

A number of federally and state listed fauna species have the potential to be present at the site. In particular, the fauna survey identified the presence of suitable foraging habitat and potential habitat trees for Black Cockatoos.

While no foraging evidence was observed on-site and all potential habitat trees were absent of suitable hollows for Black Cockatoos; the removal of foraging habitat from the site couples with the loss of some potential habitat trees may result in impacts to Black Cockatoos.



4.4.2 Mitigation and management

The LSP has considered the placement of POS to capture BC foraging habitat and potential habitat trees for retention. The Landscape Management Plan will provide direction for the LPS to establish locally endemic trees suitable for foraging ie. tuarts; furthermore, a Fauna Management Plan will be prepared at the sub-division stage of development which will include:

- inspection and management procedures for trees suspected as nesting sites
- removal and relocation techniques for fauna requiring translocation from the site
- clearing management to detail the proposed clearing schedule to minimise potential impacts to fauna
- reference to other activities such as rehabilitation of areas to promote habitat retention and improvement

LSP design has been considered to reduce impacts to fauna within the site as far as practicable, the completion of vegetation mapping has informed the placement of POS to capture the best quality habitat and retain connectivity with Bush Forever 270 and the CCW.

4.4.3 Predicted impacts

Black Cockatoo foraging habitat and significant tree retention provide the best outcome for habitat provision within the LSP. The best quality foraging habitat and future potential habitat trees are retained within POS; furthermore, the placement of POS retains connectivity with the surrounding Bush Forever 270 and the CCW which also provide foraging and breeding habitat.

Prior to subdivision, consideration referral for significant impacts to MNES, will be conducted by the landholder to ensure all appropriate steps to reduce impacts to Black Cockatoos are developed and initiated; each referral will be constructed according to the conditions of the Lot.

4.5 Bushfire

4.5.1 Potential impacts

Fire run through intact vegetation exist to the southwest of the project area through predominantly intact Class B woodland; there is also potential for bushfire occurrence through woodland to the east. Overall, much of the project area and adjacent vegetation is degraded through previous agriculture / development. The pre-development BHL assessment shows that based on the existing vegetation, the site contains land with Low, Moderate and Extreme bushfire hazard levels.

Unrestrained consideration of the BALs post development presents a risk to future property owners across the LSP.

4.5.2 Mitigation and management

A BMP has been developed for the LSP which includes actions such as:

- on-site staging buffers
- fuel management within cleared vacant lots
- road verge fuel management
- notification on title
- landscaping plans
- · building construction standards
- building setbacks
- <u>consideration of Bushfire emergency and evacuation plan and Bushfire risk management plan</u> <u>provisions</u>



4.5.3 Predicted impacts

Bushfire risk can be appropriately managed through implementation of the BMP which supports this EAR.



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Appendix 1 NatureMap database search (DBCA)





NatureMap Species Report

Created By Guest user on 19/06/2018

Current Names Only Yes
Core Datasets Only Yes

Method 'By Circle'

Centre 115° 51' 32" E,32° 12' 54" S

Buffer 2km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	3374	Acacia huegelii			
2.	3502	Acacia pulchella (Prickly Moses)			
3.	3602	Acacia willdenowiana (Grass Wattle)			
4.	24260	Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)			
5.	24261	Acanthiza chrysorrhoa (Yellow-rumped Thornbill)			
6.	24262	Acanthiza inornata (Western Thornbill)			
7.	24560	Acanthorhynchus superciliosus (Western Spinebill)			
8.	25535	Accipiter cirrocephalus (Collared Sparrowhawk)			
9.	25536	Accipiter fasciatus (Brown Goshawk)			
10.	25755	Acrocephalus australis (Australian Reed Warbler)			
11.		Aira caryophyllea/cupaniana group			
12.	1728	Allocasuarina fraseriana (Sheoak, Kondil)			
13.	200	Amphipogon turbinatus			
14.	24312	Anas gracilis (Grey Teal)			
15.	24315	Anas rhynchotis (Australasian Shoveler)			
16.	24316	Anas superciliosa (Pacific Black Duck)			
17.	47414	Anhinga novaehollandiae (Australasian Darter)			
18.	1411	Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)			
19.	24561	Anthochaera carunculata (Red Wattlebird)			
20.	24562	Anthochaera lunulata (Western Little Wattlebird)			
21.	41324	Ardea modesta (great egret, white egret)			
22.	24340	Ardea novaehollandiae (White-faced Heron)			
23.	1264	Arnocrinum preissii			
24.		Artamus cinereus (Black-faced Woodswallow)			
25.		Asparagus asparagoides (Bridal Creeper)	Υ		
26.	6334	Astroloma pallidum (Kick Bush)			
27.		Austrostipa compressa			
28.		Austrostipa flavescens			
29.	233	Avena barbata (Bearded Oat)	Υ		
30.		Aythya australis (Hardhead)			
31.		Babingtonia camphorosmae (Camphor Myrtle)			
32.	1800	Banksia attenuata (Slender Banksia, Piara)			
33.		Banksia ilicifolia (Holly-leaved Banksia)			
34.	1834	Banksia menziesii (Firewood Banksia)			
35.		Barnardius zonarius			
36.	24319	Biziura lobata (Musk Duck)			
37.		Bossiaea eriocarpa (Common Brown Pea)			
38.		Brassica tournefortii (Mediterranean Turnip)	Υ		
39.		Briza maxima (Blowfly Grass)	Υ		
40.		Briza minor (Shivery Grass)	Υ		
41.		Burchardia congesta			
42.		Cacomantis flabelliformis (Fan-tailed Cuckoo)			
43.		Caesia micrantha (Pale Grass Lily)			
44.		Caladenia flava (Cowslip Orchid)			
45.		Caladenia huegelii (Grand Spider Orchid)		Т	
46.		Calandrinia corrigioloides (Strap Purslane)		·	
47.		Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)		Т	
48.		Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black		•	
.0.	2	Cockatoo)		Т	
49.	5458	Calytrix flavescens (Summer Starflower)			
50.	2795	Carpobrotus edulis (Hottentot Fig)	Υ		
51.	1162	Cartonema philydroides			
52.	1125	Centrolepis drummondiana			





	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
53.	1280	Chamaescilla corymbosa (Blue Squill)			
54.		Chenonetta jubata (Australian Wood Duck, Wood Duck)			
55.		Circus approximans (Swamp Harrier)			
56.		Cladorhynchus leucocephalus (Banded Stilt)			
57.		Colluricincla harmonica (Grey Shrike-thrush)			
58. 59.		Comesperma integerrimum Conospermum stoechadis subsp. stoechadis (Common Smokebush)			
60.		Conostylis aculeata (Prickly Conostylis)			
61.	1410	Conyza sp.			
62.	25568	Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
63.	25592	Corvus coronoides (Australian Raven)			
64.	1285	Corynotheca micrantha (Sand Lily)			
65.	25595	Cracticus tibicen (Australian Magpie)			
66.	25596	Cracticus torquatus (Grey Butcherbird)			
67.	3137	Crassula colorata (Dense Stonecrop)			
68.		Cryptoblepharus buchananii			
69.		Cyathochaeta teretifolia		P3	
70.		Cygnus atratus (Black Swan)			
71.		Dacelo novaeguineae (Laughing Kookaburra)	Y		
72. 73.		Dampiera linearis (Common Dampiera)			
73. 74.		Daphoenositta chrysoptera (Varied Sittella) Dasypogon bromeliifolius (Pineapple Bush)			
75.		Dasyurus geoffroii (Chuditch, Western Quoll)		Т	
76.		Daviesia divaricata (Marno)		•	
77.		Daviesia triflora			
78.		Delma fraseri (Fraser's Legless Lizard)			
79.	16595	Desmocladus flexuosus			
80.	1259	Dianella revoluta (Blueberry Lily)			
81.	19649	Disa bracteata	Υ		
82.		Diuris corymbosa/magnifica			
83.	4763	Dodonaea hackettiana (Hackett's Hopbush)		P4	
84.	1639	Drakaea elastica (Glossy-leaved Hammer Orchid)		Т	
85.		Drosera erythrorhiza (Red Ink Sundew)			
86.		Drosera macrantha (Bridal Rainbow)			
87.		Drosera pallida (Pale Rainbow)			
88.	29178	Drosera porrecta			
89. 90.		Drosera sp. "climbing" Except a payochallanding			
90. 91.		Egretta novaehollandiae			Υ
92.	3/17	Ehrharta ?longiflora Ehrharta calycina (Perennial Veldt Grass)	Υ		ı
93.		Ehrharta longiflora (Annual Veldt Grass)	Y		
94.		Ehrharta sp.			
95.	47937	Elseyornis melanops (Black-fronted Dotterel)			
96.	6219	Eryngium pinnatifidum (Blue Devils)			
97.	24379	Erythrogonys cinctus (Red-kneed Dotterel)			
98.	13547	Eucalyptus marginata subsp. marginata (Jarrah)			
99.	4638	Euphorbia peplus (Petty Spurge)	Υ		
100.	4648	Euphorbia terracina (Geraldton Carnation Weed)	Υ		
101.		Falco cenchroides (Australian Kestrel, Nankeen Kestrel)			
102.		Falco longipennis (Australian Hobby)			
103.		Fulica atra (Eurasian Coot)			
104.	24761	Fulica atra subsp. australis (Eurasian Coot)			
105. 106.	25720	Fumaria sp. Gallinula tenebrosa (Dusky Moorhen)			
100.		Gallinula tenebrosa (busky Moorhen) Gallinula tenebrosa subsp. tenebrosa (busky Moorhen)			
107.		Gerygone fusca (Western Gerygone)			
109.		Gladiolus caryophyllaceus (Wild Gladiolus)	Υ		
110.		Gompholobium tomentosum (Hairy Yellow Pea)			
111.		Grallina cyanoleuca (Magpie-lark)			
112.		Haemodorum sp.			
113.	1475	Haemodorum spicatum (Mardja)			
114.	24295	Haliastur sphenurus (Whistling Kite)			
115.	3961	Hardenbergia comptoniana (Native Wisteria)			
116.	5135	Hibbertia hypericoides (Yellow Buttercups)			
117.		Hibbertia racemosa (Stalked Guinea Flower)			
118.		Hieraaetus morphnoides (Little Eagle)			
119.		Himantopus himantopus (Black-winged Stilt)			
120.		Hirundo neoxena (Welcome Swallow)			
121.		Homalosciadium homalocarpum			
122.	3966	Hovea pungens (Devil's Pins, Puyenak)			
				Departmen	tof







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
123.	12859	Hovea trisperma var. trisperma			
124.	5216	Hybanthus calycinus (Wild Violet)			
125.		Hypocalymma robustum (Swan River Myrtle)			
126.		Hypochaeris glabra (Smooth Catsear)	Y		
127. 128.	1070	Hypolaena exsulca			V
128.	017	Iridaceae sp. Isolepis marginata (Coarse Club-rush)			Y
130.		Isoodon fusciventer (Quenda, southwestern brown bandicoot)		P4	
131.		Isotropis cuneifolia (Granny Bonnets)		17	
132.		Jacksonia furcellata (Grey Stinkwood)			
133.	4029	Jacksonia sternbergiana (Stinkwood, Kapur)			
134.	4044	Kennedia prostrata (Scarlet Runner)			
135.	15498	Kunzea glabrescens (Spearwood)			
136.	44490	Leontodon rhagadioloides	Υ		
137.	944	Lepidosperma scabrum			
138.		Lepidosperma squamatum			
139.		Leporella fimbriata (Hare Orchid)			
140.		Lerista elegans			
141.		Leucopogon conostephioides			
142. 143.	0436	Leucopogon propinquus Levenhookia pusilla/stipitata			
143.	25661	Leverinooкia pusilia/supitata Lichmera indistincta (Brown Honeyeater)			
145.	20001	Lomandra ?caespitosa			
146.		Lomandra ?preissii			
147.	1223	Lomandra caespitosa (Tufted Mat Rush)			
148.	1228	Lomandra hermaphrodita			
149.	1232	Lomandra micrantha (Small-flower Mat-rush)			
150.	1234	Lomandra nigricans			
151.	1239	Lomandra preissii			
152.		Lomandra suaveolens			
153.		Lotus subbiflorus	Υ		
154.	1198	Luzula meridionalis (Field Woodrush)			
155.	20275	Lycosa ariadnae	V		
156. 157.		Lysimachia arvensis (Pimpernel) Macarthuria australis	Y		
157.		Macrozamia fraseri			
159.		Malacorhynchus membranaceus (Pink-eared Duck)			
160.		Malurus splendens (Splendid Fairy-wren)			
161.	24598	Merops ornatus (Rainbow Bee-eater)			
162.	955	Mesomelaena pseudostygia			
163.	957	Mesomelaena tetragona (Semaphore Sedge)			
164.		Microcarbo melanoleucos			
165.		Microlaena stipoides (Weeping Grass)			
166.		Microtis media (Tall Mignonette Orchid)			
167.		Mus musculus (House Mouse)	Υ		
168.		Neophema elegans (Elegant Parrot)			
169. 170.		Neurachne alopecuroidea (Foxtail Mulga Grass) Notechis scutatus (Tiger Snake)			
170.		Nycticorax caledonicus (Rufous Night Heron)			
171.		Ocyphaps lophotes (Crested Pigeon)			
173.		Oryctolagus cuniculus (Rabbit)	Υ		
174.		Oxyura australis (Blue-billed Duck)		P4	
175.		Pachycephala rufiventris (Rufous Whistler)			
176.	25253	Parasuta gouldii			
177.	25681	Pardalotus punctatus (Spotted Pardalote)			
178.		Pardalotus striatus (Striated Pardalote)			
179.		Patersonia occidentalis (Purple Flag, Koma)			
180.		Pelargonium capitatum (Rose Pelargonium)	Y		
181.		Pelecanus conspicillatus (Australian Pelican)			
182.		Persoonia saccata (Snottygobble) Potrocholidon pigricans (Trop Martin)			
183.		Petrochelidon nigricans (Tree Martin) Potroica boodong (Scarlot Pobin)			
184. 185.		Petroica boodang (Scarlet Robin) Petroica goodenovii (Red-capped Robin)			
186.		Petrophile linearis (Pixie Mops)			
187.		Petrophile macrostachya			
188.		Petrophile striata			
189.		Phalacrocorax carbo (Great Cormorant)			
190.		Phalacrocorax melanoleucos (Little Pied Cormorant)			
191.	24667	Phalacrocorax sulcirostris (Little Black Cormorant)			
192.	24409	Phaps chalcoptera (Common Bronzewing)			
				Departmen	tof







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
193.	1478	Phlebocarya ciliata			
194.		Phylidonyris niger (White-cheeked Honeyeater)			
195.	24596	Phylidonyris novaehollandiae (New Holland Honeyeater)			
196.	16177	Phyllangium paradoxum			
197.	4675	Phyllanthus calycinus (False Boronia)			
198.	24841	Platalea flavipes (Yellow-billed Spoonbill)			
199.		Poaceae sp.			
200.	25704	Podiceps cristatus (Great Crested Grebe)			
201.	8175	Podolepis gracilis (Slender Podolepis)			
202.	8184	Podotheca gnaphalioides (Golden Long-heads)			
203.	24681	Poliocephalus poliocephalus (Hoary-headed Grebe)			
204.		Poranthera microphylla/moorokatta			
205.	25731	Porphyrio porphyrio (Purple Swamphen)			
206.	24767	Porphyrio porphyrio subsp. bellus (Purple Swamphen)			
207.	25511	Pseudonaja affinis (Dugite)			
208.		Pseudonaja affinis subsp. affinis (Dugite)			
209.		Pterostylis recurva (Jug Orchid)			
210.		Pterostylis sanguinea			
211.	11260	Ptilotus drummondii var. drummondii (Pussytail)			
212.		Purpureicephalus spurius			
213.		Pyrorchis nigricans (Red beaks, Elephants ears)			
214.		Quinetia urvillei			
215.		Rattus rattus (Black Rat)	Υ		
216.		Recurvirostra novaehollandiae (Red-necked Avocet)			
217.		Rhipidura albiscapa (Grey Fantail)			
218. 219.		Rhipidura leucophrys (Willie Wagtail)	Υ		
219.		Romulea rosea (Guildford Grass)	Ĭ		
221.		Rytidosperma occidentale Scaevola canescens (Grey Scaevola)			
222.		Schoenus clandestinus			
223.		Schoenus curvifolius			
224.		Scholtzia involucrata (Spiked Scholtzia)			
225.		Sericornis frontalis (White-browed Scrubwren)			
226.		Silene gallica (French Catchfly)	Υ		
227.		Siloxerus humifusus/filifolius			
228.	30948	Smicrornis brevirostris (Weebill)			
229.	7022	Solanum nigrum (Black Berry Nightshade)	Υ		
230.	8231	Sonchus oleraceus (Common Sowthistle)	Υ		
231.	1312	Sowerbaea laxiflora (Purple Tassels)			
232.	39087	Stemonitis splendens			
233.	25597	Strepera versicolor (Grey Currawong)			
234.	25590	Streptopelia senegalensis (Laughing Turtle-Dove)	Υ		
235.	7774	Stylidium piliferum (Common Butterfly Triggerplant)			
236.	7798	Stylidium schoenoides (Cow Kicks)			
237.	15532	Synaphea spinulosa subsp. spinulosa			
238.	33992	Synemon gratiosa (Graceful Sunmoth)		P4	
239.	25705	Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
240.	24682	Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-			
		throated Grebe)			
241.		Tadorna tadornoides (Australian Shelduck, Mountain Duck)			
242.		Thelymitra graminea			
243.		Threskiornis spinicollis (Straw-necked Ibis)			
244.		Thysanotus arbuscula			
245. 246.	1319	Thysanotus arenarius Thysanotus manglesianus/patersonii complex			
240.	1351	Thysanotus mangiesianus/patersonii complex Thysanotus sparteus			
248.		Tiliqua rugosa			
249.		Tiliqua rugosa subsp. rugosa			
250.		Todiramphus sanctus (Sacred Kingfisher)			
251.		Trachymene pilosa (Native Parsnip)			
252.		Trichosurus vulpecula (Common Brushtail Possum)			
253.		Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)			
254.		Tricoryne elatior (Yellow Autumn Lily)			
255.		Unknown Annual Grasses			
256.	8254	Urospermum picroides (False Hawkbit)	Υ		
257.		Ursinia anthemoides (Ursinia)	Υ		
258.	25218	Varanus gouldii (Bungarra or Sand Monitor)			
259.		Vulpia sp.			
260.	7384	Wahlenbergia capensis (Cape Bluebell)	Υ		
261.	7389	Wahlenbergia preissii			
				A CONTRACTOR OF THE PARTY OF TH	**********







Conservation Code ¹Endemic To Query Area Name ID Species Name Naturalised

262.	1256 Xanthorrhoea preissii (Grass tree, Palga)
263.	6289 Xanthosia huegelii
264.	2331 Xylomelum occidentale (Woody Pear, Djandin)
265.	25765 Zosterops lateralis (Grey-breasted White-eye, Silvereye)

Conservation Codes

7 - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

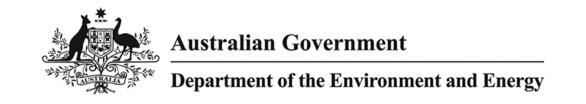






Appendix 2
EPBC Act Protected Matters Search
(DEE)





EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 19/06/18 15:35:47

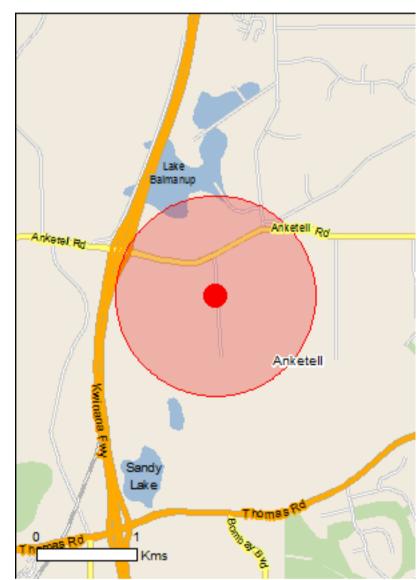
Summary

Details

Matters of NES
Other Matters Protected by the EPBC Act
Extra Information

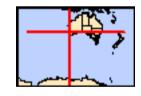
Caveat

<u>Acknowledgements</u>



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	17
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A <u>permit</u> may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Forrestdale and thomsons lakes	Within 10km of Ramsar
Peel-yalgorup system	30 - 40km upstream

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

produce indicative distribution maps.		
Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds	Ciatao	1)
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii		
Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder,	Critically Endangered	Species or species

Name Ngoor, Ngoolangit [25911]	Status	Type of Presence habitat likely to occur within area
Plants		aroa
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
<u>Diuris purdiei</u> Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Listed Migratory Species * Species is listed under a different scientific name or	n the EPBC Act - Threatene	[Resource Information] d Species list.
Name Migratory Marina Birda	Threatened	Type of Presence
Migratory Marine Birds Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		

Name	Threatened	Type of Presence
		habitat may occur within
		area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on t	the EPBC Act - Threatened	l Species list.
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Otation	T
Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus		
Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]	1	Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana		
Broom [67538]		Species or species habitat may occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Largeleaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum		Species or species habitat likely to occur within area
African Boxthorn, Boxthorn [19235]		Species or species habitat
Amean Boxmom, Boxmom [19233]		likely to occur within area
Olea europaea		
Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x	reichardtii	
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]	Tolonardii	Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the gualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.2134 115.85889

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- -Australian Government Australian Antarctic Data Centre
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Appendix 3 Flora and Vegetation Assessment (Bennett Environmental Consulting 2009)



Our Ref: 702-2 AI

environmental management consultants

28 April 2010

Kim Kyle Principal Urban Designer Greg Rowe and Associates Level 3, 369 Newcastle Street NORTHBRIDGE WA 6003

Via email: kim.kyle@greg-rowe.com

Dear Kim

Jandakot Structure Plan Area: Anketell Cell

Spring 2009 Flora and Vegetation Survey

360 Environmental Pty Ltd (360 Environmental) is pleased to provide the final report for the flora and vegetation survey undertaken in Spring 2009 across the Anketell Cell in the Jandakot Structure Plan area.

The results of the survey did not find any Declared Rare Flora or Threatened Ecological Communities, however the survey did find the following:

- The results indicated the presence of a Priority Ecological Community (PEC) in the southern part of the survey area.
- The Priority 3 flora species, Jacksonia gracillima was observed at two locations.

Although neither the PEC or priority flora species are protected under legislation it is likely their presence may require further consultation with regulatory authorities, particularly as the vegetation is considered "Good" to Very Good" where the PEC is located. The PEC is also mostly associated with a mapped Conservation Category Wetland (CCW).

Discussions with the Department of Environment and Conservation's Species and Communities Branch indicated the DEC may request a second spring survey be undertaken to confirm the presence of the PEC. The Town of Kwinana's Local Biodiversity Strategy also recommends multiple spring surveys.

The requirement for additional surveys should be closely managed as it is becoming more common that multiple spring flora and vegetation surveys are being requested by the DEC. This is more common when flora or vegetation of conservation significance are



observed on site. Although not specifically protected under legislation, the presence of the PEC and the Priority 3 flora species will require specific management as they are considered conservation significant and the DEC has a policy that attempts, where possible, to protect conservation significant flora and vegetation. The presence of the PEC mostly associated with the CCW will add further to management actions as CCWs also have strong policy positions associated with them.

We trust this meets your requirements at this time. Should you have any questions or require further action please do not hesitate to contact Joseph Toon or the undersigned on (08) 9321 0420.

For and on behalf of 360 Environmental Pty Ltd

Tamara Smith

Principal

FLORA AND VEGETATION OF ANKETELL URBAN DEFERRED CELL



Prepared for: 360 Environmental PO Box 14 WESTPERTH 6005

Prepared by: Bennett Environmental Consulting Pty Ltd



PO Box 341 KALAMUNDA 6926

April 2010

STATEMENT OF LIMITATIONS

Scope of Services

This report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Eleanor Bennett ("the Author"). In some circumstances a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services.

Reliance on Data

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

Environmental Conclusions

In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report. The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

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SUMMARY

Bennett Environmental Consulting Pty Ltd was commissioned by 360 Environmental to undertake a survey of the Anketell Urban Deferred Cell. The survey area consisted of several lots on Anketell and Treeby Roads of which 7 of the 23 lots included in the area had been given permission by the owners to be surveyed. Several of these lots had already been completely or partially cleared. Lot 13 at the southern extent of the survey area included a conservation category wetland which at the time of the survey, November 5th and 6th 2009 still had water. The site includes a section of Bush Forever Site 270.

A total of 58 vascular plant families, 125 genera and 167 taxa of which 38 were weeds were recorded from the survey area. The dominant plant families were Poaceae, Papilionaceae, Myrtaceae and Asteraceae. Seven of the weeds were listed as high impact on the vegetation and should be targeted for removal. These were:

- *Typha orientalis was only recorded at the northern end of the lake;
- *Cortaderia selloana from the southern end of Lot 13 close to where ANK01 was surveyed;
- *Bromus diandrus, *Ehrharta calycina, *Lagurus ovatus and *Romulea rosea were recorded scattered or in dense clumps across the survey area; and
- *Euphorbia terracina was only recorded from Treeby Road verge adjacent to Lot 188.

No Declared Rare Flora but *Jacksonia gracillima*, a Priority 3 Flora was recorded from 2 quadrats, ANK07 and ANK09. About 40 plants were recorded.

No Threatened Ecological Communities were recorded by the Department of Environment and Conservation (2009b) but one Priority Ecological Community, *Banksia ilicifolia* woodlands, southern Swan Coastal Plain (floristic community type 22) was identified by the Department of Environment and Conservation as occurring at the survey area. This community was not identified during the survey.

A PATN analysis undertaken by TEH Griffin concluded that the quadrats ANK07 and ANK09 were representative of the Priority Ecological Community FCT21c. These quadrats were identified in the field as being representative of the vegetation unit Open Tall Woodland of *Eucalyptus marginata* subsp. *marginata* occasionally with scattered trees of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens*. This vegetation unit was common across most of the survey area. However quadrat ANK11also identified as being the same vegetation unit in the field was concluded to be FCT14 which is not a Priority Ecological Community. It is therefore possible that the area identified as Em in the southern section of the survey area may be the Priority Ecological Community FCT21c.

A total of 10 different vegetation units were described for the survey area. There were two associated with the lake margin. These were:

- Open Low Woodland A of *Eucalyptus rudis* subsp. *rudis* over Low Scrub B of *Astartea scoparia* over Tall Sedges dominated by *Juncus pallidus*;
- Low Woodland A of *Eucalyptus rudis* subsp. *rudis*, *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Thicket of *Kunzea glabrescens* over Dwarf Scrub of *Astartea scoparia*. Both these were located around the lake margin;

The other vegetation units were recorded away from the lake. These were:

- Open Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open Low Scrub A dominated by *Leucopogon australis*. This was the dominant vegetation in the southern section of Lot 13;
- Open Low Woodland A of *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* and *Taxandria linearifolia* over Tall Sedges of *Lepidosperma longitudinale* and *Dielsia*

- stenostachya. This was the vegetation associated with the minor drain through the survey area:
- Low Forest A of *Banksia attenuata*, *Banksia menziesii* and *Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath B dominated by *Hibbertia hypericoides*. This was recorded from higher ground in Lot 32 and Lot 33;
- Open Tall Woodland of *Eucalyptus marginata* subsp. *marginata* occasionally with scattered trees of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens*. This was the dominant vegetation over most of the survey area;
- Low Woodland A of *Banksia attenuata*, *Banksia ilicifolia* and *Nuytsia floribunda* over Thicket of *Kunzea glabrescens* and *Melaleuca thymoides* over Low Heath D dominated by *Scholtzia uberiflora* and *Aotus procumbens*;
- Open Low Woodland A of Eucalyptus todtiana, Banksia menziesii and Banksia attenuata
 over Dense Thicket of Kunzea glabrescens over Dwarf Scrub D of Scholtzia uberiflora
 over Open Low Grass dominated by *Vulpia bromoides over Herbs dominated by
 Trachymene pilosa and Drosera paleacea. This was recorded as a very small area on the
 western side of Lot 13 but did continue as the main vegetation into the adjoining property;
- Open Low Woodland A of *Banksia attenuata* and *Banksia menziesii* occasionally with *Allocasuarina fraseriana* over Dense Thicket of *Kunzea glabrescens* over Herbs of *Dasypogon bromeliifolius* and *Philotheca spicata* in grey sand (Af); and
- Dense Thicket of *Kunzea glabrescens* over Open Dwarf Scrub C of *Hypocalymma angustifolium* over Very Open Low Sedges of *Dielsia stenostachya* or *Schoenus rigens* or *Hypolaena exsulca* and Open Low Grass dominated by **Vulpia bromoides*). This vegetation unit occurred as a distinct unit in Lot 13.

The conservation category wetland on Lot 13 had many tracks accessing the lake. Many of the tracks appear to originate from Thomas Road to the south and from the firebreaks along the properties and the road reserve which is the continuation of Treeby Road. By closing the tracks and allowing the area to rehabilitate naturally it should be possible to return this area to a better condition.

A deeply incised but very narrow drain cut through the lower south west section of Lot 13. The southern section had been burnt within the last 12 months but the northern section was well vegetated.

1. INTRODUCTION

1.1 Background

Bennett Environmental Consulting Pty Ltd was contracted by 360 Environmental to undertake a flora and vegetation survey of the Anketell Urban Deferred Cell. The survey area consisted of several lots on Anketell and Treeby Roads. For 7 of the 23 lots included in the area permission had been given by the owners to survey them. Several of these lots had already been completely or partially cleared. The south eastern section, Lots 13, 35 and 100, were accessed, including a conservation category wetland.

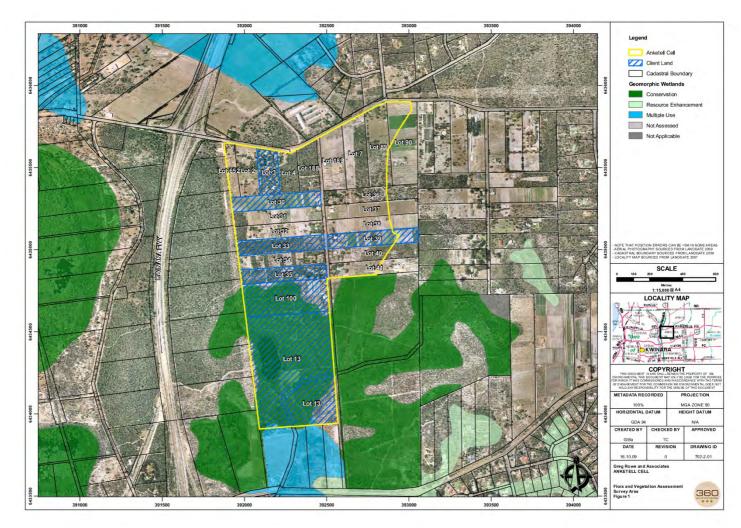


Figure 1. Study area outlined in yellow. Lots that could be accessed are hatched in blue

1.2 Scope of Works

The requirements for this project were to:

- Record the vegetation units and associated species in the remnant bushland;
 and
- ii. Search for and record all significant species at the survey area.

2. REGIONAL METHODOLOGY

2.1 Geology and Landform

The survey area is included in the Swan Coastal Plain Subregion of the Southwest Botanical Province (Beard, 1990). It is a low-lying, coastal plain often swampy with

sandhills. The soils are mainly recent sands or swamp deposits. This is further subdivided into 7 different units, with the study area occurring within the older, weathered dunes of the Bassendean System.

The soils of the Bassendean Dunes consist of poorly sorted quartz sand with mainly fine to medium grains. The sands are off white to pale grey at the surface and cream to yellow at depth.

2.2 Vegetation

The Interim Biogeographical Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995) recognises 85 bioregions. The IBRA is used as the common unit to compare biological and biophysical attributes. Bioregions represent a landscape based approach to classifying the land surface and each region is defined by a set of major environmental influences, which shape the occurrence of flora and fauna and their interaction with the physical environment. The survey area occurs in the Swan Coastal Plain (Mitchell *et al.*, 2002) of which Perth is a subregion. The Perth subregion is composed of colluvial and Aeolian sands, alluvial river flats and coastal limestone with heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah-*Banksia* woodlands on Quaternary marine dunes of various ages and Marri on colluvial sands and alluvials. The Perth subregion area also includes a complex series of seasonal wetlands. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean (Mitchell *et al.*, 2002).

The Perth Metropolitan Area portion of the Swan Coastal Plain (approximately 20% of the whole subregion) has had a comprehensive study of the reservation status and protection requirements in the Perth's Bushplan/Bush Forever project (Government of Western Australia, 2000). This has identified regionally significant bushland for protection by reservation or within the statutory planning framework. Part of the study area is listed as Bush Forever site 270.

Prior to the above classification Beard (1981) classified the vegetation of Western Australia. Western Australia was divided into three main Botanical Provinces, Southwest, Eremaean and Northern. The study area was described by Beard (1981) as Banksia Low Woodland with scattered Jarrah (abbreviation e2bLi) Shepherd *et al.* (2002) have determined the pre-European and current extent of the vegetation associations described by Beard. In addition they have assessed the percentage of each association remaining, the amount in IUCN reserves and the percentage in other reserves. This develops an excellent picture of the extent of these remnants. The data provided by Shepherd *et al.* (2002) is provided in Table 1.

Table 1. Pre-European extent, current extent and reservation status of Beard community e2bLi

Pre-European extent	Current Extent	Remaining Vegetated	% in IUCN Reserves	% in other reserves
50,127ha	33,700ha	67.2%	57.4%	14.0%

The National Objectives and Targets for Biodiversity Conservation 2001-2005 (Commonwealth of Australia, 2001) is to conserve at least 30% of each vegetation unit. This legislation recognises that at least 30% of the original pre-clearing extent must be retained to protect Australia's biodiversity. This Beard complex has more than 30% remaining vegetated.

Heddle *et al.* (1980) described the vegetation complexes of the Darling system at a scale of 1: 250 000. There was found to be a distinct pattern of plant distribution linked to landforms, soils and climate. The most obvious trend was associated with increasing aridity from west to east on the Darling Plateau. The vegetation changes observed were a decrease in height and percentage cover of the tallest stratum and a distinct change in floristics. The study area was described as occuring in vegetation

complex, Bassendean Complex – Central and South. This is described as "Vegetation ranges from Woodland of *Eucalyptus marginata* subsp. *marginata* – *Allocasuarina* fraseriana – Banksia species to Low Woodland of Melaleuca species and Sedgelands on the moister sites." In Bush Forever (Government of Western Australia, 2000) it is estimated that within the Swan Coastal Plain portion of Metropolitan Perth there was originally 46,220 ha of Bassendean Complex – Central and South of which 10,919ha remains vegetated. This represents 24% of the original area of which it is intended to reserve 13%.

2.3 Bush Forever

The study area includes a section of Bush Forever Site 270 – Sandy Lake and Adjacent Bushland, Anketell. Bush Forever Site 270 also occurs on western sides and eastern neighbouring properties. The total size of Bush Forever Site 270 is 201.4ha of which >80% is in excellent to very good condition (Government of Western Australia, 2000).

The significant flora listed for Site 270 are *Aotus cordifolia*, a Priority 3 flora and *Dielsia stenostachya* listed in Government of Western Australia (2000) as endemic to the Swan Coastal Plain. The southern section of the study area, which includes the wetland, is located in Bush Forever Site 270.

The following Floristic Communities Type (Gibson et al., 1994) are recorded for Bush Forever Site 270 (Government of Western Australia):

FCT21c - Low-lying Banksia attenuata Woodlands or Shrublands; and

FCT22 – Banksia ilicifolia Woodlands.

3. METHODS

The remnant vegetation in the area was surveyed using the methods set out in the EPA Guidance No 51 (2004). Not all blocks within the Anketell Urban Deferred Cell could be accessed as the owner(s) had not provided permission to enter.

Temporary 10m x 10m quadrats were set up using a compass and oriented due N,S,E,W. Quadrats were placed to record the variation in the species present. The vegetation, flora and weed surveys were conducted concurrently. For each quadrat, the following was recorded in the field:

- GPS reading (WGS84, equivalent to Geocentric Datum of Australia 1994 (GDA94)) at NW corner;
- Digital photograph taken at the NW corner;
- Soil type;
- Presence, size and type of any outcropping rocks;
- Topography eg. ridge, upper slope, middle slope, lower slope, drainage line, minor creek, major creek, wetland;
- Aspect where this is applicable;
- Percentage litter cover divided into bark, leaves, twigs and logs;
- Vegetation condition using the scale of Keighery (1994);
- Presence of any Declared Rare or Priority Flora or other significant flora;
- Additional information including dieback, age since fire, predators, erosion, weeds, grazing, tracks etc.; and
- All species were listed together with their percentage cover within the quadrat and average height.

The area outside of the quadrat was also surveyed to record additional (opportunistic) species for that vegetation unit. All species unknown in the field were collected, pressed and identified later using appropriate keys and by comparison with collections housed at the Western Australian Herbarium.

Declared Rare and Priority Flora were searched for as the area was surveyed. A collection of each Rare or Priority Flora seen was made and forms will be completed and sent to the Rare Flora section of the Department of Environment and Conservation. The pressed and dried specimens were sent to the Western Australian Herbarium for inclusion in their collection.

4. **RESULTS**

The vegetation survey was undertaken on 5^{th} and 6^{th} November 2009. The taxa recorded and a photographic record for each quadrat is provided in Appendix B and the location of each quadrat mapped in Appendix C. A total of 13 quadrats were established during the survey.

4.1 Taxa

A total of 58 vascular plant families, 125 genera and 167 taxa (species, subspecies and varieties) were recorded during the survey (Appendix A). The dominant families were:

Poaceae with 13 genera, 15 taxa of which 13 were weeds; Papilionaceae with 12 genera, 16 taxa of which 1 was a weed; Myrtaceae with 8 genera, 15 taxa of which none were weeds; and Asteraceae with 12 genera, 14 taxa of which 10 were weeds.

These 4 families represent 6.9% of the number of families, 36% of the number of genera and 35.3% of the total number of taxa.

4.2 Vegetation Units Described from Field Survey

The vegetation units recorded from the survey area were described using the vegetation classification of Muir (1977) as described in Table 2.

Table 2. Vegetation Classification (from Muir 1977)

LIFE FORM / HEIGHT	Canopy Cover				
CLASS	DENSE 70 % - 100%	MID DENSE 30% - 70%	SPARSE 10% - 30%	VERY SPARSE 2% - 10%	
Trees > 30 m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland	
Trees 15 – 30 m	Dense Forest	Forest	Woodland	Open Woodland	
Trees 5 – 15 m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A	
Trees < 5 m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B	
Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee	
Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee	
Shrubs > 2 m	Dense Thicket	Thicket	Scrub	Open Scrub	
Shrubs 1.5 – 2 m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A	
Shrubs 1 - 1.5 m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B	
Shrubs 0.5 – 1 m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C	
Shrubs 0 - 0.5 m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D	
Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants	
Hummock grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass	
Bunch grass > 0.5 m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass	
Bunch grass < 0.5 m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass	
Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs	
Sedges > 0.5 m	Dense Tall sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges	
Sedges < 0.5 m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges	
Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns	
Mosses, liverworts	Dense Mosses	Mosses	Open Mosses	Very Open Mosses	

The vegetation varied across the survey area with variations in the soil depth and distance from the lake in the south west corner. The different vegetation units are described below with the abbreviation used in mapping following in brackets.

Lake Associated Vegetation:

Open Low Woodland A of *Eucalyptus rudis* subsp. *rudis* over Low Scrub B of *Astartea scoparia* over Tall Sedges dominated by *Juncus pallidus* on the edge above the water line (Jp). This was represented by ANK03.

Low Woodland A of *Eucalyptus rudis* subsp. *rudis*, *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Thicket of *Kunzea glabrescens* over Dwarf Scrub C of *Astartea scoparia* around the edge of the lake (As). This was represented by ANK02. This was the vegetation surrounding the lake, but merged with Er further away.

Open Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open Low Scrub A dominated by *Leucopogon australis* (Er). This was represented by ANK01. This was the dominant vegetation in the southern area of the study survey area.

Forest

Low Forest A of *Banksia attenuata, Banksia menziesii* and *Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath B dominated by *Hibbertia hypericoides* in grey sand (Hh). This was represented by ANK13. This was one of the vegetation units on the higher ground.

Woodlands

Open Tall Woodland of *Eucalyptus marginata* subsp. *marginata* occasionally with scattered trees of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* in grey sand (Em). This was represented by quadrats ANK07, ANK09 and ANK11.

Low Woodland A of *Banksia attenuata, Banksia ilicifolia* and *Nuytsia floribunda* over Thicket of *Kunzea glabrescens* and *Melaleuca thymoides* over Low Heath D dominated by *Scholtzia uberiflora* and *Aotus procumbens* on a slight rise in grey sand with scattered limestone (Bi). It was represented by ANK08.

Open Low Woodland A of *Eucalyptus todtiana, Banksia menziesii* and *Banksia attenuata* over Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub D of *Scholtzia uberiflora* over Open Low Grass dominated by *Vulpia bromoides over Herbs dominated by *Trachymene pilosa* and *Drosera paleacea* on the lower slope in grey sand (Et). This was represented by ANK04.

Open Low Woodland A of *Banksia attenuata* and *Banksia menziesii* occasionally with *Allocasuarina fraseriana* over Dense Thicket of *Kunzea glabrescens* over Herbs of *Dasypogon bromeliifolius* and *Philotheca spicata* in grey sand (Af). This was represented by AHK12.

Open Low Woodland A of *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* and *Taxandria linearifolia* over Tall Sedges of *Lepidosperma longitudinale* and *Dielsia stenostachya* in grey sand along a minor drain (Ds). This was represented by ANK05 and ANK06.

Thicket

Dense Thicket of *Kunzea glabrescens* over Open Dwarf Scrub C of *Hypocalymma angustifolium* over Open Low Grass dominated by **Vulpia bromoides* over Very Open Low Sedges of *Dielsia stenostachya* or *Schoenus rigens* or *Hypolaena exsulca* in grey sand (Ha). This was represented by ANK10.

In addition there were two other areas identified. These are mapped as: DEG = cultivated areas; and

? = where unable to access the Lot to determine the vegetation units present.

The vegetation units are mapped in Appendix C but the descriptions for these were only derived from Lots 33, 35, 100 and 13. Where the vegetation is mapped for other Lots it was solely assigned from viewing from adjacent properties or along the roads.

4.2 PATN Analysis

A PATN analysis was undertaken by TEH Griffin from the data supplied which is provided in full in Appendix D. The analysis is run using only presence/absence of taxa and does not take into account any vegetation cover. Two analyses were undertaken, firstly a dendrogram and then running to determine the nearest neighbour. This analysis resulted in the following summary.

Table 3. Summay of PATN Analysis

SITE	DENDROGRAM	NEAREST NEIGHBOUR	CONCLUSION
ANK12	21c	21c, 21a, 23a	21c, 21a, 23a
ANK13	21c	28, 21a	28, 21a
ANK01	11	?11	?11
ANK03	11	11,13	11,13
ANK02	11	11	11
ANK05	11	11	11
ANK06	11	11	11
ANK10	14	4, 21c, 11	4, 21c, 11
ANK11	14	?14	?14
ANK04	21c	21c, 23a	21c, 23a
ANK07	21c	21c	21c
ANK09	21c	21c	21c
ANK08	21c	21a, 23a, 21c	21a, 23a, 21c

4.3 Threatened Ecological Communities

No Threatened Ecological Communities were listed by the Department of Environment and Conservation as occurring at the survey area but there was a listing for a Priority Ecological Community (PEC) from Lot 100. This was the category 2 PEC, Banksia ilicifolia woodlands, southern Swan Coastal Plain (floristic community type 22). This is described by the Department of Environment and Conservation (2009b) as occurring in low lying sites generally consisting of Banksia ilicifolia – B. attenuata woodlands, but Melaleuca preissiana woodlands and scrubs are also recorded. It occurs on Bassendean and Spearwood systems in the central Swan Coastal Plain north of Rockingham. Typically it has very open understorey, and sites are likely to be seasonally waterlogged. However using the PATN analysis this PEC was not concluded, yet the same location where this PEC had been recorded by DEC was relocated. Quadrat ANK08 was placed in this unit. The unit was recorded between the eastern side of the survey area stretching across the survey area from east to west and ending just before the lake. It therefore traversed from a slight rise through lower ground, some of which would definitely have been inundated during winter. This was also the only community at the survey area where Melaleuca thymoides was recorded although this taxon, has been recorded from several different habitats elsewhere.

The level 3, Priority Ecological Community, Floristic Community Type (FCT) 21c has been concluded by using PATN as occurring at the survey area. It is represented by quadrats ANK07 and ANK09 which are included in the vegetation unit Em. This would indicate that the whole extent of the Em in that southern area is possibly representative of the PEC, FCT21c. Quadrat ANK11 was also identified in the field as being representative of vegetation unit Em but has been identified as closest to FCT14 so is separated in the mapping as EMN.

Quadrats ANK04, ANK12, ANK10 and ANK08, although not conclusive may also be representative of FCT21c. Floristic Community Type 21c is described by the Department of Environment and Conservation (2009b) as tending to occur in lower lying wetter areas and is variously dominated by *Melaleuca preissiana*, *Banksia attenuata*, *Banksia menziesii*, *Regelia ciliata*, *Eucalyptus marginata* subsp. *marginata* or *Corymbia calophylla*. It is restricted to the Bassendean system, occurring sporadically between Gingin and Bunbury.

4.4 Vegetation Condition

Bushland has been historically subject to ongoing degradation and is especially susceptible to disturbances arising as a result of indirect impacts from surrounding developments and human activity. Degradation is caused by a wide range of factors, including isolation, edge effects, weed invasion, plant diseases, changes in fire frequency, landscape fragmentation, increased predation on native fauna by feral animals, decrease in species richness and general modification of ecological function. These issues can affect the biodiversity rating and ecological viability of areas of remnant vegetation and should be assessed in line with conservation values.

Vegetation condition was rated according to the vegetation condition scale used in Keighery (1994). The vegetation condition recorded for each quadrat is included in Appendix B and mapped in Appendix C.

Table 4. Explanation of Vegetation Condition Rating (Keighery, 1994)

Rating	Description	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Using the vegetation condition rating explained in Table 4 most of the area was in good or very good vegetation condition. Tracks through the bushland varied from degraded to good depending upon the weed cover, condition of the endemic taxa and frequency of use. Table 5 provides the vegetation condition of the quadrats surveyed.

Table 5. Vegetation Condition of quadrats and Lots that could not be accessed

CONDITION	QUADRAT NUMBER
Very good	ANK01, ANK02, ANK06, ANK08, ANK12, ANK13
Good to Very Good	ANK03, ANK07, ANK09, ANK10, ANK11
Good	ANK04, ANK05, Lot 4
Degraded to Good	Lot 188
Degraded	Lot 3
Completely Degraded	Lot 652, Lot 2, Lot 189, Lot30, Lot 31, Lot 32, Lot 34,
	Lot 37, Lot 38, Lot 41

In addition to weeds there was rubbish scattered and dumped in the bushland, particularly in Lot 13. There appear to be many vehicles accessing that Lot, possibly from Thomas Road to the south, although it is private land.

Lot 3 was surveyed for the vegetation unit as well as condition but there were very few native trees on the property. Many non-endemic trees had been planted. The understorey was nearly non-existent having been replaced by weeds.

Lot 188 was viewed from the road edge. The road verge included several plants of *Euphorbia terracina as well as a dense cover of grass weeds.



Diagram 2. From this aerial view of the study area the following Lots can be seen to be completely or nearly devoid of all vegetation: Lots 652, 2, 189, 7, 90 (along Anketell Road), Lots 30, 31, 32, 37, 38, 39, 34 and 41 (along Treeby Road). The lots where access permitted was generally had the better natural vegetation



Photograph 1. Illustrates rubbish dumped around the edge of the lake and adjacent to the vegetation.



Photograph 2 illustrates a recent vehicle bashed track through remnant bushland close to the lake



Photograph 3 illustrating the width of some tracks through the area and a vehicle accessing one of these.

4.5 Significant Flora

Species of flora are defined as rare or priority conservation status where their populations are restricted geographically or threatened by local processes. The Department of Environment and Conservation recognises these threats of extinction and consequently applies regulations towards population and species protection. Rare Flora are gazetted under subsection 2 of section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to "take" or damage rare flora without approval from the Minister for the Environment. Prior to undertaking the field work a search of the Department of Environment and Conservation Rare and Priority Flora database was undertaken for potential Declared Rare and Priority flora that may occur at the study survey area (Table 6). This resulted in four declared rare flora, two priority 1 flora, four priority 3 flora and four priority 4 flora. The interpretation of the code is set out in Table 7.

Table 6. Potential Declared Rare and Priority Flora that may occur at the study area (Department of Environment and Conservation, 2009a). Department of the Environment, Water, Heritage and Arts (2009a) code in brackets. Description obtained from FloraBase (Western Australian Herbarium, 2009a)

TAXON	CODE	DESCRIPTION
Caladenia huegelii	R (E)	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green, cream, red,
		Sep-Oct. Grey or brown sand, clay loam.
Diuris micrantha	R (V)	Tuberous, perennial, herb, 0.3–0.6 m high. Fl. yellow, brown, Sep-
		Oct. Brown loamy clay. Winter-wet swamps, in shallow water.
Diuris purdiei	R (E)	Tuberous, perennial, herb, 0.15–0.35 m high. Fl. yellow, Sep–Oct.
		Grey-black sand, moist. Winter-wet swamps.
Drakaea elastica	R (E)	Tuberous, perennial, herb, 0.12–0.3 m high. Fl. red, green, yellow,
		Oct-Nov. White or grey sand. Low-lying situations adjoining
		winter-wet swamps.
Boronia juncea	1	Slender or straggly shrub, pedicels and sepals glabrous. Fl. pink,
		Apr. Sand. Low scrub.
Eremaea asterocarpa	1	Shrub, to 0.7 m high. Fl. orange. Deep grey sand.
subsp. brachyclada		
Aotus cordifolia	3	Erect or straggling shrub, 0.3–1.5 m high. Fl. yellow, Aug–Jan.
		Peaty soils. Swamps.
Cyathochaeta teretifolia	3	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge),
		to 2 m high, to 1.0 m wide. Fl. brown. Grey sand, sandy clay.
	_	Swamps, creek edges.
Jacksonia gracillima	3	No description.
Stylidium longitubum	3	Erect annual (ephemeral), herb, 0.05–0.12 m high. Fl. pink, Oct–
		Dec. Sandy clay, clay. Seasonal wetlands.
Aponogeton hexatepalus	4	Rhizomatous or cormous, aquatic perennial, herb, leaves floating.
		Fl. green, white, Jul-Oct. Mud. Freshwater: ponds, rivers,
		claypans.
Dodonaea hackettiana	4	Erect shrub or tree, 1–5 m high. Fl. yellow, green, red, Jul–Oct.
		Sand. Outcropping limestone.
Stylidium ireneae	4	Lax perennial, herb, (0.06–)0.1–0.28 m high, Leaves oblanceolate,
		0.4-2 cm long, 1-3 (-5) mm wide, apex subacute to acuminate,
		margin entire, glandular. Scape glandular. Inflorescence racemose.
		Fl. pink, Oct–Dec. Sandy loam. Valleys near creek lines,
T7 1. 1. 11	4	woodland, often with Agonis.
Verticordia lindleyi subsp.	4	Erect shrub, 0.2–0.75 m high. Fl. pink, May/Nov–Jan. Sand, sandy
lindleyi		clay. Winter-wet depressions.

Table 7. Code and description of Rare and Priority Flora categories (Wildlife Conservation Act (1950) (Department of Environment and Conservation, 2009a)

Code	Description of Declared Rare and Priority Flora Categories
R	DRF (Declared Rare Flora) -Extant Taxa. Taxa, which have been adequately searched for
	and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of
	special protection.
X	DRF (Declared Rare Flora) -Presumed Extinct Taxa. Taxa which have not been collected,
	or otherwise verified, over the past 50 years despite thorough searching, or of which all
	known wild populations have been destroyed more recently.
1	Priority One -Poorly Known Taxa. Taxa, which are known from one or a few (generally <5)
	populations, which are under threat.
2	Priority Two -Poorly Known Taxa. Taxa which are known from one or a few (generally <5)
	populations, at least some of which are not believed to be under immediate threat.
3	Priority Three -Poorly Known Taxa. Taxa, which are known from several populations, at
	least some of which are not believed to be under immediate threat.
4	Priority Four -Rare Taxa. Taxa which are considered to have been adequately surveyed and
	which whilst being rare, are not currently threatened by any identifiable factors.

Table 7 presents the definitions of Declared Rare and the four Priority Flora ratings under the Wildlife Conservation Act (1950) as extracted from Department of Environment and Conservation (2009a). Table 8 presents the definitions of the threatened species under the Environmental Protection and Diversity Conservation Act, 1999 (Department of the Environment, Water, Heritage and Arts (2009a).

Table 8. Categories of Threatened Flora Species (Environmental Protection and Biodiversity Conservation Act, 1999) (Department of the Environment, Water, Heritage and Arts (2009a)

Code	Code Declared Rare and Priority Flora Categories
Ex	Extinct
	Taxa which at a particular time if, at that time, there is no reasonable doubt that the
	last member of this species has died.
ExW	Extinct in the Wild
	Taxa which is known only to survive in cultivation, in captivity or as a naturalised
	population well outside its past range; or it has not been recorded in its known
	and/or expected habitat, at appropriate seasons, anywhere in its past range, despite
	exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered
	Taxa which at any particular time if, at that time, it is facing an extremely high risk
	of extinction in the wild in the immediate future, as determined in accordance with
	the prescribed criteria.
Е	Endangered
	Taxa, which is not critically endangered, and it is facing a very high risk of
	extinction in the wild in the immediate or near future, as determined in accordance
	with the prescribed criteria.
V	Vulnerable
	Taxa which is not critically endangered or endangered and is facing a high risk of
	extinction in the wild in the medium-term future, as determined in accordance with
	the prescribed criteria.
CD	Conservation Dependent
	Taxa which at a particular time if, at that time, the species is the focus of a specific
	conservation program, the cessation of which would result in the species becoming
	vulnerable, endangered or critically endangered within a period of 5 years.

Jacksonia gracillima a Priority 3 Flora, was recorded from 2 quadrats, ANK07 and ANK09. About 20 plants were recorded from each location. The plants at quadrat ANK07 were vegetative whereas those at quadrat ANK09 were in flower. It is a spreading somewhat lax shrub up to 1m in height. It is readily overlooked in dense vegetation.



Photograph 4 of the Priority 3 Flora, Jacksonia gracillima

No other Declared Rare or Priority Flora were recorded during the survey although a Declared Rare Flora has previously been recorded from Lot 35. An extensive search was undertaken of that Lot but if the DRF was an orchid species it may not have been visible in November.

4.6 Weeds

A total of 38 weeds were recorded from the survey area. All have been determined as weeds by the Western Australian Herbarium (2009a) and Department of Conservation and Land Management (1999). The rating allocated to each weed by CALM is based on three criteria:

Invasiveness – ability to invade natural bushland in good to excellent condition or ability to invade waterways.

Distribution – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.

Environmental impacts – Ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

Ratings indicate the following:

High indicates this weed is prioritised for control and/or research ie prioritising funding to it.

Moderate indicates control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).

Mild indicates monitoring of the weed and control where appropriate. **Low** indicates that this species would require a low level of monitoring

Table 9. Weeds recorded from the survey area

1 4 5 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
SCIENTIFIC NAME	COMMON NAME	CALM RATING	INVASIVENESS	IMPACTS	
*Bromus diandrus	Great brome	High	✓	✓	
*Cortaderia selloana	Pampas grass	High	✓	✓	
*Ehrharta calycina	Perennial veldt grass	High	✓	✓	
*Euphorbia terracina	Geraldton carnation weed	High	√	✓	
*Lagurus ovatus	Hares tail grass	High	✓	✓	
*Romulea rosea	Guildford grass	High	✓	✓	

SCIENTIFIC NAME	COMMON NAME	CALM RATING	INVASIVENESS	IMPACTS
*Typha orientalis	Bullrush	High	✓	✓
*Acacia longifolia	Sydney wattle	Moderate	✓	
*Aira caryophyllea	Silvery hair grass	Moderate	✓	
*Anagallis arvensis var. arvensis	Pimpernel	Moderate	✓	
*Arctotheca calendula	Cape weed	Moderate	✓	
*Avena barbata	Bearded oat	Moderate	✓	
*Briza maxima	Blowfly grass	Moderate	✓	
*Briza minor	Shivery grass	Moderate	✓	
*Carpobrotus edulis	Hottentot fig	Moderate	✓	
*Cirsium vulgare	Slender thistle	Moderate	✓	
*Disa bracteata	South African orchid	Moderate	✓	
*Ehrharta longiflora	Annual veldt grass	Moderate	✓	
*Gladiolus caryophyllaceus	Wild gladiolus	Moderate	✓	
*Hypochaeris glabra	Flatweed	Moderate	✓	
*Juncus bufonius	Toad rush	Moderate	✓	
*Lolium rigidum	Annual rye grass	Moderate	✓	
*Orobanche minor	Lesser broomrape	Moderate	✓	
*Polypogon monspeliensis	Annual beardgrass	Moderate	✓	
*Pseudognaphalium luteoalbum	Jersey cudweed	Moderate	✓	
*Senecio diaschides		Moderate	✓	
*Solanum americanum	Glossy nightshade	Moderate	✓	
*Solanum nigrum	Black berry nightshade	Moderate	✓	
*Sonchus asper	Prickly sowthistle	Moderate	✓	
*Sonchus oleraceus	Common sowthistle	Moderate	✓	
*Ursinia anthemoides	Ursinia	Moderate	✓	
*Vulpia bromoides	Squirrels tail fescue	Moderate	✓	
*Phytolacca octandra	Inkweed	Mild		
*Arundo donax	Bamboo	Low		
*Conyza bonariensis	Flaxleaf fleabane	Low		
*Lotus subbiflorus	Lotus	Low		
*Cotula coronopifolia	Waterbuttons	To be assessed		
*Isolepis marginata	Coarse club rush	To be assessed	_	

Seven of the weeds were rated as High, indicating that these weeds should be targeted for removal. *Typha orientalis was only recorded at the northern end of the lake; *Cortaderia selloana from the southern end of Lot 13 close to where ANK01 was surveyed; *Bromus diandrus, *Ehrharta calycina, *Lagurus ovatus and *Romulea rosea were recorded scattered or in dense clumps across the survey area and *Euphorbia terracina was only recorded on Treeby Road verge adjacent to Lot 188.

5. DISCUSSION

The Anketell Urban Deferred Area consists of 23 different lots all of which are privately owned of which access into 7 was permitted. From the aerial photograph provided 9 lots were completely degraded as they were being farmed, another 6 were extensively cleared but did appear to retain a small area of remnant bushland. Of the 8 Lots with an extensive cover of remnant bushland, access was permitted into 5 of them, including Lot 13 which covered the largest area.

A total of 58 vascular plant families, 125 genera and 167 taxa of which 38 were weeds were recorded from the survey area. The dominant plant families were Poaceae, Papilionaceae, Myrtaceae and Asteraceae.

A total of 10 different vegetation units were described for the survey area. These were:

- Open Low Woodland A of *Eucalyptus rudis* subsp. *rudis* over Low Scrub B of *Astartea scoparia* over Tall Sedges dominated by *Juncus pallidus*;
- Low Woodland A of *Eucalyptus rudis* subsp. *rudis*, *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Thicket of *Kunzea glabrescens* over Dwarf Scrub of *Astartea scoparia.*;
- Open Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open Low Scrub A dominated by *Leucopogon australis*. This was the dominant vegetation in the southern section of Lot 13;
- Open Low Woodland A of *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* and *Taxandria linearifolia* over Tall Sedges of *Lepidosperma longitudinale* and *Dielsia stenostachya*. This was the vegetation associated with the minor drain through the survey area;
- Low Forest A of *Banksia attenuata*, *Banksia menziesii* and *Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath B dominated by *Hibbertia hypericoides*. This was recorded from higher ground in Lot 32 and Lot 33:
- Open Tall Woodland of *Eucalyptus marginata* subsp. *marginata* occasionally with scattered trees of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens*. This was the dominant vegetation over most of the survey area;
- Low Woodland A of *Banksia attenuata*, *Banksia ilicifolia* and *Nuytsia floribunda* over Thicket of *Kunzea glabrescens* and *Melaleuca thymoides* over Low Heath D dominated by *Scholtzia uberiflora* and *Aotus procumbens*. This was the vegetation of the Priority Ecological Community;.
- Open Low Woodland A of *Eucalyptus todtiana*, *Banksia menziesii* and *Banksia attenuata* over Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub D of *Scholtzia uberiflora* over Open Low Grass dominated by *Vulpia bromoides over Herbs dominated by *Trachymene pilosa* and *Drosera paleacea*. This was recorded as a very small area on the western side of Lot 13 but did continue as the main vegetation into the adjoining property;
- Open Low Woodland A of *Banksia attenuata* and *Banksia menziesii* occasionally with *Allocasuarina fraseriana* over Dense Thicket of *Kunzea glabrescens* over Herbs of *Dasypogon bromeliifolius* and *Philotheca spicata* in grey sand (Af). This was from Lot 35; and
- Dense Thicket of *Kunzea glabrescens* over Open Dwarf Scrub C of *Hypocalymma angustifolium* over Open Low Grass dominated by **Vulpia bromoides* over Very Open Low Sedges of *Dielsia stenostachya* or *Schoenus rigens* or *Hypolaena exsulca*. This vegetation unit occurred as a distinct unit in Lot 13.

No Threatened Ecological Communities were recorded by the Department of Environment and Conservation (2009b) but one Priority Ecological Community, *Banksia ilicifolia* woodlands, southern Swan Coastal Plain (floristic community type 22) was recorded as being present at the survey area by the Department of Environment and Conservation. The accuracy of the Department of Environment and Conservation data location for this FCT is questionable as indicated in correspondence to T. Cowell (360 Environmental) from M. Hunter (Department of Environment and Conservation).

A PATN analysis was undertaken by TEH Griffin (see Appendix D) identified the level 3, Priority Ecological Community FCT21c as occurring at the survey area. Using PATN, quadrats ANK07 and ANK09 were concluded to be FCT21c, which were described in Section 4.2 as vegetation unit Em. Quadrat FCT11 was also identified in Section 4.2 as being representative of vegetation unit Em but in the PATN analysis was assessed to be FCT14, so is mapped as a slightly different unit, EmN.

ANK08 which was specifically placed in the area identified by the Department of Environment and Conservation as representative of FCT22, was determined using PATN to be FCT 21a, 23a, 21c. Therefore FCT22 could not be confirmed at the site.

No Declared Rare Flora were observed but a Priority 3 Flora, *Jacksonia gracillima* was recorded from two areas within the survey area with a total of about 40 plants being recorded. This is a shrub about 1m tall with the typical yellow and orange flowers of *Jacksonia* species. When in flower it is readily observed but when vegetative it blends into the surrounding bushland.

The survey area included a conservation category wetland. There are many tracks accessing the lake as visible in Diagram 3 below. These appear to originate from Thomas Road to the south, from the firebreaks along the properties, the road reserve and the continuation of Treeby Road. Although these have opened the area the majority of the surrounding bushland is in good or very good condition. By closing the tracks and allowing the area to rehabilitate naturally it should be possible to return it to a better condition. In several of the quadrats assessed seedlings of the trees were recorded.



Diagram 3. Lake illustrating tracks accessing the lake

A total of 38 weeds were recorded from the survey area of which 7 were rated as high. These are the weeds that should be targeted for removal. These were:

- *Typha orientalis recorded from the northern end of the lake;
- *Cortaderia selloana recorded from the southern end of Lot 13;
- *Euphorbia terracina recorded from the verge of Treeby Road adjacent to Lot 188; and
- *Bromus diandrus, *Ehrharta calycina, *Lagurus ovatus and *Romulea rosea- recorded scattered throughout the survey area.

Lot 13 has the largest area of remnant bushland, and it also includes the lake and the narrow, deeply incised drain. Lot 100 immediately to the north of Lot 13 also has a good cover of remnant bushland. The only other lot that was surveyed that still retained a reasonable area of remnant bushland was Lot 33. The majority of Lots have been fully or partially developed for agriculture/horticulture.

6. **RECOMMENDATION**

As the Priority Ecological Community FCT21c was identified at the site it is recommended, on the advice of V. English (Department of Environment and Conservation) that an additional spring survey be undertaken early in spring and the data be re-run using PATN. This will provide more clarity on the distribution of the Priority Ecological Community. A second spring survey is also recommended by the Town of Kwinana Local Biodiversity strategy.

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APPENDIX A

Species listed under vascular plant families

ABBREVIATION	INTERPRETATION
subsp.	Subspecies
var.	Variety
forma	Form
sp.	Species as unable to identify to species due to having vegetative
	material only
*	weed
?	unsure if taxon name applied is correct as plants only vegetative

Taxon

Dennstaedtiaceae

Pteridium esculentum

Zamiaceae

Macrozamia riedlei

Typhaceae

*Typha orientalis

Poaceae

*Aira caryophyllea

Amphipogon turbinatus

*Arundo donax

Austrostipa compressa

*Avena barbata

*Briza maxima

*Briza minor

*Bromus diandrus

*Cortaderia selloana

*Ehrharta calycina

*Ehrharta longiflora

*Lagurus ovatus

*Lolium rigidum

*Polypogon monspeliensis

*Vulpia bromoides

Cyperaceae

*Isolepis marginata

Lepidosperma longitudinale

Lepidosperma squamatum

Mesomelaena pseudostygia

Schoenus rigens

Restionaceae

Dielsia stenostachya

Hypolaena exsulca

Desmocladus flexuosus

Anarthriaceae

Lyginia barbata

Centrolepidaceae

Centrolepis drummondii

Juncaceae

*Juncus bufonius

Juncus pallidus

Asparagaceae

Chamaescilla corymbosa

Laxmannia grandiflora subsp. grandiflora

Lomandra caespitosa

Lomandra hermaphrodita

Sowerbaea laxiflora

Thysanotus patersonii

Thysanotus thyrsoides

Dasypogonaceae

Dasypogon bromeliifolius

Xanthorrhoeaceae

Xanthorrhoea preissii

Taxon

Colchicaceae

Burchardia umbellata

Hemerocallidaceae

Caesia parviflora

Dianella revoluta var. divaricata

Haemodoraceae

Anigozanthos humilis subsp. humilis

Anigozanthos manglesii

Conostylis aculeata

Conostylis juncea

Haemodorum spicatum

Phlebocarya ciliata

Iridaceae

*Gladiolus caryophyllaceus

Patersonia occidentalis

*Romulea rosea

Orchidaceae

Caladenia flava

Caladenia macrostylis

*Disa bracteata

Diuris corymbosa

Diuris sp.

Microtis media

Pterostylis pyramidalis

Pterostylis vittata

Thelymitra pauciflora

Casuarinaceae

Allocasuarina fraseriana

Proteaceae

Adenanthos cygnorum

Banksia attenuata

Banksia ilicifolia

Banksia menziesii

Persoonia saccata

Petrophile linearis

Stirlingia latifolia

Synaphea spinulosa

Sapindaceae

Nuytsia floribunda

Polygonaceae

Persicaria? decipiens

Phytolaccaceae

 $*Phytolacca\ octandra$

Aizoaceae

*Carpobrotus edulis

Molluginaceae

Macarthuria australis

Lauraceae

Cassytha racemosa forma racemosa

Taxon

Droseraceae

Drosera erythrorhiza

Drosera macrantha

Drosera paleacea

Drosera pallida

Drosera stolonifera

Crassulaceae

Crassula colorata

Mimosaceae

Acacia huegelii

*Acacia longifolia

Acacia pulchella var. glaberrima

Acacia saligna

Papilionaceae

Aotus gracillima

Aotus intermedia

Aotus procumbens

Bossiaea eriocarpa

Daviesia divaricata

Euchilopsis linearis

Gastrolobium capitatum

Gompholobium tomentosum

Hardenbergia comptoniana

Hovea trisperma

Jacksonia furcellata

Jacksonia gracillima

Jacksonia sternbergiana

Kennedia prostrata

*Lotus subbiflorus

Pultenaea reticulata

Rutaceae

Philotheca spicata

Euphorbiaceae

*Euphorbia terracina

Poranthera microphylla

Stackhousiaceae

Stackhousia monogyna

Tripterococcus brunonis

Dilleniaceae

Hibbertia hypericoides

Hibbertia racemosa

Hibbertia subvaginata

Thymelaeaceae

Pimelea rosea subsp. rosea

Myrtaceae

Astartea scoparia

Eremaea pauciflora

Eucalyptus marginata subsp. marginata

Eucalyptus rudis subsp. rudis

Eucalyptus todtiana

Hypocalymma angustifolium

Taxon

Myrtaceae (cont.)

Hypocalymma robustum

Kunzea glabrescens

Melaleuca preissiana

Melaleuca rhaphiophylla

Melaleuca teretifolia

Melaleuca thymoides

Scholtzia involucrata

Scholtzia uberiflora

Taxandria linearifolia

Apiaceae

Centella asiatica

Daucus glochidiatus

Hydrocotyle callicarpa

Trachymene pilosa

Epacridaceae

Astroloma pallidum

Brachyloma preissii

Conostephium pendulum

Leucopogon australis

Leucopogon conostephioides

Lysinema ciliatum

Primulaceae

*Anagallis arvensis var. arvensis

Loganiaceae

Phyllangium paradoxum

Solanaceae

*Solanum americanum

*Solanum nigrum

Orobanchaceae

*Orobanche minor

Plantaginaceae

Gratiola pubescens

Rubiaceae

Opercularia vaginata

Campanulaceae

Wahlenbergia? multicaulis

Lobeliaceae

Lobelia alata

Lobelia rhytidosperma

Goodeniaceae

Dampiera linearis

Lechenaultia floribunda

Stylidiaceae

Levenhookia stipitata

Stylidium brunonianum

Stylidium paludicola

Stylidium perpusillum

Stylidium repens

Stylidium utricularioides

Taxon

Asteraceae

- *Arctotheca calendula
- *Cirsium vulgare
- *Conyza bonariensis
- *Cotula coronopifolia
- *Hypochaeris glabra

Pithocarpa pulchella var. pulchella

Podotheca angustifolia

Podotheca chrysantha

 $*Pseudognaphalium\ luteoalbum$

*Senecio diaschides

Siloxerus humifusus

- *Sonchus asper
- *Sonchus oleraceus
- $*Ursinia\ anthemoides$

APPENDIX B

Quadrat Data

ABBREVIATION	INTERPRETATION
subsp.	Subspecies
var.	Variety
forma	Form
sp.	Species as unable to identify to species due to having vegetative
	material only
*	weed
?	unsure if taxon name applied is correct as plants only vegetative

QUADRAT ANK01

Location: Lot 13, south west corner **Datum (WGS84):** 392117E; 6433948N

Soil: Grey sand

Litter: Leaves 50%; Branches 30%

Topography: Flat

Vegetation Description: Open Woodland of Eucalyptus rudis subsp. rudis over Dense Thicket

of Kunzea glabrescens over Open Low Scrub A dominated by Leucopogon australis

Vegetation Condition: 3 but most surrounding area is 3-4

Other Notes: Close by are Melaleuca preissiana trees. Lot of rubbish dumped. Many juvenile

Eucalyptus rudis subsp. rudis



TAXON	HEIGHT (CM)	% COVER
Astartea scoparia	200	1
Austrostipa compressa	25	<1
*Briza maxima	50	3
Cassytha racemosa forma racemosa	twiner	1
Daucus glochidiatus	10	<1
*Ehrharta longiflora	30	<1
Eucalyptus rudis subsp. rudis	1600	10
Hypocalymma angustifolium	50	3
*Hypochaeris glabra	25	1
Kunzea glabrescens	400	80
Leucopogon australis	250	5
*Lolium rigidum	20	<1

TAXON	HEIGHT (CM)	% COVER
*Lotus subbiflorus	10	<1
Pultenaea reticulata	175	1
*Solanum americanum	200	<1
*Solanum nigrum	50	1
*Sonchus asper	60	1
*Sonchus oleraceus	70	3
Thysanotus patersonii	200	<1
*Acacia longifolia	Opportunistic	
Acacia pulchella var. glaberrima	Opportunistic	
Adenanthos cygnorum	Opportunistic	
*Aira caryophyllea	Opportunistic	
*Arctotheca calendula	Opportunistic	
Banksia ilicifolia	Opportunistic	
*Briza minor	Opportunistic	
*Bromus diandrus	Opportunistic	
Burchardia umbellata	Opportunistic	
Carpobrotus edulis	Opportunistic	
*Cirsium vulgare	Opportunistic	
Conostylis juncea	Opportunistic	
*Conyza bonariensis	Opportunistic	
*Cortaderia selloana	Opportunistic	
Crassula colorata	Opportunistic	
Dampiera linearis	Opportunistic	
Dianella revoluta var. divaricata	Opportunistic	
Dielsia stenostachya	Opportunistic	
*Disa bracteata	Opportunistic	
Diuris corymbosa	Opportunistic	
*Ehrharta calycina	Opportunistic	
*Gladiolus caryophyllaceus	Opportunistic	
Gompholobium tomentosum	Opportunistic	
*Isolepis marginata	Opportunistic	
*Juncus bufonius	Opportunistic	
Lepidosperma longitudinale	Opportunistic	
Melaleuca preissiana	Opportunistic	
Melaleuca rhaphiophylla	Opportunistic	
Microtis media	Opportunistic	
Orobanche minor	Opportunistic	
Phlebocarya ciliata	Opportunistic	
*Phytolacca octandra	Opportunistic	
Pimelea rosea subsp. rosea	Opportunistic	
Pteridium esculentum	Opportunistic	
*Romulea rosea	Opportunistic	
Scholtzia uberiflora	Opportunistic	
Senecio diaschides	Opportunistic	
Stylidium repens	Opportunistic	
*Ursinia anthemoides	Opportunistic	
*Vulpia bromoides	Opportunistic	

QUADRAT ANK02

Location: Lot 13, on east side of lake **Datum (WGS84):** 392223E; 6434362N

Soil: Grey loam Litter: Leaves 30% Topography: Lake edge

Vegetation Description: Low Woodland A of *Eucalyptus rudis* subsp. *rudis*, *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Thicket of *Kunzea glabrescens* over Dwarf Scrub

C of Astartea scoparia

Vegetation Condition: 3, tracks through the area 3-4

Other Notes: Lot of rubbish on lake edge and in the water. Edge of lake very weedy.

Vegetation is common around the lake edge.



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	60	5
*Anagallis arvensis var. arvensis	10	<1
Astartea scoparia	60	15
*Briza maxima	50	3
*Briza minor	30	10
*Carpobrotus edulis	10	1
Cassytha racemosa forma racemosa	twiner	30
Centella asiatica	20	<1
Dielsia stenostachya	50	1
Eucalyptus rudis subsp. rudis	1000	10
Hypocalymma angustifolium	30	1
Juncus pallidus	70	1
Kunzea glabrescens	300	70
*Lotus subbiflorus	15	5
Melaleuca preissiana	800	2
Melaleuca teretifolia	300	2
*Vulpia bromoides	30	10
*Aira caryophyllea	Opportunistic	
*Arundo donax	Opportunistic	
Dampiera linearis	Opportunistic	

TAXON	HEIGHT (CM)	% COVER
Hydrocotyle callicarpa	Opportunistic	
*Isolepis marginata	Opportunistic	
Lepidosperma longitudinale	Opportunistic	
Melaleuca rhaphiophylla	Opportunistic	
Phyllangium paradoxum	Opportunistic	
Siloxerus humifusus	Opportunistic	
Stylidium perpusillum	Opportunistic	
Stylidium utricularioides	Opportunistic	
Thelymitra pauciflora	Opportunistic	

Location: Lot 13, northern tip of lake **Datum (WGS84):** 392135E; 6434470N

Soil: Black peaty sand, damp Litter: Leaves 15%; Logs 5% Topography: Lake edge

Vegetation Description: Open Low Woodland A of Eucalyptus rudis subsp. rudis over Low

Scrub B of Astartea scoparia over Tall Sedges dominated by Juncus pallidus

Vegetation Condition: 3-4

Other Notes: This vegetation unit only a small section at the northern edge of the lake. Most of

the surrounding lake vegetation is as described at ANK02



TAXON	HEIGHT (CM)	% COVER
Astartea scoparia	150	15
*Avena barbata	70	5
*Briza maxima	50	2
*Briza minor	20	25
Cassytha racemosa forma racemosa	twiner	15
Cotula coronopifolia	20	5
Eucalyptus rudis subsp. rudis	1000	5
Gratiola pubescens	20	<1
*Hypochaeris glabra	30	2
*Isolepis marginata	10	<1
Juncus pallidus	125	70

TAXON	HEIGHT (CM)	% COVER
Lobelia alata	30	<1
*Lolium rigidum	35	<1
*Lotus subbiflorus	25	25
Persicaria? decipiens	80	<1
*Polypogon monspeliensis	70	<1
Senecio diaschides	70	1
*Sonchus asper	70	1
*Sonchus oleraceus	70	1
*Typha orientalis	70	5
*Vulpia bromoides	50	3
Aotus gracillima	Opportunistic	
*Arctotheca calendula	Opportunistic	
*Carpobrotus edulis	Opportunistic	
*Lagurus ovatus	Opportunistic	
Melaleuca rhaphiophylla	Opportunistic	
Microtis media	Opportunistic	

Location: Lot 13, on western edge of survey area

Datum (WGS84): 392089E; 6434150N

Soil: Grey sand

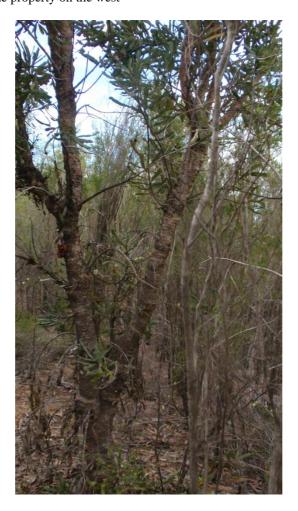
Litter: Leaves 70%; Branches 15%

Topography: Lower slope

Vegetation Description: Open Low Woodland A of *Eucalyptus todtiana, Banksia menziesii* and *Banksia attenuata* over Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub D of *Scholtzia uberiflora* over Open Low Grass dominated by **Vulpia bromoides* over Herbs dominated by *Trachymene pilosa* and *Drosera paleacea*

Vegetation Condition: 4

Other Notes: Higher ground consisting of narrow strip to the west of the lake on the boundary. Continues into the property on the west



TAXON	HEIGHT (CM)	% COVER
Austrostipa compressa	70	<1
Banksia menziesii	800	2
Burchardia umbellata	50	<1
*Carpobrotus edulis	20	3
Crassula colorata	15	5
Drosera paleacea	5	30
Gompholobium tomentosum	20	<1
Hibbertia subvaginata	70	1
*Hypochaeris glabra	25	5
*Isolepis marginata	10	<1

TAXON	HEIGHT (CM)	% COVER
Kunzea glabrescens	600	75
Scholtzia uberiflora	30	15
Stylidium perpusillum	30	<1
Stylidium repens	25	<1
Trachymene pilosa	25	20
*Vulpia bromoides	40	30
Banksia attenuata	Opportunistic	
*Briza maxima	Opportunistic	
*Ehrharta calycina	Opportunistic	
*Ehrharta longiflora	Opportunistic	
Eucalyptus todtiana	Opportunistic	

Location: Lot 13

Datum (WGS84): 392242E; 6434107N. Also resurveyed at 392255E; 6434122N

Soil: Grey sand

Litter: Leaves 10%; Branches 5% **Topography:** Minor drain

Vegetation Description: Low Woodland A of *Melaleuca preissiana* and *Eucalyptus rudis* subsp. *rudis* over Low Scrub A of *Kunzea glabrescens* over Open Tall Sedges of *Lepidosperma*

longitudinale over Open Ferns of Pteridium esculentum

Vegetation Condition: 4

Other Notes: Drain bed. First site burnt about 18 months where there were a large number of *Eucalyptus rudis* subsp. *rudis* seedlings. Narrow quadrat done down the drain. Second site was denser vegetation



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	70	15
Austrostipa compressa	70	1
*Briza maxima	70	1
*Carpobrotus edulis	10	<1
Centrolepis drummondii	60	3
Crassula colorata	10	2

TAXON	HEIGHT (CM)	% COVER
Dielsia stenostachya	60	10
Eucalyptus rudis subsp. rudis	1200	5
*Hypochaeris glabra	70	<1
*Isolepis marginata	5	<1
Kunzea glabrescens	50	20
Lepidosperma longitudinale	60	10
*Lotus subbiflorus	20	1
Melaleuca preissiana	1200	10
Melaleuca teretifolia	90	2
Opercularia vaginata	40	2
Pteridium esculentum	200	20
Stylidium utricularioides	2	<1
*Vulpia bromoides	50	3
Acacia saligna	Opportunistic	
*Arctotheca calendula	Opportunistic	
Hypocalymma angustifolium	Opportunistic	
Juncus pallidus	Opportunistic	
Taxandria linearifolia	Opportunistic	

QUADRAT NUMBER ANK06

Location: Lot 13

Datum (WGS84): 392356E; 6434197N. Also surveyed at 392542E; 6434243N

Soil: Grey sand

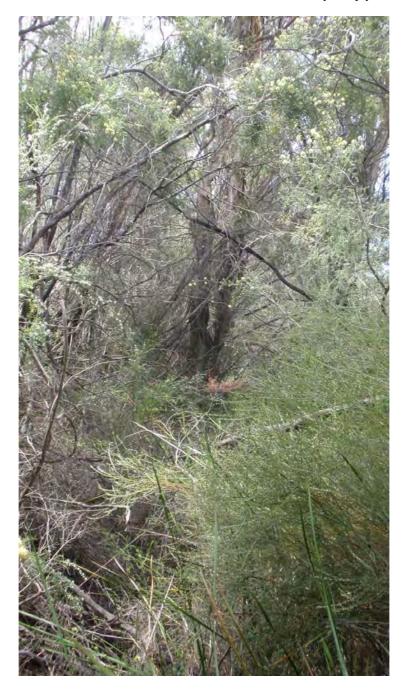
Litter: Leaves 50%; Branches 80%; Logs 5%

Topography: Minor drain

Vegetation Description: Open Low Woodland A of *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* and *Taxandria linearifolia* over Tall Sedges of *Lepidosperma longitudinale*

and *Dielsia stenostachya* **Vegetation Condition:** 3

Other Notes: Drain consists of several channels. Not burnt. Drain dry, deeply incised



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	10	<1
Aotus gracillima	175	5
Astartea scoparia	100	2
Dielsia stenostachya	60	15
Gratiola pubescens	10	1
Hypocalymma angustifolium	90	1
*Hypochaeris glabra	30	1
Kunzea glabrescens	1000	25
Lepidosperma longitudinale	100	25
Lobelia alata	30	1
Melaleuca preissiana	1200	10
Melaleuca rhaphiophylla	1000	1
Taxandria linearifolia	220	15
Lobelia rhytidosperma	Opportunistic	
*Vulpia bromoides	Opportunistic	

QUADRAT NUMBER ANK07

Location: Lot 13, south east area **Datum (WGS84):** 392466E; 6434139N

Soil: Grey sand

Litter: Leaves 60%; Branches 35% **Topography:** Lower slope

Vegetation Description: OpenTall Woodland of Eucalyptus marginata subsp. marginata over

Dense Thicket of Kunzea glabrescens

Vegetation Condition: 3-4

Other Notes: Possibly same unit as ANK04. Several *Eucalyptus marginata* subsp. *marginata*

seedlings. Several stumps from trees previously cut down.



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	50	<1
Banksia ilicifolia	40	<1
*Briza maxima	30	<1
Caladenia flava	20	<1
Conostylis juncea	40	<1
Crassula colorata	10	1
0Drosera erythrorhiza	5	3
Drosera pallida	twiner	<1
*Ehrharta calycina	70	<1
Eucalyptus marginata subsp. marginata	1800	10
Gompholobium tomentosum	50	1
*Hypochaeris glabra	10	2
Jacksonia gracillima	35	<1
Kennedia prostrata	10	<1
Kunzea glabrescens	500	75
*Lotus subbiflorus	5	<1
Microtis media	20	<1
Poranthera microphylla	10	<1
Pterostylis vittata	20	<1
Thysanotus patersonii	twiner	<1
Trachymene pilosa	20	<1

TAXON	HEIGHT (CM)	% COVER
*Ursinia anthemoides	30	<1
*Vulpia bromoides	25	5
Allocasuarina fraseriana	Opportunistic	
Banksia menziesii	Opportunistic	
Banksia attenuata	Opportunistic	
*Carpobrotus edulis	Opportunistic	
*Gladiolus caryophyllaceus	Opportunistic	

Location: Lot 13

Datum (WGS84): 392411E; 6434596E

Soil: Grey sand with limestone close to the surface **Litter:** Leaves 40%; Branches 20%; Logs 5% **Topography:** Upper slope on slight rise

Vegetation Description: Low Woodland A of *Banksia attenuata, Banksia ilicifolia* and *Nuytsia floribunda* over Thicket of *Kunzea glabrescens* and *Melaleuca thymoides* over Low Heath D

dominated by Scholtzia uberiflora and Aotus procumbens

Vegetation Condition: 3

Other Notes: Priority Ecological Community. Tall *Nuytsia floribunda* outside of the quadrat.

Continues close to edge of lake

No photograph taken

TAXON	HEIGHT (CM)	% COVER
Aotus procumbens	50	10
Astroloma pallidum	60	3
Banksia attenuata	1000	5
Banksia ilicifolia	1600	10
Bossiaea eriocarpa	50	5
*Briza maxima	50	3
Caladenia macrostylis	25	<1
*Carpobrotus edulis	30	1
Dasypogon bromeliifolius	70	5
Diuris sp.	30	<1
Drosera pallida	twiner	<1
Ehrharta longiflora	50	5
Hibbertia racemosa	50	2
Hovea trisperma	70	<1
Hypocalymma robustum	50	<1
*Hypochaeris glabra	10	<1
Hypolaena exsulca	70	2
Kunzea glabrescens	500	30
Lomandra caespitosa	40	3
Lyginia barbata	70	<1
Lysinema ciliatum	70	<1
Melaleuca thymoides	300	30
Microtis media	15	<1
Nuytsia floribunda	50	1
Phlebocarya ciliata	70	3
Pterostylis pyramidata	15	<1
Pterostylis vittata	20	<1
Scholtzia uberiflora	30	10
Stackhousia monogyna	40	<1
*Vulpia bromoides	50	5
Allocasuarina fraseriana	Opportunistic	
Banksia menziesii	Opportunistic	

Location: Lot 13

Datum (WGS84): 392412E; 6434474N

Soil: Grey sand

Litter: Leaves 30%; Branches 25%

Topography: Flat

Vegetation Description: Dense Thicket of *Kunzea glabrescens* over Open Dwarf Scrub C of *Hypocalymma angustifolium* over and Open Low Grass dominated by **Vulpia bromoides*

Over Very Open Low Sedges of Dielsia stenostachya

Vegetation Condition: 3-4

Other Notes: Occasional Melaleuca preissiana



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	50	<1
*Carpobrotus edulis	10	2
Conostylis juncea	30	<1
Crassula colorata	10	<1
Dielsia stenostachya	50	10
Gompholobium tomentosum	50	1
Hypocalymma angustifolium	70	5
*Hypochaeris glabra	40	2
Jacksonia gracillima	50	1
Kunzea glabrescens	500	85
Phlebocarya ciliata	50	3
Thysanotus patersonii	twiner	<1
*Vulpia bromoides	20	5
Austrostipa compressa	Opportunistic	
Banksia ilicifolia	Opportunistic	
Melaleuca preissiana	Opportunistic	
Philotheca spicata	Opportunistic	

Location: Lot 13 on eastern edge **Datum (WGS84):** 392488E; 6434479N

Soil: Grey sand

Litter: Leaves 10%; branches 10%

Topography: Flat

Vegetation Description: Open Scrub of *Kunzea glabrescens* over Dwarf Scrub C of *Hypocalymma angustifolium* over Open Tall Sedges dominated by *Hypolaena exsulca* and

Schoenus rigens

Vegetation Condition: 3-4

Other Notes: Possibly a disturbance area



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	60	1
Aotus intermedia	50	<1
Austrostipa compressa	70	2
*Briza maxima	40	5
*Briza minor	30	<1
Conostylis juncea	50	<1
Dampiera linearis	15	<1
Euchilopsis linearis	50	2
Hypocalymma angustifolium	60	20
Hypolaena exsulca	80	5
Kunzea glabrescens	220	5
Mitrasacme paradoxa	10	<1
Phlebocarya ciliata	70	3
Pseudognaphalium luteoalbum	2	<1
Schoenus rigens	80	5
Stylidium paludicola	70	1
Stylidium utricularioides	2	<1
Melaleuca preissiana	Opportunistic	

Location: Lot 100

Datum (WGS84): 392305E; 6434772N

Soil: Grey sand

Litter: Leaves 70%; Branches 30%

Topography: Flat

Vegetation Description: Open Woodland of Eucalyptus marginata subsp. marginata and

Melaleuca preissiana over Dense Thicket of Kunzea glabrescens

Vegetation Condition: 3-4

Other Notes: Regrowth thicket of Kunzea glabrescens



TAXON	HEIGHT (CM)	% COVER
Acacia pulchella var. glaberrima	70	1
Aotus intermedia	60	1
*Briza minor	30	15
*Ehrharta calycina	70	2
*Ehrharta longiflora	40	1
Eucalyptus marginata subsp. marginata	1400	5
Hypocalymma angustifolium	50	2
*Hypochaeris glabra	10	3
Kunzea glabrescens	600	98
Melaleuca preissiana	1600	5
*Arctotheca calendula	Opportunistic	
*Carpobrotus edulis	Opportunistic	·
Euchilopsis linearis	Opportunistic	
*Phytolacca octandra	Opportunistic	

Location: Lot 35

Datum (WGS84): 392108E; 6434826N

Soil: Grey sand

Litter: Bark 25%; Leaves 40%; Branches 25%

Topography: Lower slope

Vegetation Description: Open Low Woodland A of *Banksia attenuata* and *Banksia menziesii* over Dense Thicket of *Kunzea glabrescens* over Herbs of *Dasypogon bromeliifolius* and

Philotheca spicata
Vegetation Condition: 3

Other Notes: From the track on the eastern side of this Lot there appears to be dieback as there are several *Banksias* dead.

Lot 34 condition 4 but along western edge is condition 3.

Lot 33 condition 4. More *Eucalyptus marginata* subsp. *marginata* in this Lot. Becomes condition 3 near western edge



TAXON	HEIGHT (CM)	% COVER
Amphipogon turbinatus	50	1
Astroloma pallidum	70	10
Banksia attenuata	600	5
Banksia menziesii	600	2
Bossiaea eriocarpa	50	5
Burchardia umbellata	70	<1
Conostephium pendulum	40	1
Conostylis juncea	40	<1
Dasypogon bromeliifolius	70	15
Drosera pallida	twiner	<1
Gompholobium tomentosum	50	3
Hypolaena exsulca	40	5
Kunzea glabrescens	600	75
Levenhookia stipitata	5	<1
Loxocarya flexuosa	40	10
Lyginia barbata	50	15
Melaleuca thymoides	90	3
Patersonia occidentalis	70	5

TAXON	HEIGHT (CM)	% COVER
Philotheca spicata	70	20
Scholtzia uberiflora	30	3
Stylidium brunonianum	10	<1
Trachymene pilosa	20	<1
Xanthorrhoea preissii	120	10
Acacia huegelii	Opportunistic	
Acacia pulchella var. glaberrima	Opportunistic	
Adenanthos cygnorum	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Anigozanthos manglesii	Opportunistic	
Aotus procumbens	Opportunistic	
Austrostipa compressa	Opportunistic	
Banksia ilicifolia	Opportunistic	
Brachyloma preissii	Opportunistic	
*Carpobrotus edulis	Opportunistic	
Conostylis aculeata	Opportunistic	
Crassula colorata	Opportunistic	
Dampiera linearis	Opportunistic	
Dianella revoluta var. divaricata	Opportunistic	
Drosera macrantha	Opportunistic	
Eremaea pauciflora	Opportunistic	
Eucalyptus marginata subsp. marginata	Opportunistic	
*Gladiolus caryophyllaceus	Opportunistic	
Haemodorum spicatum	Opportunistic	
Hibbertia hypericoides	Opportunistic	
Hibbertia racemosa	Opportunistic	
*Isolepis marginata	Opportunistic	
Jacksonia sternbergiana	Opportunistic	
Laxmannia grandiflora	Opportunistic	
Lechenaultia floribunda	Opportunistic	
Lepidosperma squamatum	Opportunistic	
Leucopogon conostephioides	Opportunistic	
Lomandra caespitosa	Opportunistic	
Lomandra hermaphrodita	Opportunistic	
Macrozamia riedlei	Opportunistic	
Microtis media	Opportunistic	
Persoonia saccata	Opportunistic	
Petrophile linearis	Opportunistic	
Phlebocarya ciliata	Opportunistic	
Pithocarpa pulchella var. pulchella	Opportunistic	
Pultenaea reticulata	Opportunistic	
Stirlingia latifolia	Opportunistic	
Stylidium repens	Opportunistic	
Thysanotus patersonii	Opportunistic	
Thysanotus thyrsoideus	Opportunistic	
Tripterococcus brunonis	Opportunistic	
*		
*Ursinia anthemoides	Opportunistic	

Location: Lot 33

Datum (WGS84): 391966E; 6435028N **Soil:** Grey sand with yellow sand beneath **Litter:** Leaves 30%; Branches 20%; Logs 5%

Topography: Middle slope

Vegetation Description: Low Forest A of Banksia attenuata, Banksia menziesii and

Allocasuarina fraseriana over Open Scrub of Kunzea glabrescens over Heath B dominated by

Hibbertia hypericoides Vegetation Condition: 3



TAXON	HEIGHT (CM)	% COVER		
Acacia pulchella var. glaberrima	90	1		
Adenanthos cygnorum	500	5		
Allocasuarina fraseriana	1400	10		
Amphipogon turbinatus	40	2		
Astroloma pallidum	20	<1		
Austrostipa compressa	50	<1		
Banksia attenuata	1000	15		
Banksia menziesii	1000	15		
Brachyloma preissii	70	1		
*Briza maxima	50	1		

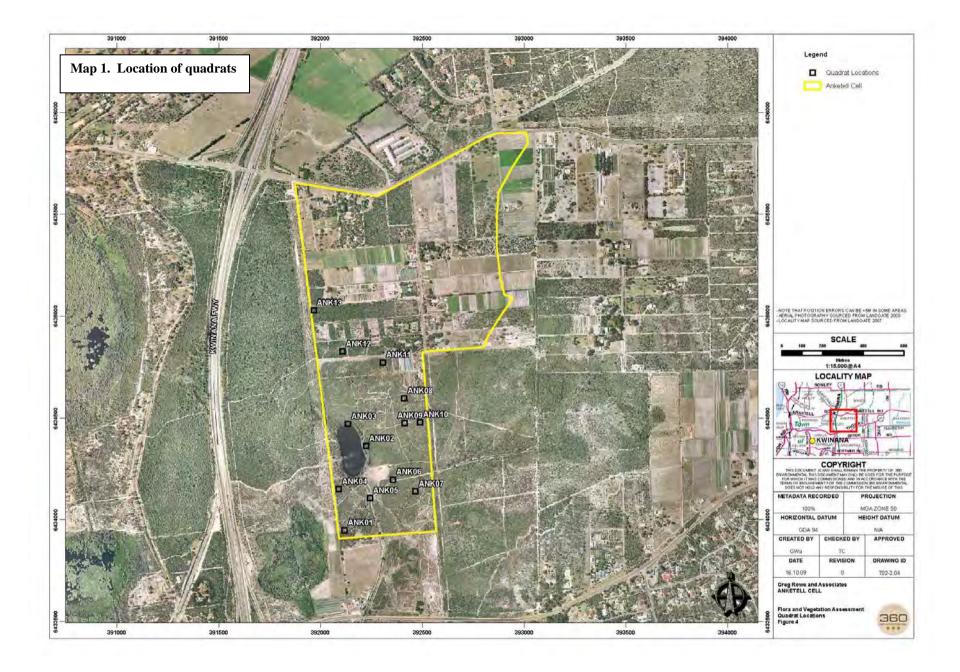
TAXON	HEIGHT (CM)	% COVER
*Briza minor	15	<1
Burchardia umbellata	90	<1
Caesia parviflora	70	<1
Chamaescilla corymbosa	10	<1
Conostephium pendulum	50	1
Conostylis aculeata	40	1
Crassula colorata	10	<1
Daviesia divaricata	70	3
Diuris sp.	50	<1
Drosera pallida	twiner	<1`
Drosera stolonifera	30	<1
*Ehrharta calycina	80	1
Gastrolobium capitatum	50	1
*Gladiolus caryophyllaceus	70	<1
Hardenbergia comptoniana	twiner	<1
Hibbertia hypericoides	70	60
Hypocalymma robustum	60	5
*Hypochaeris glabra	30	1
Jacksonia furcellata	300	5
Jacksonia sternbergiana	300	5
Kunzea glabrescens	300	2
Levenhookia stipitata	5	<1
Loxocarya flexuosa	50	5
Macarthuria australis	20	<1
Mesomelaena pseudostygia	60	10
Patersonia occidentalis	70	5
Petrophile linearis	50	1
Podotheca angustifolia	15	<1
Poranthera microphylla	5	<1
Scholtzia involucrata	40	10
Siloxerus humifusus	2	<1
Sowerbaea laxiflora	70	<1
Stylidium brunonianum	70	<1
Synaphea spinulosa	50	1
Thysanotus patersonii	twiner	<1
Trachymene pilosa	20	1
Wahlenbergia? multicaulis	25	<1
Anigozanthos humilis subsp. humilis	Opportunistic	\1
Anigozanthos manglesii	Opportunistic	
Caladenia flava	Opportunistic	
Carpobrotus edulis	Opportunistic	
Centrolepis drummondii		
Eucalyptus marginata subsp. marginata	Opportunistic Opportunistic	
Gompholobium tomentosum	Opportunistic	
Kennedia prostrata	Opportunistic Opportunistic	
Laxmannia grandiflora subsp. grandiflora	Opportunistic Opportunistic	
Lobelia rhytidosperma	Opportunistic	
Lomandra caespitosa	Opportunistic	
Macrozamia riedlei	Opportunistic	
Persoonia saccata	Opportunistic	
Podotheca chrysantha	Opportunistic	

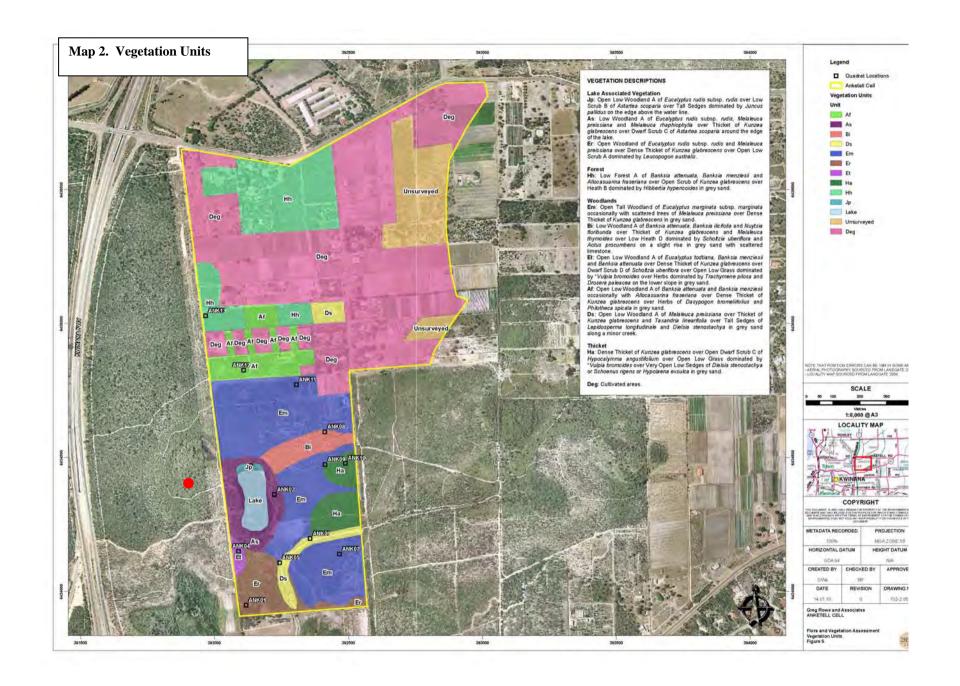
TAXON	HEIGHT (CM)	% COVER
Stirlingia latifolia	Opportunistic	
*Ursinia anthemoides	Opportunistic	
Xanthorrhoea preissii	Opportunistic	

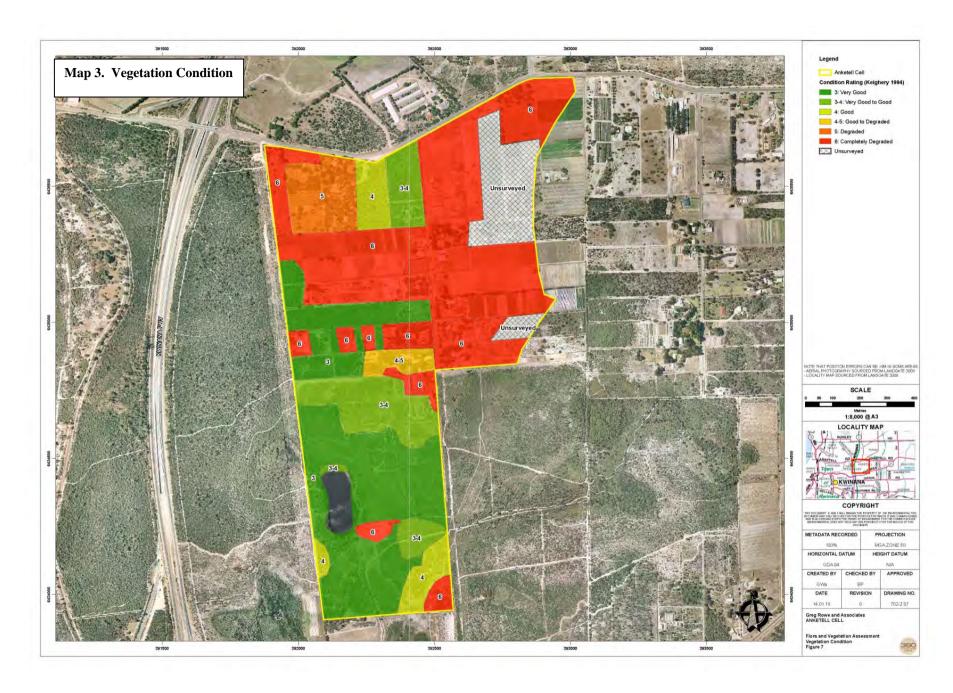
APPENDIX C

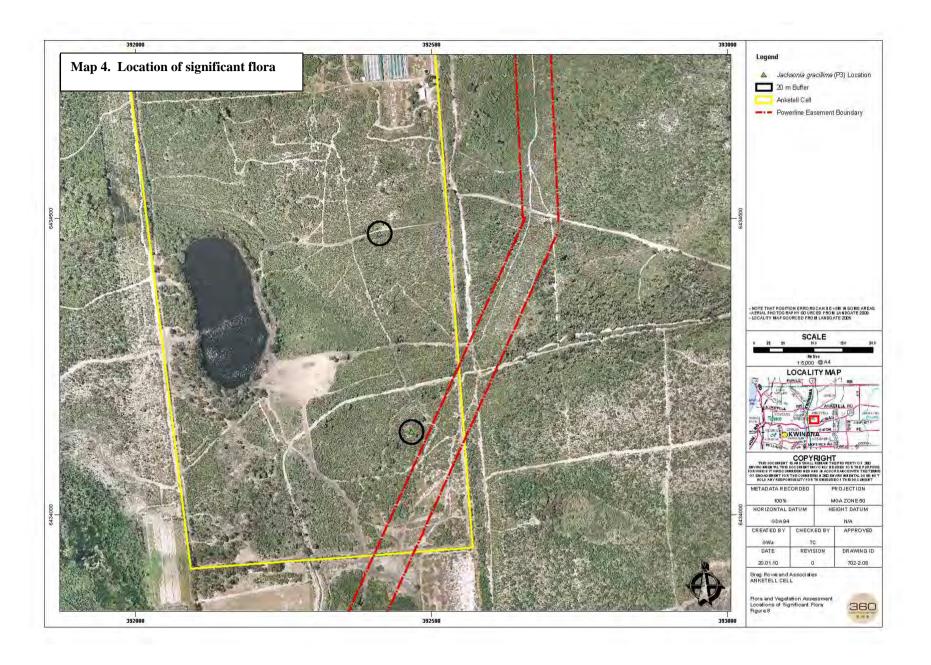
Maps

- Location of quadrats
 Vegetation Units
 Vegetation Condition
 Location of Priority Flora
- 5. Location of Priority Ecological Community









APPENDIX D

PATN ANalysis

1.0 INTRODUCTION

1.1 Purpose of this report

The current report is intended to help clarify the assignment of Floristic Community type (FCT) designation to vegetation community (site) data. FCTs were defined by Gibson et al (1994) based on site data collected from vegetation on the Swan Coastal Plain. In particular, the potential that a Threatened Ecological Community (English and Blyth 1997) is represented by the data collected needs to be clarified.

1.2 Location of Anketell Sites

The sites were ???.

1.3 Brief background to floristic analysis of vegetation on the Swan Coastal Plain Floristic analysis (ie., analysis of variation in vegetation based on the species present, rather than description of structural variation and dominance) as a significant component of the understanding of the variation present in the native vegetation of the Swan Coastal Plain dates to Gibson *et al* (1994 – all references to the SCP survey in the current report refer to this publication), the first publication to document the floristics of the vegetation of a large part of the Swan Coastal Plain. While the SCP survey is based on a very significant amount of work, it must be viewed as a "first pass" survey, limited, in the context of the great variety of vegetation present in the very large area surveyed, by the relatively limited number (509) of sites (quadrats) it is based on. To a limited degree, this limitation has subsequently been addressed in an "update" to the work of the SCP survey (which describes additional units). However, there is no detailed publication of the results of this update available and the additional data used are not readily available in an appropriate form (ie., one that would enable ready comparison of new data to the overall data set).

The units described by the SCP survey are a series of "floristic community types", a "unit" whose rank is defined by the use within a study. The SCP survey surveyed a very large survey area and defined a relatively small number of floristic community types. Consequently, the floristic community types they have described are of a very high order (see Trudgen 1999, volume 1, for further discussion of this point). This is an extremely important point to fully grasp in interpreting the analysis presented by the SCP survey and in understanding the meaning of analysis of other data sets when they are compared to the floristic community types of the SCP survey.

The important effects of the limited size data set used by the SCP survey and of the relatively small number of floristic community types defined by them, can be summarised by the following points:

 the definition of all but two of the Threatened Ecological Communities for vegetation on the Swan Coastal Plain (English and Blyth 1997) has been based on the floristic community types of the SCP survey. It therefore follows, that with two exceptions, only vegetation units from one study that are different at a very high order of floristics are treated as rare by Government. No account is taken of other important differences, such as differences in structure and dominance;

- 2. for the definition of floristic community types to be robust, a sufficient sized database is needed to give adequate precision in their definition. About half of the floristics community types (or sub types) of the SCP survey are based on less than 10 sites. It is likely that with a larger data set there would be significant alteration in the classification of those floristic community types from the SCP survey based on small numbers of sites.
- 3. as noted above, many (if not most) of the floristic community types defined by the SCP survey are very broad. They contain very significant variation in floristics, structure and dominance. Some (or in more highly cleared parts of the Swan Coastal Plain much) of this variation may be rare by any reasonable definition, but it is currently "buried" within larger groups;
- 4. there is likely to be significant variation not sampled by the SCP survey. This includes some variation at a high level of floristic difference (see Trudgen 1999, volume 1, for an example of this) and undoubtedly quite significant (large!) amounts of variation at "medium" and "low" levels.
- 5. the document, and its use by Government, has focussed attention in the environmental impact assessment process on the high level of units described, deflecting attention from the layers of variation beneath these units that also have significant conservation value.

From these points it is obvious that there is a need for a major "upgrade" to the floristic analysis of the vegetation of the Swan Coastal Plain to provide a more detailed floristic classification that considers not only more of the variation present, but explicitly recognises more of the variation present in formally described units.

Obviously, such a reworking would have some effect on what vegetation is considered rare on the Swan Coastal Plain. It needs to be stressed that it would be very unlikely to find that any of the vegetation currently considered to be rare on the basis of the SCP survey's classification was not rare. On the other hand, it is likely that such a review would very probably consider to be rare some vegetation which is not currently considered rare.

1.4 Data provided

It is very important in comparing different sets of floristic data that they are comparable in the application of names, in the intensity of the survey (ie., the effort of searching resulting in similar proportion of the flora at sites being recorded) and in the size of the site recorded. If the data from different data sets is not comparable in these ways, it reduces the clarity of the results of the analyses carried out. If the discrepancy in the comparability of the data sets is large, the results may become meaningless.

It was noted that the sites were recorded in summer and the likely under representation of some species because of that. Some differences in representation is shown in Appendix 2 for comparison.

2.0 METHODS

2.1 Data Preparation

The data from the Anketell sites were provided in a spreadsheet. These were incorporated into a standard MS Access based database designed for this type of data. One virtue of the database is that the species recorded at each site are stored against standard codes (numbers, those used by the Western Australian Herbarium) for each species. This facilitates ready comparison of data from different surveys stored in the same system.

After the data were incorporated into the database, a process of reconciliation of flora species names with those used in the SCP survey was undertaken. This step was necessary at least because of changes in nomenclature over the last ten years and the potential of survey specific variations in the application of names. The reconciliation involved:

- reducing some infra-specific names to the relevant species name, and
- combining some taxa where confusion is known to have occurred in field observations and identifications.

The reconciliation process was relatively straightforward as most of the names had already been standardised. Most reconciliation was to conform with the methods that the SCP survey used to manage confusing taxa plus some nomenclatural changes.

2.2 Comparability of datasets

It was concluded that the quadrat datasets were probably reasonably compatible in nomenclature. The richness of sites are moderate in some quadrats given most were dampland related (see extract of dendrogram in results.) The number of species from families often overlooked (eg Orchidaceae) tended to be lower than that of quadrats in SCP dataset for similar vegetation (Appendix 2).

2.3 Comparisons made

The data therefore from the 13 quadrats plus the 509 sites from the SCP survey of the southern part of the Swan Coastal Plain (south of Gingin) were combined. This enabled various analyses to be performed.

The main purpose was intended to assign the individual sites to the Floristic Community Types (FCTs) defined in the SCP survey. These data are provided in Anketell.mdb.)

2.4 Analyses carried out

The approach was the use of numerical classification techniques (PATN) based on the similarity of the floristic composition of the Anketell quadrats to sites in the SCP survey data set.

2.4.1 PATN

Several modules of the numerical classification package PATN (Belbin 1987) were used for the analyses. The parameter values were the same as used by the SCP survey to ensure consistency of analysis with that study.

The PATN modules used were ASO (calculation of similarity matrix), FUSE (classification based on the results of ASO), DEND (representation of classification) and NNB (determination of sites most similar to each site – nearest neighbours). The results of the analyses were imported into a database (Anketell.mdb) so that site characteristics and previous classifications (eg., Floristic Community Types derived in earlier classifications) could be associated and various analyses based on these data could be performed.

The assignment of floristic community types to the Anketell quadrats was made by summarising the results of two different methods:

- the classification, and
- the twenty nearest neighbours.

Experience demonstrates that the results of these are likely to vary, but that from nearest neighbours is likely to make more sense for it is not directly influenced by group membership. On the other hand the nearest neighbour analysis often is ambiquous as it provides several options.

To the classification dendrogram of the combined dataset, the FCT assigned by the SCP survey was associated with the SCP survey sites. The apparent FCTs were assigned to the Anketell quadrats by interpreting the position of these sites in the dendrogram (particularly by the way they joined to the SCP sites).

The 20 sites in the combined data set that were most similar to each of Anketell quadrats were obtained from the nearest neighbour method (NNB). By associating those nearest neighbours from the SCP survey, the most likely FCTs from this method for each of the Anketell quadrats were determined.

It is common for there to appear tob inconsistencies in the affinietie indicated by these methods. Classification can be strongly influenced by the membership of groups which can "draw" a site "away" from another that it appears similar to. An attempt was then made to reconcile these different assignments of a Floristic Community Type. The relevant portion of the site by species matrix was examined to seek clarity in some cases.

3.0 LIMITATIONS

It has been found in earlier projects that the addition of new sites to the SCP survey data set to produce a combined classification disrupts the original classification. The more data added, the higher the level of the disruption. This is particularly the case with wetland sites, partly because there are relatively few of these in the SCP data set and these communities are often very distinctive. This problem can make it difficult to assign Floristic Community Types to new sites using this method.

Secondly, it is common for new data to group to their cohorts. In some cases this has proven to result from common deficiencies in the data, ie. whole groups of species

missing. This absence tends to draw them together. The more sites in the added batch, the tighter they draw together.

The analyses are conducted without personal knowledge of the sites.

4.0 RESULTS

4.1 Determination of floristic community type by classification

The Anketell sites occurred largely in one cluster with a few of the SCP sites. This suggests that there was something about these sites which were different from the SCP sites, eg a common disturbance history or a low survey effort.

While these combined with some sites from SCP, it is notable that these SCP sites were split from their cohorts from the same FCT. Thus, the Anketell sites were only similar to some from the respective FCTs.

Generally, the Anketell sites appeared related to FCTs 11 and 21c.

Figure 1. Relevant portions of Dendrogram

site	FCT	sp			dendr	ogram		
			0.2050	0.3678	0.5306	0.6933	0.8561	1.0189
								I
ANK12		66						
ANK13		64						
DEJONG-c	21c	41						
FL-5	21c	41						
FL-6	21c	38						
hymus03	21c	30						

ANK01		59	
ANK03		27	
ANK02		29	
ANK05		24	
ANK06		15	
hymus01	11	21	
ANK10		18	
ANK11		14	
YAN-21	14	18	
C71-1	11	51	
MODO-3	11	16	
HARRY-6	11	25	
ANK04		21	
ANK07		28	
ANK09		17	
MODO-2	21c	35	
PLINE-7	21c	32	
ANK08		32	
hymus04	21c	26	
card10	6	29	
card11	6	24	
card4	6	26	

4.2 Determination of floristic community type using Nearest Neighbour method

The summary of the nearest neighbour results presented in Table 1 are presented in Table 2. Like the classification most tended to be related to sites from FCTs 11 and 21c.

Table 1. Results of Nearest Neighbour analysis

S	s1	f1	v1	s2	f2	v2	s3	f3	v3	s4	f4	v4	s5	f5	v5
ANK01	ANK02		0.571	ANK05		0.575	ANK09		0.589	ANK03		0.590	ANK07		0.619
ANK02	ANK05		0.423	ANK01		0.571	hymus02	11	0.576	ANK06		0.581	MODO-3	11	0.590
ANK03	ANK01		0.590	ANK02		0.6	ANK05		0.647	hymus02	11	0.647	McLART-1	13	0.65
ANK04	ANK07		0.551	hymus03	21c	0.607	PLINE-7	21c	0.622	ANK09		0.631	YULE-1	23a	0.636
ANK05	ANK02		0.423	ANK09		0.512	ANK06		0.538	ANK01		0.575	hymus01	11	0.6
ANK06	ANK05		0.538	ANK09		0.562	ANK11		0.571	ANK02		0.581	hymus01	11	0.611
ANK07	ANK09		0.511	ANK13		0.538	low06a	21c	0.542	ANK04		0.551	MODO-2	21c	0.587
ANK08	ANK12		0.587	ANK07		0.593	NINE-2	21a	0.6	HARRY-4	23a	0.616	low07	21c	0.638
ANK09	ANK07		0.511	ANK05		0.512	ANK06		0.562	ANK10		0.588	ANK01		0.589
ANK10	ANK11		0.533	ANK09		0.588	ANK02		0.644	MODO-6	4	0.644	MODO-2	21c	0.653
ANK11	ANK10		0.533	ANK06		0.571	ANK09		0.6	ANK05		0.621	YAN-21	14	0.677
ANK12	ANK13		0.426	DEJONG	21c	0.457	NINE-2	21a	0.483	REDL-1	21a	0.488	WAND-1	23a	0.495
ANK13	ANK12		0.426	HARRY-2	28	0.460	WELL-2	21a	0.477	HARRY-5	21a	0.530	ANK07		0.538

Table 1 (cont)

S	s6	f6	v6	s7	f7	v7	s8	f8	v8	s9	f9	v9	s10	f10	v10
ANK01	ANK04		0.636	ANK12		0.639	hymus01	11	0.662	YULE-1	23	0.678	WARI-1	28	0.681
ANK02	ANK03		0.6	hymus01	11	0.632	ANK10		0.644	CAPEL-8	12	0.681	FL-9	4	0.682
ANK03	hymus01	11	0.666	ANK06		0.666	HARRY-6	11	0.692	AUSTB-3	11	0.703	hymus05	11	0.719
ANK04	ANK01		0.636	MODO-2	21c	0.642	ANK05		0.644	low07	21c	0.645	WHITE-1	23a	0.645
ANK05	ANK11		0.621	ANK04		0.644	ANK03		0.647	ANK10		0.658	hymus02	11	0.666
ANK06	ANK03		0.666	MODO-3	11	0.677	ANK10		0.687	KOOLJ-1	4	0.714	ANK01		0.718
ANK07	ANK08		0.593	low07	21c	0.594	ANK12		0.617	ANK01		0.619	hurst03	23a	0.621
ANK08	MODO-5	23a	0.645	low01	21c	0.647	hymus04	21c	0.649	REDL-1	21	0.653	ANK04		0.653
ANK09	ANK11		0.6	MODO-2	21c	0.615	ANK04		0.631	PLINE-7	21c	0.673	hymus01	11	0.684
ANK10	ANK05		0.658	C58-1	4	0.660	ANK06		0.687	MODO-3	11	0.697	ANK01		0.726
ANK11	ANK04		0.705	ANK07		0.707	ANK02		0.707	ANK01		0.710	GUTHR-4	5	0.714
ANK12	WARB-3	23a	0.496	dard02	21b	0.503	YULE-1	23a	0.508	FL-5	21c	0.514	MODO-4	23a	0.515
ANK13	low04	21a	0.541	KING-2	28	0.543	YULE-1	23a	0.546	BANK-2	23	0.548	dard02	21b	0.549

s – the site being compared

4.3 Combining the results

There was modest accord between the classification and the Nearest Neighbour analyses. The Nearest Neighbour tends to be more reliable as it is less influences by its cohort sites.

s1 to s10 – the 1st to 10th most similar sites f1 to f10 – the FCT of the similar sites (only for SCP sites)

v1 to v10 - the dissimilarity value between the site and the similar sites (values above 0.6 tend to indicate low similarity)

Table 2 Summary of FCT assignment

Tubic 2 Summary of 1 of usbignment								
	Dendrogram	Nearest Neighbour	Conclusion					
ANK12	21c	21c,21a,23a	21c,21a,23a					
ANK13	21c	28,21a	28,21a					
ANK01	11	?11	?11					
ANK03	11	11,13	11,13					
ANK02	11	11	11					
ANK05	11	11	11					
ANK06	11	11	11					
ANK10	14	4,21c,11	4,21c,11					
ANK11	14	?14	?14					
ANK04	21c	21c,23a	21c,23a					
ANK07	21c	21c	21c					
ANK09	21c	21c	21c					
ANK08	21c	21a,23a,21c	21a,23a,21c					

5.0 REFERENCES

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English, V., and Blyth, J. (1997) *Identifying and conserving threatened ecological communities (TECs) in the South West Botanical Province*. ANCA National Reserves System Cooperative Program: Project Number N702, Australian National Conservation Agency, Canberra

Gibson, N.G., Keighery, B.J., Keighery, G.J., Burbidge, A.H. and Lyons, M (1994). *A Floristic Survey of the Southern Swan Coastal Plain*. Unpublished report by the Department of Conservation and Land Management and the Conservation Council of Western Australia to the Australian Heritage Commission.

Trudgen, M.E. (1999). A flora and vegetation survey of Lots 46 and 47 Maralla Road and Lexia Avenue, Ellenbrook. Volumes 1-4. Unpublished report prepared for the Crown Solicitors Office, Government of Western Australia. December 1999.

APPENDIX1

Names combined for reconcilliation

FCODE	Species	Lookup				
031	Aira caryophyllea	Aira caryophyllea/cupaniana group				
031	Arundo donax	omitted				
031	Avena barbata	Avena barbata/fatua				
031	Cortaderia selloana	omitted				
039	Loxocarya flexuosa	Loxocarya cinerea				
054E	Dianella revoluta var. divaricata	Dianella revoluta				
054F	Caesia parviflora	Caesia micrantha				
054F	Laxmannia grandiflora subsp. grandiflora	Laxmannia grandiflora				
054F	Thysanotus patersonii	Thysanotus patersonii/manglesianus				
054J	Burchardia umbellata	Burchardia umbellata/congesta				
055	Anigozanthos humilis subsp. humilis	Anigozanthos humilis				
066	Diuris corymbosa	Diuris longifolia				
066	Diuris sp.	omitted				
066	Monadenia bracteata	Disa bracteata				
066	Pterostylis pyramidalis	Pterostylis aff nana				
109	Phytolacca octandra	omitted				
131	Cassytha racemosa forma racemosa	Cassytha racemosa				
163	Acacia longifolia	omitted				
163	Acacia pulchella var. glaberrima	Acacia pulchella				
165	Aotus intermedia	Aotus gracillima				
165	Hovea trisperma	Hovea trisperma var. trisperma				
165	Jacksonia gracillima	Jacksonia furcellata				
165	Lotus subbiflorus	Lotus suaveolens				
165	Nemcia capitata	Gompholobium capitatum				
263	Pimelea rosea subsp. rosea	Pimelea rosea				
273	Astartea scoparia	Astartea aff. fascicularis				
273	Eucalyptus marginata subsp. marginata	Eucalyptus marginata				
273	Eucalyptus rudis subsp. rudis	Eucalyptus rudis				
273	Kunzea glabrescens	Kunzea ericifolia				
273	Scholtzia uberiflora	Scholtzia involucrata				
281	Centella asiatica	Centella cordifolia				
293	Anagallis arvensis var. arvensis	Anagallis arvensis				
302	Mitrasacme paradoxa	Mitrasacme palustris				
316	Gratiola pubescens	Gratiola peruviana				
339	Wahlenbergia multicaulis	Wahlenbergia preissii				
340	Lobelia rhytidosperma	Lobelia tenuior				
343	Stylidium paludicola	omitted				
345	Pithocarpa pulchella var. pulchella	Pithocarpa pulchella				
345	Senecio diaschides	Senecio quadridentatus				

Appendix 2 Comparison of average species per family per site for relevant FCTs.

FCT:	2 Comparison	54C	54D	54E	54F	54J	66	143	281	343	sum
4		1.75	0.75	0.06	1.94	0.63	1.38	1.44	1.31	3.13	12
11		0.15	0.75	0.08	1.23	0.03	1.38	0.15	0.69	0.92	4
		0.13	0.13	0.08							
13					0.22	0.33	0.11	0.33	0.44	0.22	2
14				0.5		0.5	3		0.5		5
21a		3.67	0.46	0.13	3.67	0.82	3.05	2.33	2.33	1.77	18
21c		2.25	0.56	0.06	2.56	0.63	2.44	1.56	1.31	1.94	13
23a		3.11	0.58		4.26	0.89	2.42	2.16	1.68	3.68	19
Site:											
ANK12	21c,21a,23a	3	1	1	3	1	1	2	1	3	16
ANK13	28,21a	1	1		5	1	2	2	1	2	15
ANK01	?11			1	1	1	3		1	1	8
ANK03	11,13						1				1
ANK02	11						1		2	2	5
ANK05	11									1	1
ANK06	11										0
ANK10	4,21c,11									2	2
ANK11	?14										0
ANK04	21c,23a					1		1	1	2	5
ANK07	21c				1		3	2	1		7
ANK09	21c				1						1
ANK08	21a,23a,21c	2					5	1			8

APPENDIX B BUSHFIRE MANAGEMENT PLAN



Anketell North Local Structure Plan

Bushfire Management Plan

Prepared for Acumen Development Solutions by Strategen

May 2019





Anketell North Local Structure Plan

Bushfire Management Plan

Strategen is a trading name of Strategen Environmental Consultants Pty Ltd Level 1, 50 Subiaco Square Road Subiaco WA 6008 ACN: 056 190 419

May 2019

Limitations

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Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Document control

Client: Acumen Development Solutions

	Revision	_	Strategen	Submitted to Client	
Report Version	No.	Purpose	author/reviewer and accreditation details	Form	Date
Draft Report	Rev A	For review by Client	B Mastrangelo (BPAD45985) / C Turner	Electronic (email)	30/11/2018
Final Report	Rev 0	To accompany submission of the structure plan	W Oversby / L Wears (BPAD19809)	Electronic (email)	07/11/2018
Final Report	Rev 1	To accompany submission of the structure plan	B Mastrangelo (BPAD 45985) / L Wears (BPAD19809)	Electronic (email)	14/01/2019
Final Report	Rev 2	To accompany submission of the revised structure plan	C O'Brien / L Wears (BPAD19809)	Electronic (email)	22/05/2019

Filename: ADS18136_03 R001 Rev 2 - 21 May 2019

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Appendix 1 Landscape masterplan

Appendix 2 City of Kwinana firebreak notice 2018/2019
Appendix 3 Asset Protection Zone Standards (Schedule 1, the Guidelines)



1. Proposal details

Acumen Development Solutions (the proponent), intends to lodge a Local Structure Plan (LSP) application (Figure 1) to guide future land use and development within the Anketell North LSP area (the project area; Figure 2). The project area is approximately 98.4 ha and is currently zoned "Urban" under the Metropolitan Region Scheme (MRS) and "Development" under the City of Kwinana Town Planning Scheme No. 2 (TPS2). The project area comprises twenty-three lots under separate ownership is located within the municipality of the City of Kwinana.

The project area is located just south of Anketell Road, being bordered to the west and south by Bush Forever Site 270 and to the east by Jandakot Groundwater Mound. Land directly west and southeast is zoned "Parks and Recreation", while land directly south and west is zoned "Rural Water Protection". The southern portion of the project area is classified as a Conservation Category Wetland (CCW) however a subdivision approval exists over this portion of the project area. Agricultural and horticultural land uses predominate the project area although several residential properties exist as well. Western Power easements extend the eastern portion of the project area as well as external to the western boundary.

The project area is partially situated within a designated bushfire prone area according to the DFES State Map of Bush Fire Prone Areas (DFES 2017; refer to Plate 1), which triggers bushfire planning requirements under Policy Measure 6.2 and 6.3 of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015). This Bushfire Management Plan (BMP) has been prepared in accordance with Section 5.2.5 of *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines; WAPC 2017), which requires SPs to be accompanied by a BMP that includes the results of a strategic level Bushfire Hazard Level (BHL) assessment.

The SP submission has also been accompanied by an Environmental Assessment Report (Strategen 2018) and a Local Water Management Strategy (Bioscience 2018).



Plate 1: Map of Bush Fire Prone Areas (as indicated in pink)



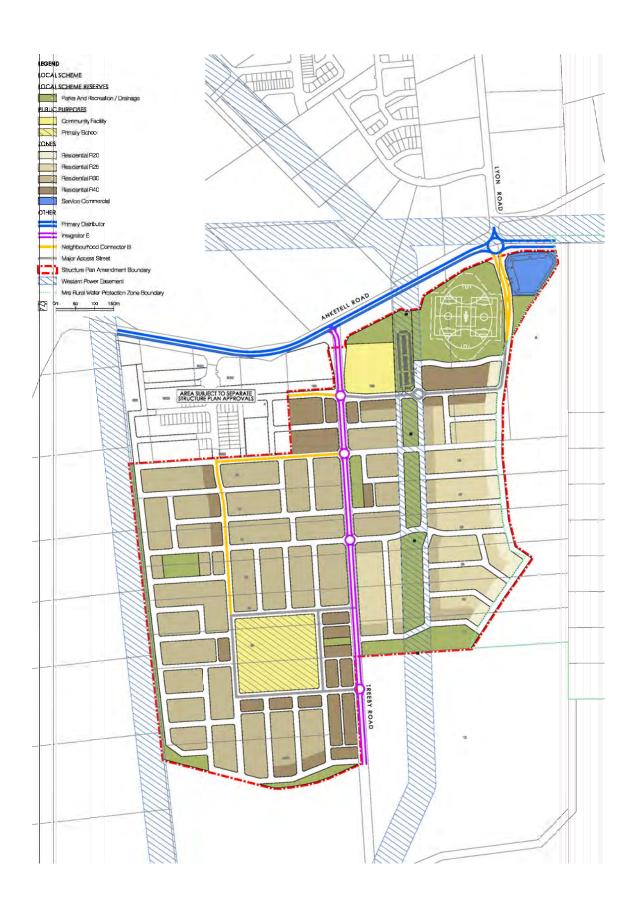


Figure 1: Concept plan



Date: 16/05/2019



Figure 2: Location plan



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2. Environmental considerations

The project area currently comprises a combination of cleared agricultural land and native bushland. Flora and vegetation surveys conducted by Strategen Environmental in 2018 confirmed that the project area contains areas of Banksia Woodlands Threatened Ecological Community (TEC) and black cockatoo habitat.

A search of publicly available environmental data concluded that:

- the southern portion of the project area contains a mapped CCW (refer to Figure 2)
- the southern portion of the project area is mapped as being an Environmentally Sensitive Area (ESA), however ESAs are only relevant in the context of clearing exemptions
- the Environment Protection and Biodiversity Conservation Act 1999 (EPBC) listed Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (TEC) has been confirmed to occur within the project area through site specific surveys
- the project area contains mapped confirmed roosting areas (buffered) for the EPBC listed Carnaby's Black Cockatoo as well as potential feeding areas
- Bush Forever site 270 is situated directly west and south of the project area (refer to Figure 2)

Future development within the project area will require the removal of native vegetation to accommodate future urban land uses and associated infrastructure. The extent of native vegetation to be retained within the project area will be determined at future planning stages through the allocation of Public Open Space (POS). It is expected that some native vegetation will be retained within the POS and drainage areas, which will be configured to a low-threat standard in accordance with a relevant under AS3959 Clause 2.2.3.2.

Strategen understands that the relevant environmental approvals for the proposed development, including referral under the EPBC Act will be sought as part of ongoing planning stages.

2.1 Native vegetation – modification and clearing

Proposed development of the site will result in the clearing of the majority of on-site vegetation. Vegetation may be retained in pockets throughout future POS areas for landscape amenity purposes and/or throughout drainage basins to serve the required drainage functions for the site. Street-scaping along future road reserves may also result in retention of individual trees. However, it is likely that any areas catering for vegetation to be retained/introduced would be strategically designed in a manner that does not unnecessarily impede future development from a bushfire hazard perspective, and, as such, the intent would be to have any such vegetation excluded from classification under appropriate sections of Clause 2.2.3.2 of AS 3959. This would need to be confirmed as part of future planning stages (subdivision or Development Application (DA)) and accompanying landscape concept plans. Should any on-site vegetation not be excludable, then BAL contour assessment at the subdivision stage would identify the likely BAL impact on proposed development to inform compliance with the relevant bushfire protection criteria.

2.2 Revegetation / Landscape Plans

A high-level landscape masterplan has been prepared for the proposed development (Appendix 1). Future landscaping plans would identify greater detail regarding the nature and location of proposed vegetation to be retained/ introduced and would be prepared at the subdivision or DA stage.



3. Bushfire hazard level assessment

3.1 Assessment inputs

A Bushfire Hazard Level (BHL) assessment has been undertaken for the project area and adjacent 150 m in accordance with Appendix 2 of the Guidelines. A site assessment was completed on 3 October 2018 to confirm classified vegetation, effective slope and exclusions within the project area and adjacent 150 m. Assessment inputs and outputs are discussed in the following subsections, including provision of Figure 3, which depicts the spatial location and extent of pre-development classified vegetation, exclusions, topography and georeferenced site photos. The site photos are presented in Table 1 and plot numbers summarised in Table 2. The post-development vegetation extent is depicted in Figure 4.

It is noted that effective slope does not form part of a BHL assessment except where slope is greater than 10 degrees. There are no areas of slope exceeding 10 degrees within the project area.

Table 1: BHL assessment inputs

Photo ID: 1 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Proposed vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: trees 5-10 m in height, low shrub/grass understorey, low surface fuel loads, lacking a multi-tiered fuel profile

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.



Photo ID: 2 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Proposed vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: trees 5-10 m in height, low shrub/grass understorey, low surface fuel loads, lacking a multi-tiered fuel profile



Photo ID: 3 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 4 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Proposed vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: trees 5-10 m in height, low shrub/grass understorey, low surface fuel loads, lacking a multi-tiered fuel profile

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.





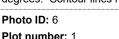


Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.



Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).







Photo ID: 7 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 8
Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: trees 10-20 m in height, low shrub understorey, low surface fuel loads, lacking a multi-tiered fuel profile

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.





Photo ID: 9 Plot number: N/A

Existing vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (e) and (f)

Description / justification for classification: Cleared land with sparse retention of trees adjacent to a low threat road reserve.

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.



Photo ID: 10 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: trees 5-20 m in height, grassy understorey and lacking a multitiered fuel profile.





Photo ID: 11 Plot number: 2

Existing vegetation classification or exclusion clause: Class D scrub

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 12 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 13 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 14 Plot number: 1

Existing vegetation classification or exclusion clause: Class B woodland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).











Photo ID: 15 Plot number: 4

Existing vegetation classification or exclusion clause: Class G grassland in background

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 16 Plot number: 4

Existing vegetation classification or exclusion clause: Class G grassland

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.

Photo ID: 17 Plot number: 4

Existing vegetation classification or exclusion clause: Class B woodland

Description / justification for classification: Trees 5-20 m in height with a grassy understorey.

Effective slope: N/A. Effective slope calculations do not form part of a BHL assessment except where slope is >10 degrees. Contour lines have been provided in Figure 3.







Photo ID: 18 Plot number: 4

Existing vegetation classification or exclusion clause: Class G grassland

Description / justification for classification: Dominated by grasses and a fine fuel structure adjacent to low crops and a low threat road reserve.





Photo ID: 19 Plot number: N/A

Existing vegetation classification or exclusion clause: Firebreak excluded under Clause 2.2.3.2 (e) and (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).

Description / justification for classification: Excluded

under Clause 2.2.3.2 (e) and (f)

Effective slope: N/A.



Photo ID: 20 Plot number: 4

Existing vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (e) and (f)

Proposed vegetation classification or exclusion clause: Excluded under Clause 2.2.3.2 (b), (c), (d), (e) or (f)

Description / justification for classification: Vegetation within POS areas, proposed residential development and road reserves will be cleared and engineered through the landscape design process to be excluded under a combination of Clause 2.2.3.2 (b), (c), (d), (e) and (f).



Table 2: Summary of pre-development vegetation classification and effective slope

Vegetation area / plot	Applied vegetation classification	Effective slope under the classified vegetation
1	Class B woodland	<10 degrees
2	Class D scrub	<10 degrees
3	Class C shrubland	<10 degrees
4	Class G grassland	<10 degrees
5	Excluded under Clause 2.2.3. 2 (b), (c), (d), (e) and (f)	N/A



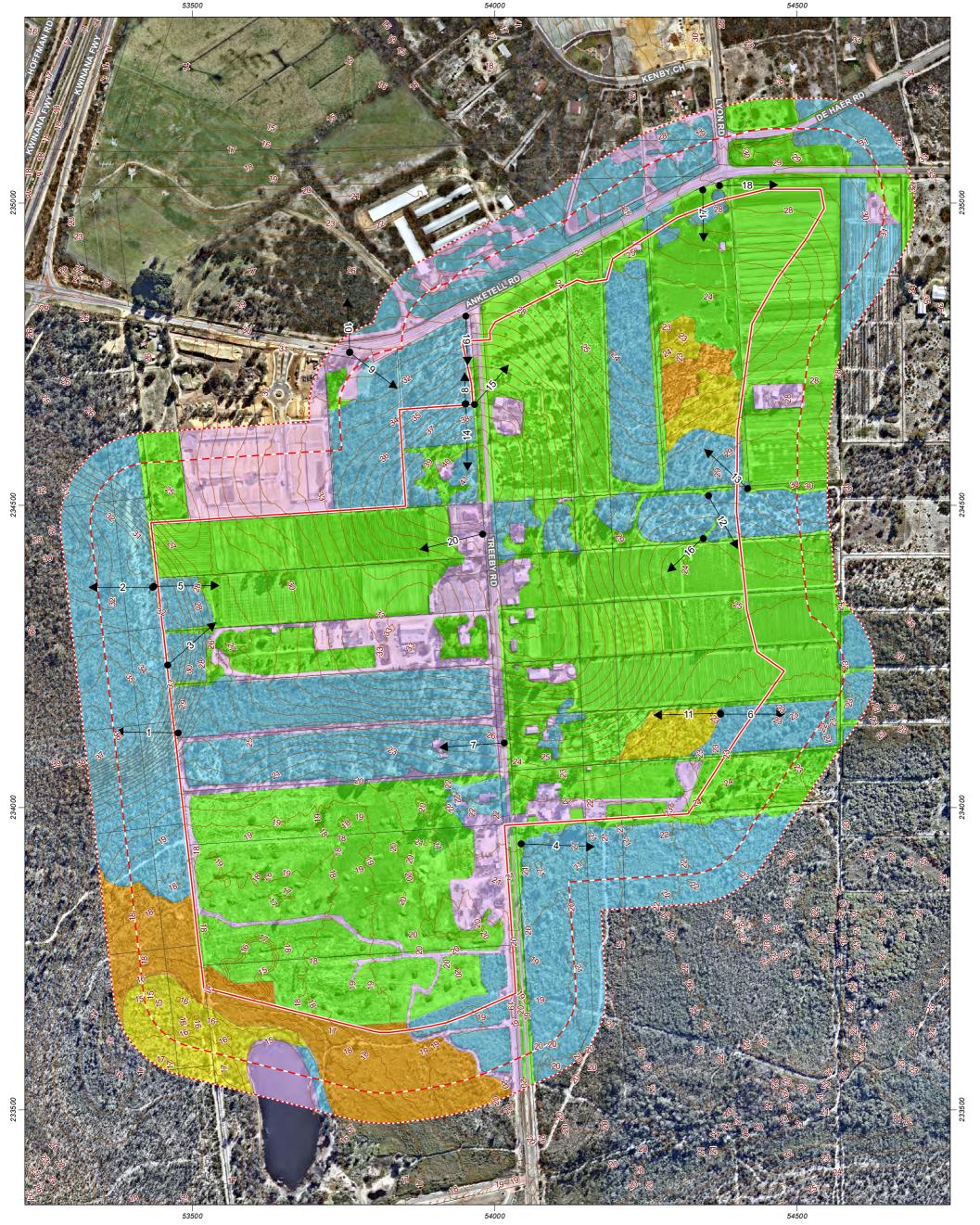
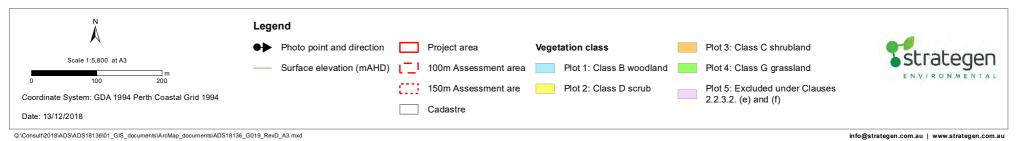


Figure 3: Pre-development vegetation classification and topography



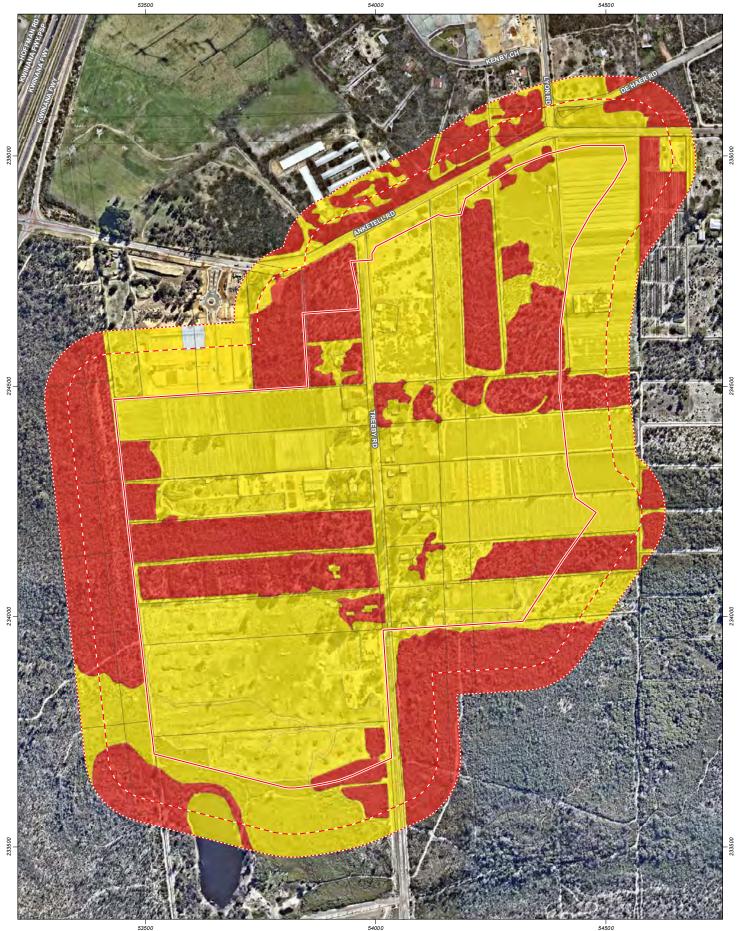


Figure 4: Pre-development Bushfire Hazard Level assessment



3.2 Assessment outputs

Strategen has mapped the pre-development BHLs within the project area and adjacent 150 m in accordance with methodology outlined in Appendix 2 of the Guidelines (refer to Figure 4). The BHLs have been assessed on the basis of the pre-development vegetation classification outlined in Figure 3. As mentioned previously, there are no areas of the site which exhibit a slope greater than 10 degrees.

A summary of the pre-development BHL results is provided below and depicted in Figure 4:

- all Class B Woodland has been assigned a bushfire hazard level of Extreme
- all Class D Scrub has been assigned a bushfire hazard level of Extreme
- all Class C shrubland has been assigned a bushfire hazard level of Moderate
- all Class G Grassland has been assigned a bushfire hazard level of Moderate
- in accordance with the bushfire hazard level assessment methodology detailed in Appendix 2 of the Guidelines, vegetation that has a Low bushfire hazard level but is within 100 m of Extreme or Moderate bushfire hazard level vegetation has been assigned a Moderate bushfire hazard level
- all remaining areas have been assigned a bushfire hazard level of Low.

The pre-development BHL assessment (see Figure 4) shows that based on the existing vegetation, the project area contains land with Low, Moderate and Extreme BHLs.

Following development works, the project area will be largely cleared (see Figure 5). The post-development BHL assessment (see Figure 6) shows that following development works, the project area will contain land with predominantly Low and Moderate BHLs, with an area of Extreme BHL located in the southern portion of the site associated with vegetation retained within the CCW buffer.



Identification of bushfire hazard issues

Following development works, the project area will be predominantly cleared, with any remaining vegetation or trees configured in a way that can be excluded under a relevant Clause (2.2.3.2) of AS3959. Details of how each of these exclusions will be achieved will be provided at the subdivision and DA stages in detailed landscape drawings. A small area of vegetation will be retained in the southern portion of the site, associated with the CCW.

Strategen understands that the Western Power corridor traversing the eastern portion of the project area will be managed as POS by the City (following handover) to achieve an exclusion under Clause 2.2.3.2 (b), (c), (d), (e) and (f) of AS3959.

Given the above, the predominant bushfire hazard to the development is associated with Bush Forever site 270 to the west, south and south-east of the project area. The presence of this vegetation could result in fire travelling toward the project area from the west with a fire run of approximately 3 km through predominantly intact Class B woodland. There is also potential for bushfire occurrence through Class B woodland to the east within private landholdings. The vegetation adjacent to the project area is fragmented in areas, by agricultural land uses, major roads and tracks that would reduce the ability for fire spread and significant bushfire escalation at the development interface.

Sections 5 and 6 outline the bushfire protection criteria and management measures that will facilitate mitigating these bushfire hazards and ensuring compliance with the requirements of SPP3.7 and the Guidelines at future planning stages.

It is noted that the Mandogalup Fire Station is located approximately 1 km to the west along Anketell Road, providing the option of a direct suppression response and a two-minute response time at legal road speeds.



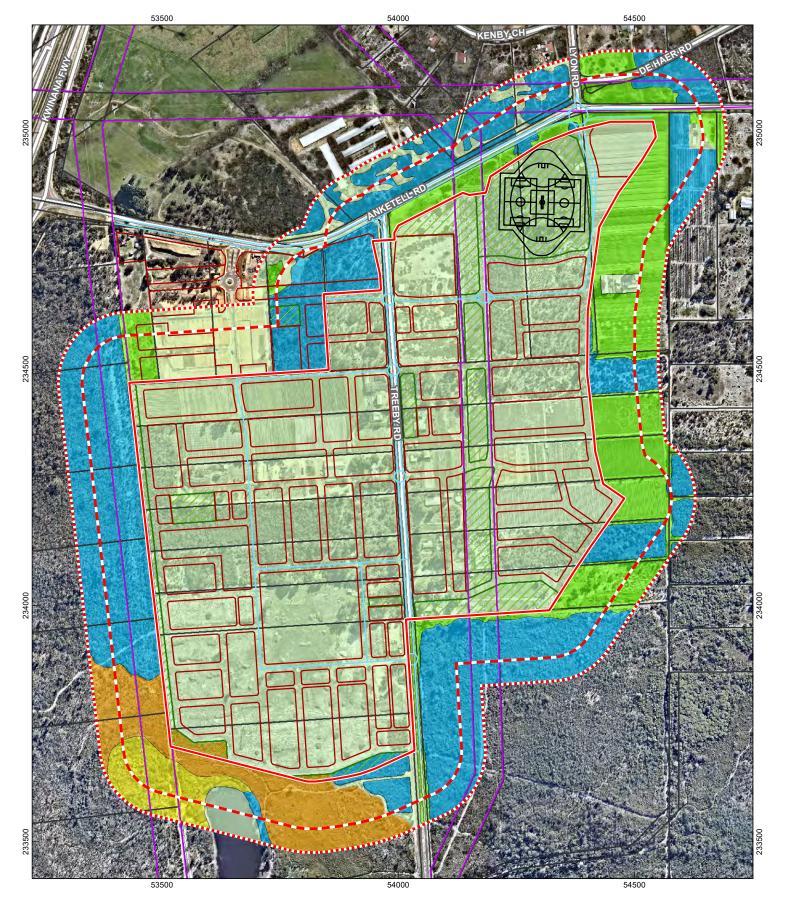
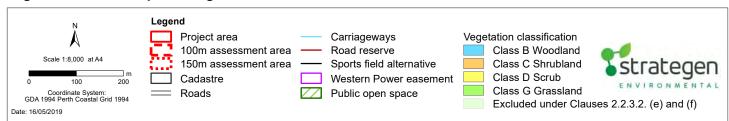


Figure 5: Post-development vegetation classification



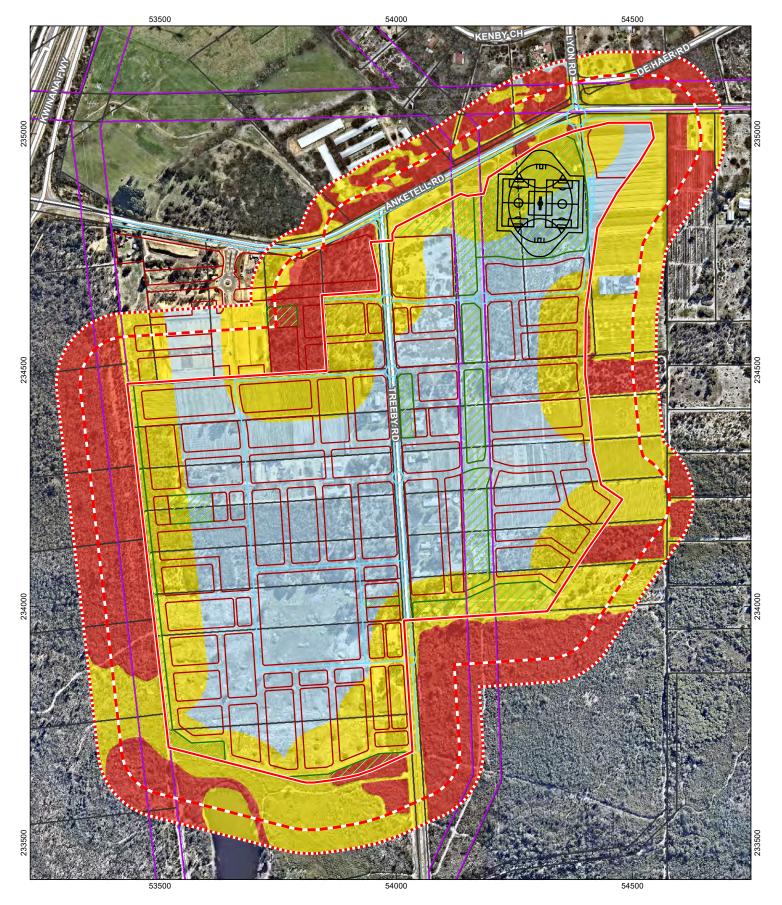


Figure 6: Post-development Bushfire Hazard Level assessment



© 2019. Whilst every care has been taken to prepare this map, Strategen & Acumen Development Solutions makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

5. Assessment against the bushfire protection criteria

5.1 Compliance table

In response to the requirements of SPP 3.7 and the Guidelines, strategic level bushfire management measures have been devised to demonstrate how the bushfire protection criteria will be met at subsequent stages of the planning process, as outlined in Table 3.

Table 3: Bushfire protection criteria compliance table

Bushfire protection	Method of compliance	Proposed bushfire management strategies
criteria	Acceptable solutions	i roposed pusitifie management strategies
Element 1: Location	A1.1 Development location	Given the size of the project area and the proposed extent of clearing and vegetation modification required to facilitate future development, BHLs within the project area will be reduced to a moderate or low level (see Figure 6). The management measures specified in Section 6 will ensure that on completion of development, all developable land will comprise either a low or moderate BHL and a rating of BAL-29 or lower will be achieved through provision of appropriate setbacks to any post-development classified vegetation. The presence of perimeter roads and managed POS at the bushfire hazard interfaces will assist in achieving the required separation.
Element 2: Siting and design	A2.1 Asset Protection Zone	APZs sufficient to achieve BAL-29 or lower are to be implemented for all future lots subject to a BAL rating above BAL-LOW. As outlined above, the presence of perimeter roads and managed POS at the bushfire hazard interfaces will assist in achieving the required separation.
		The required APZs are to be identified at future planning stages based on future subdivision / development design and following a BAL contour assessment.
		APZs are to be implemented and maintained in accordance with Schedule 1 of the Guidelines (Appendix 3) and the City's firebreak notice (Appendix 2).
Element 3: Vehicular access	A3.1 Two access routes.	Future development will ensure at least two linkages to the existing public road network will be established. The proposed LSP identifies a through access by extension of Treeby Road from Anketell Road abutting the north of the project area to Thomas Road to the south of the project area. Two access routes are therefore readily achievable.
		In the event that the development of the project area is staged, the proponent will ensure two (temporary or permanent) access options to two different directions are provided to each stage of development.
	A3.2 Public road	Creation of new public roads will need to comply with technical requirements of the Guidelines (see Table 4).
	A3.3 Cul-de-sac (including a dead-end-road)	Future development will not result in creation of permanent cul- de-sacs or dead-end roads. Subdivision stage BMPs will ensure that any temporary cul-de-sacs or dead ends created during staging are compliant in accordance with Table 4.
		The development is proposed to connect to a separate development to the north-west of the project area (as shown in the SP; Figure 1) and provide thru access. In the event that development of the project area precedes the adjacent development, a temporary cul-de-sac will be required at the two 'dead-end' roads. The cul-de-sacs will be required to comply with the technical specifications in Table 4.
	A3.4 Battle-axe	N/A. Future development will not result in creation of battle-axes.



Bushfire protection	Method of compliance	Daniel de la constante de la c
criteria	Acceptable solutions	Proposed bushfire management strategies
	A3.5 Private driveway longer than 50 m	Should future development result in creation of private driveways longer than 50 m, then compliance for private driveways will need to be met as outlined in Table 4.
	A3.6 Emergency access way	No permanent emergency access ways will be proposed or required as part of development. Subdivision stage BMPs will ensure that any temporary EAWs created during staging are compliant in accordance with Table 4.
	A3.7 Fire service access routes (perimeter roads)	N/A. No fire service access routes will be proposed or required as part of development.
	A3.8 Firebreak width	Individual lot firebreaks will be compliant with the City of Kwinana firebreak notice (Appendix 2).
Element 4: Water	A4.1 Reticulated areas	Future development will be provided with a reticulated supply compliant with Water Corporation DS-63 requirements.
	A4.2 Non-reticulated areas	N/A. Proposed development will be reticulated.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A. Proposed development will be reticulated.

Table 4: Vehicular access technical requirements

Technical requirement	Public road	Cul-de-sac	Battle-axe legs and private driveways longer than 50 m	Emergency access ways	Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5

* Refer to E3.2 Public roads: Trafficable surface

Source: WAPC 2017



5.2 Discussion of management strategies

Strategen makes the following additional recommendations to inform ongoing planning stages of the development and increase the level of bushfire risk mitigation across the site:

- 1. On-site staging buffers: if development (and therefore clearing) is to occur on a staged basis, clearing in advance will need to occur to ensure building construction is not inhibited by a temporary vegetation extent located within adjacent development stages yet to be cleared. This can be achieved by ensuring that each approved stage subject to construction separated from classified vegetation by a 100 m wide (50 m for Class G grassland), on-site cleared or low threat buffer prior to development (not including vegetation proposed to be retained). Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve low-threat vegetation in minimal fuel condition, year-round, until such time that the buffer area is developed as part of the next development stage. This will assist in managing the current on-site temporary vegetation hazards.
- Fuel management within cleared vacant lots: cleared lots will be managed on a regular and ongoing basis by the developer until sale of lots after which time landowners will be responsible for ongoing management. Management will involve slashing/mowing of grassland and weeds to height of less than 50 mm, which is driven through compliance with the City of Kwinana firebreak notice (refer to Appendix 2).
- 3. Road verge fuel management: road verges will need to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management will be the responsibility of the City.
 POS fuel management: where exclusion Clause 2.2.3.2 (f) is applied, POS will be managed on a regular and ongoing basis by the developer after which time the City will be responsible for ongoing management. Management will involve slashing/mowing of grassland and weeds to height of less than 50 mm, and removal of leaf litter and other dead plant material.
- 4. <u>Notification on title</u>: notification is to be placed on the Title of all proposed lots subject to BAL-12.5 or higher (either through condition of subdivision or other head of power) to ensure landowners/proponents and prospective purchasers are aware that their lot is subject to an approved BMP and BAL assessment.
- 5. <u>Landscaping plans</u>: proposed landscaping plans for the project area (including POS, drainage basins, visual amenity buffers, streetscapes and any retained vegetation) will need to reflect the bushfire management measures required under this BMP and future subdivision and DA stage BMPs.
- 6. <u>Building construction standards for commercial buildings</u>: ember attack is likely to be the predominant risk to future development in a bushfire event, Strategen therefore recommends that buildings other than Class 1, 2, and 3 (and associated 10a) adopt a voluntary BAL-12.5 construction standard (where possible) for all future buildings to incorporate ember protection as a minimum. However, this is not a formal requirement of SPP3.7, the Guidelines or AS 3959.
- 7. <u>Building setbacks</u>: where APZs cannot be achieved solely within perimeter roads and low-threat landscaping, voluntary APZ building setbacks may be required within individual lots to ensure that no development will occur in BAL-40 or BAL FZ.
- 8. <u>Consideration of BEEP/ BRMP provisions</u>: if any vulnerable or high-risk land uses are being proposed, there will need to be consideration of Bushfire Emergency Evacuation Plan (BEEP) or Bushfire Risk Management Plan (BRMP) provisions at the DA stage.



6. Responsibilities for implementation and management of the bushfire measures

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. Aside from the preparation of future BMPs to accompany future subdivision and DAs where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Future BMPs prepared for subsequent subdivision and DAs are to meet the relevant commitments outlined in this strategic level BMP, address the relevant requirements of SPP 3.7 (i.e. Policy Measures 6.4 and 6.5 respectively) and demonstrate in detail how the proposed development will incorporate the relevant acceptable solutions to meet the performance requirements of the Guidelines. The proponent is to ensure that future BMPs include the following detailed information:

- proposed lot layout (subdivision stage)
- detailed landscaping design (subdivision stage)
- post development classified vegetation extent, effective slope and exclusions (subdivision stage)
- BAL contour map demonstrating that proposed development areas will achieve BAL-29 or lower (subdivision stage)
- width and alignment of compliant APZs (subdivision stage)
- confirmation of how bushfire management will be addressed during development staging (subdivision stage)
- proposed approach to fuel management or AS 3959 application in response to on-site POS or easements (subdivision stage)
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of development in accordance with acceptable solution A3.1 (subdivision stage)
- water supply provisions with regards to reticulated water (subdivision stage)
- future requirements for any future vulnerable or high-risk land uses, such as provision of a Bushfire Emergency Evacuation Plan or Bushfire Risk Management Plan DA stage)
- provisions for notification on Title for any future lots with a rating of BAL-12.5 or greater as a condition of subdivision (subdivision stage)
- compliance requirements with the current City annual firebreak notice (subdivision stage)
- requirements for BAL compliance as a condition of subdivision (subdivision stage)
- · acceptable solutions assessment against the bushfire protection criteria (subdivision stage)
- proposed implementation and audit program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation (subdivision stage).

On the basis of the information contained in this BMP, Strategen considers the bushfire hazards within and adjacent to the project area and the associated bushfire risk is readily manageable through standard management responses outlined in the Guidelines and AS 3959. Strategen considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.



7. References

Bioscience 2018, Local Water Management Strategy: Anketell North Local Structure Plan, report prepared for Acumen Development Solutions.

Department of Fire and Emergency Services (DFES) 2018, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: https://maps.slip.wa.gov.au/landgate/bushfireprone/

Standards Australia (SA) 2009, Australian Standard AS 3959–2009 Construction of Buildings in Bushfireprone Areas, Standards Australia, Sydney.

Strategen 2018, *Environmental Assessment Report: Anketell North Local Structure Plan*, report prepared for Acumen Development Solutions.

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2017, *Guidelines for Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.



Appendix 1 Landscape masterplan













C









Appendix 2 City of Kwinana firebreak notice 2018/2019

Firebreak Variations

If the owner or occupier considers it impractical to install a firebreak or comply with this notice for any reason, you are required to apply to the City of Kwinana in writing by 30 October 2018 to obtain approval to install firebreaks in an alternative position. If the variation is not approved, the owner or occupier must comply with this Notice in its entirety.

Previously approved firebreak variations do not need to be reapplied for unless circumstances have changed, or you have been advised in writing by the Local Government of any changes.

Additional Works

Regardless of land size and location, the City of Kwinana or its Bush Fire Control Officers may require owners and/or occupiers to undertake additional work on your property to improve access, and/or undertake further works to reduce a hazard that may be conducive to preventing the outbreak and/or the spread or extension of a fire.

Burning of Garden Refuse

PROHIBITED BURNING PERIODS ONLY

During the declared Prohibited Burning Period, owners and/or occupiers must not undertake any bush or garden refuse burning activities

RESTRICTED BURNING PERIODS ONLY

During the declared Restricted Burning Period only, owners and/or occupiers may:

- Apply for a permit to burn the bush for bush fire risk mitigation purposes, by following the conditions imposed on a permit to burn as issued by a Bush Fire Control Officer.
- In areas zoned rural by the Metropolitan Region Scheme you may undertake burning of leaves, tree branches, and other dry vegetation in piles no larger than 1.0m³ in size, without a permit to burn, subject to the following conditions:
 - No Flammable Matter (other than that being burned) is to be within five (5) metres of the fire at any time while the fire is burning;
 - The fire is lit between 6pm and 11pm and is completely extinguished before midnight on the same day;

- At least one person is present at the site of the fire at all times until it is completely extinguished.
- When the fire is no longer required, the person ensures that the fire is completely extinguished by the application of water or earth.

UNRESTRICTED BURN PERIODS ONLY

During the Unrestricted Burning Time, owners and/or occupiers in areas zoned rural under the Metropolitan Region Scheme may burn garden refuse and set fire to bush on their land without a permit. Burning of the bush must be undertaken in accordance with all relevant State legislation and Local Government Local Laws.

NO BURNING IN AREA DEFINED AS URBAN AREAS

Pursuant to section, 24G (2) of the *Bush Fires Act 1954*, no garden refuse burning is to be undertaken in areas defined as "Urban" under the Metropolitan Region Scheme without **written approval** of Local Government.

For information regarding dates for the Unrestricted, Restricted and Prohibited periods please contact the City of Kwinana City Assist office on 9439 0400 or view the City's website, www.kwinana.wa.gov.au.

PENALTIES

Failing to comply with this Fire Notice may result in a penalty of up to \$5,000.

A person in default of the requirements of this Notice is also liable, whether prosecuted or not, to pay the costs of performing the work directed by the City of Kwinana or its Bush Fire Control Officer.

Any owner and/or occupier who engages a contractor to undertake works on their behalf is responsible to ensure that the works completed meet the requirements of this Notice.

Maria Cooke, Acting Chief Executive Officer



BUSH FIRES ACT 1954

Fire Notice City of Kwinana



Pursuant to the powers contained in section 33 of the *Bush Fires Act 1954* (as amended), all property owners and/ or occupiers of land within the City of Kwinana are hereby served first and final notice and are required to comply with the requirements set out in this notice in its entirety.

All land and buildings shall be maintained for such duration and in such positions/ dimensions and specifications as required by this notice or as approved in writing by the City of Kwinana or its Bush Fire Control Officers. The works outlined in this notice must be completed before the dates listed in this notice and must be maintained throughout as required by this notice.

Definitions

"ASSET PROTECTION ZONE" means an area with a radius of twenty (20) metres measured from the external perimeter of the building/s or as stated in your approved Bushfire Attack Level (BAL) assessment, within the boundaries of the lot on which the building/s is situated. Fuel loads in this zone shall be reduced and maintained to two (2) tonnes per hectare or less.

"BUSH FIRE CONTROL OFFICER" means an Officer appointed by the City of Kwinana to exercise the powers and duties of a Bush Fire Control Officer appointed under s38(1) of the Bush Fires Act 1954.

"BUSH FIRE" means a fire or potential fire, however caused, and includes a fire in a building.

"DEAD END" means a track, firebreak, road or access way that terminates without any means of escape or ability to turn around safely.

"EMERGENCY ACCESS WAYS" are for Emergency Services vehicles only and are not to be considered as an escape route unless declared as such by the Incident Controller during an emergency.

"FIREBREAK" means a strip of land that has been cleared of all trees, bushes, grasses and any other object or thing or vegetation material leaving clear bare mineral earth. This includes the trimming back of all overhanging trees, bushes, shrubs and any other object or thing over the firebreak area.

"FLAMMABLE" means any bush, plant, tree, grass, vegetation, object, thing or material that may or is likely to catch fire and burn.

"TRAFFICABLE" means to be able to travel from one point to another in a fire vehicle on a firm and stable surface, unhindered without any obstruction that may endanger resources. The firebreak must not terminate without provision for egress to a safe place or a cleared turn around area of not less than a twenty one (21) metre radius (prior written approval may be required from the local government if trees are to be removed).

"VERTICAL AXIS" means a continuous vertical uninterrupted line at a right angle to the horizontal line of the firebreak.

Land area – 3,001m² or greater

The works outlined in this section must be completed before 1 December 2018 and continually maintained until 30 April 2019.

Owners and/or occupiers of land that is 3,001m² or greater are required to:

- Construct clear bare mineral earth firebreaks three (3) metres wide inside and along all boundaries of land in a continuous form, or within ten (10) metres of boundaries adjacent to roads, rail and drain reserves and all public open space reserves, with all overhanging branches, trees, limbs etc. to be trimmed back from over the firebreak area to a minimum width of four (4) metres and a vertical axis height of four (4) metres;
- Around all sides of the buildings on the property on the land construct clear bare mineral earth firebreaks three (3) metres wide around all buildings in a continuous form, or within twenty (20) metres of buildings, with all overhanging branches, trees, limbs etc. to be trimmed back from over the firebreak area to a minimum width of four (4) metres and a vertical axis height of four (4) metres;
- On all driveways and access ways to houses, sheds and buildings, maintain clear bare mineral earth surface to a trafficable standard three (3) metres wide in a continuous form, with all overhanging branches, trees, limbs etc. to be trimmed back from over all

- driveways and access ways to houses, sheds and buildings to a minimum width of four (4) metres and a vertical axis height of four (4) metres:
- On any land surrounding any place where, wood or timber piles, hay stacks, tyres, vehicles, flammable liquids, chemicals and gas products are kept on the land, construct clear bare mineral earth firebreaks three (3) metres wide in a continuous form, with all overhanging branches, trees, limbs etc. to be trimmed back from over the firebreak area to a minimum width of four (4) metres and a vertical axis height of four (4) metres;
- Construct these firebreaks in a manner so that there are no "Dead Ends," with all corners or change in directions wide enough for a heavy-duty fire or emergency services vehicle, to be able to turn the corner without the vehicle being obstructed in any way; and
- Maintain an asset protect zone around all buildings, infrastructure and fixed assets on the property.



Land area – 3,000m² or less

The works outlined in this section must be maintained all year round and owners and/ or occupiers are required to;

- Have all matter such as long grass, weeds, etc. slashed, mowed or trimmed down by other means to a height no greater than 50mm across the entire property.
- All overhanging branches, trees, limbs etc. to be trimmed back from over any building area to a minimum width of two (2) metres from the walls and to a vertical axis height of four (4) metres surrounding any building.
- Maintain an asset protect zone around all buildings, infrastructure and fixed assets on the property.



Appendix 3
Asset Protection Zone Standards
(Schedule 1, the Guidelines)



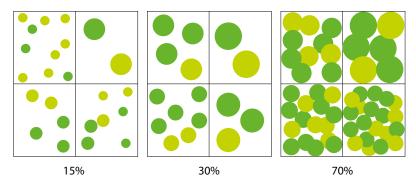


ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

- Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- Fine Fuel load: combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

Figure 16: Tree canopy cover – ranging from 15 to 70 per cent at maturity



- Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- Grass: should be managed to maintain a height of 100 millimetres or less.

APPENDIX C ACOUSTIC ASSESSMENT



ANKETELL NORTH DEVELOPMENT

ACOUSTIC ASSESSMENT

FOR

ACUMEN PROPERTY SOLUTIONS

MAY 2019

OUR REFERENCE: 24306-2-19086



DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT ANKETELL NORTH DEVELOPMENT

Job No: 19086

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FOR

ACUMEN PROPERTY SOLUTIONS

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EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Acumen Property Solutions, to undertake an acoustical assessment of noise that would be received at the proposed commercial and residential development located at the Anketell North Development from road traffic noise associated with the future Anketell Road.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

 $L_{Aeq(Day)}$ of 60 dB(A); $L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

 $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Additional to the above, noise received at an outdoor area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

From information provided, we understand that Anketell Road may, in the future, undergo a re-alignment, which would affect noise levels onto the development. Therefore, this report considers noise level associated with the proposed future road alignment.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

For this proposal, a commercial precinct has been proposed for the entrance to the development on the front lots bordering Anketell Road. Predictive noise modelling has included the built form of the commercial structures, which provide a barrier to residential lots behind. Depending on the final development/layout for the area some of these lots may require noise amelioration in the form of quiet house design and/or Notification on Titles. These requirements would need to be determined once the lot layouts have been finalised.

If the first row of Lots located adjacent to the Anketell Road are to contain noise sensitive premises, such as child care centres etc, then it is likely the noise level will exceed the criteria. Therefore, the design of the buildings can be such that noise is mitigated to allow the internal noise criteria to be met. Design techniques such as building orientation, smaller window sizing etc are feasible options.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Acumen Property Solutions, to undertake an acoustical assessment of noise that would be received at the proposed commercial and residential development located at the Anketell North Development from road traffic noise associated with the future Anketell Road.

1

This acoustic study has been undertaken to assess the commercial usage at the façade lots to Anketell Road, and if these areas contain any noise sensitive premises such as child care centres, then provide advice on the acoustic requirements.

As part of the study, the following was carried out:

- Determine by noise modelling the noise that would be received at proposed Lots within this stage of the LSP from vehicles travelling on the roadway (Anketell Road) for the future road alignment.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles.

For information, a site layout is attached as Figure A1 in Appendix A.

2. CRITERIA

The WAPC released on 22 September 2009 State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations In Land Use Planning". Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to—

- proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and
- proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations —

- for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and
- for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.

Further information is provided in the guidelines.

TABLE 1: OUTDOOR NOISE CRITERIA

Time of day	Noise Target	Noise Limit
Day (6 am–10 pm)	$L_{Aeq(Day)} = 55 \ dB(A)$	$L_{Aeq(Day)} = 60 dB(A)$
Night (10 pm–6 am)	$L_{Aeq(Night)} = 50 \ dB(A)$	$L_{Aeq(Night)} = 55 \ dB(A)$

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to the sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot¹.

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot¹. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance

¹ For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.

with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms². For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the quidelines."

The Policy, under Section 5.7, also provides the following information regarding "Notifications on Titles":

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- the potential for transport noise impacts; and
- the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the quidelines).

² For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the quidelines.

An example of a standard form of wording for notifications is presented in the quidelines."

3. NOISE MONITORING

Previously, noise monitoring was undertaken at the boundary of the proposed LSP between the 27th June and the 4th July 2016. From these measurements, the noise received at the development from vehicles travelling along Anketell Road was determined.

The results of the noise data logging are summarised in Table 3.1 with the graphical data contained in Appendix C.

TABLE 3.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Boundary of Development (7 metres from the road edge)	71.0	69.2	62.2

Based on the noise monitoring, the calculated difference between the $L_{A10,18hour}$ and $L_{Aeq,8hour}$, and the $L_{Aeq,16\,hr}$ is -8.8 and -1.8 dB respectively. Also, as the difference between day and night L_{Aeq} noise levels is greater than 5 dB(A) (i.e. 7 dB(A)), the day period is the critical period for compliance.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows 20 years in the future.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Current Anketell Road	Future Anketell Road
Traffic flows	7,226 vpd	20,000 vpd
Heavy Vehicles (%)	19.6%	19.6%
Speed Limit (km/hr)	80/110	80/110
Road Surface	Chip Seal	Chip Seal
Façade Correction	+2.5 dB(A)	+2.5 dB(A)

Noise modelling was carried out for noise received within the development for current traffic volumes and road alignment to calibrate the noise model.

Advice has been provided by WAPC, MRWA and City of Kwinana that there is to be a major upgrade of Anketell Road in the future. This upgrade will likely align the road closer to the development boundary. Advice was also sought on the projected future traffic volumes, with the values shown in Table 4.1 above.

Based on the above information the following scenarios have been considered:

Scenario 1 – Future road alignment with future traffic volumes, no noise control (Appendix B Figure B1).

Design on the future alignment was provided by MRWA, hence has been used for the above scenarios.

5. TRAFFIC NOISE ASSESSMENT

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

Living and Work Areas $L_{Aeq(Day)}$ of 40 dB(A) Bedrooms $L_{Aeq(Night)}$ of 35 dB(A)

The results of the noise modelling are shown in Figure 1 as an overall noise contour plot. As can be seen, the land use for the façade Lots are not considered as highly noise sensitive (residential), however, if in the commercial land use a noise sensitive premise such as a child care centre is to be considered, an individual noise assessment on the building location would be required.

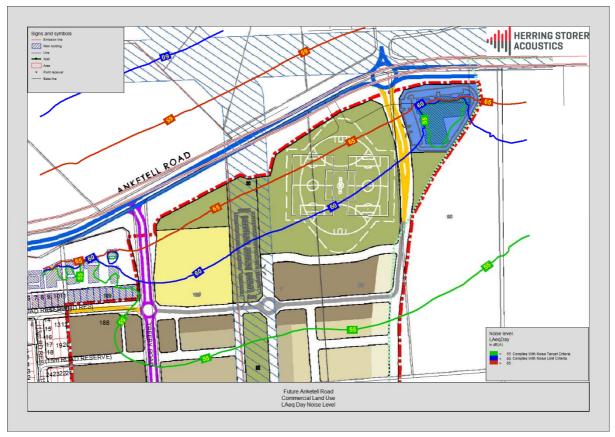


FIGURE 1 – FUTURE NOISE CONTOUR PLOT

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

For reference, it is noted that noise received at some residential lots may exceed the "Noise Target". Hence, some lots may require noise amelioration in the form of quiet house design and/or Notifications on Titles. These requirements would need to be determined once the Lot layout has been finalised.

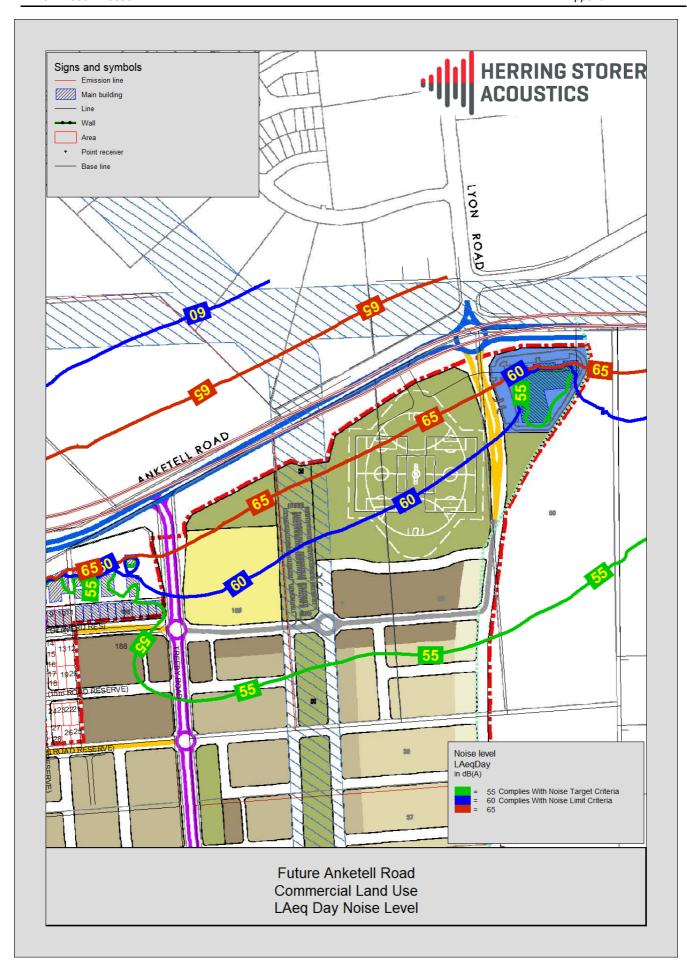
APPENDIX A

FIGURE A1 – SITE LAYOUT



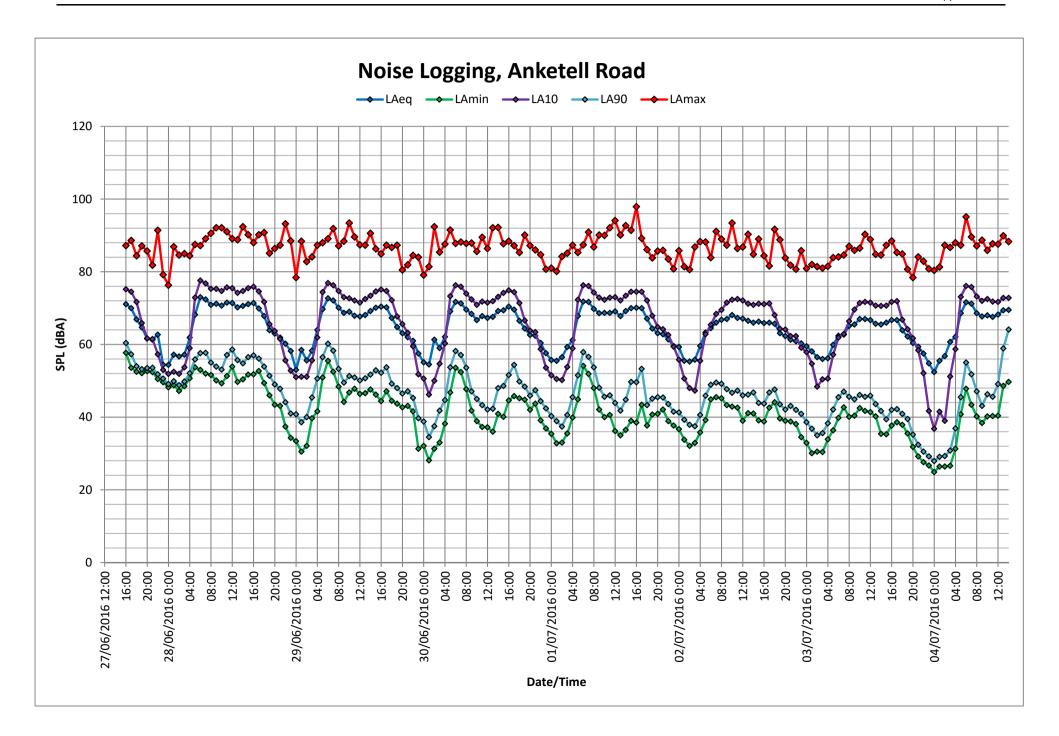
APPENDIX B

NOISE CONTOURS PLOT



APPENDIX C

NOISE MONITORING RESULTS



APPENDIX D SERVICE COMMERCIAL MARKET ADVICE

Information Paper

To:	Jarrod Rendell	jarrod@acumends.com.au	
Cc:	Rachel Chapman	rachel@tbbplanning.com.au	
From:	Greg Davis	<u>g.davis@taktics4.com.au</u>	
Date	Thursday, 18 April 2019	Pages 3	
Subject	Service Commercial Implications - Professional Opinion Anketell North LSP Amendment No. 4		



Dear Jarrod

We understand that a Service Commercial zone is being considered along the frontage of Anketell Road in Wandi as part of an amendment to the Anketell North Local Structure Plan. You have requested Taktics4 to provide professional opinion on the suitability and sustainability of a Service Commercial zone in the area currently allocated within the LSP amendment.

Physical Capacity

The Service Commercial area is divided into two sites and are each approximately 1.5Ha in size. The combined area of both zoned sites is therefore approximately 3 Ha. Based on ground level development and an industry accepted plot ratio of between 33% and 50% of site, a land area of 3Ha (30,000sqm) would be physically able to accommodate up to 10,000 – 15,000sqm of built form. A 10,000 – 15,000sqm Service Commercial development would be consistent with similar large format retail/showroom retail developments around Perth.

Planning Logic

At face value the allocation of a Service Commercial zone along Anketell Road seems plausible. Anketell Road is ultimately designated to become a major freight route making residential development an inappropriate fronting land use to Anketell Road. Service Commercial would normally seem a logical buffer between freight traffic and residential development, as Service Commercial activity relies heavily on accessibility and exposure to significant traffic volumes. However, the limited origin and destination points to the east and west along Anketell Road would suggest that there would only be limited local or district (non-freight transport) traffic along Anketell Road, and exposure to freight transport traffic is less significant for Service Commercial businesses than resident-based vehicle traffic. I therefore have concerns about the sustainability of service commercial activity located on Anketell Road.

Wandi District Centre

Another major factor in considering Service Commercial along Anketell Road in this location could be its proximity less than 1km to the east of the planned Wandi District Centre (DC). It would normally make logical planning sense to accommodate Service Commercial adjacent to a District Centre. The Wandi DC is planned to accommodate 16,000sqm of retail floor space and 10,00sqm of Service Commercial activity. The overall size of the Wandi DC is physically capable of accommodating this floor space allocation. This sized centre typically comprises two full line supermarkets and a Discount Department Store such as Target, BigW or Kmart.

Retail development economics confirm that Wandi DC will not develop to its allocated size without securing each of these three major tenants. The Wandi DC is central to a very limited residential catchment. The residential areas planned to the east of the Kwinana Freeway from

Information Paper

Rowley Road to Mortimer Road is severely restricted by the Jandakot Water Management Plan. The potential residential development within The Wandi DC catchment is further impacted by the proximity of expansive regional open space areas including The Spectacles Reserve and Jandakot Regional Park. The main residential catchment for the Wandi DC was expected to come from Mandogalup to the north west of the Wandi – west of the freeway. However, there is doubt over the future potential for residential development in Mandogalup which may restrict the population in the Wandi DC catchment.

1.5km catchment - 8,500 residents instead of an initially planned 13,000 residents.

3km catchment – 15,300 residents instead of an initially planned 24,600 residents

I have concerns as to whether a major DDS will be attracted to Wandi DC even if future planning initiatives result in Mandogalup achieving a higher population base, meaning that I subsequently have concerns over the ability of the Wandi DC to attract the major retail anchor tenants necessary to reach its full retail planning potential.

Wandi DC may therefore initially (and potentially only) ever develop as a neighbourhood-based retail centre anchored by a single supermarket creating a total retail floor space of 5,000 sqm. This development model would limit the attractiveness of the surrounding areas for Service Commercial activity, as this activity relies heavily on the foot traffic and traffic exposure created by the major retail tenants. If this scenario does in fact unfold, the immediate Wandi DC zone will require every available commercial and community activity to be located together on the one site in order to create a vibrant hub of commercial activity where all businesses are able to trade from each other's exposure.

I also understand that there may be commercial initiatives afoot to attract a next level bulky goods warehouse retailer such as Costco to the Wandi DC site. Whilst I have concerns over the suitability and sustainability of this activity type in this location, it would not alter my position that all activity should, where possible be contained primarily within the Wandi DC site. I therefore have concerns over allowing significant Service Commercial activity to be developed along the major arterial of Anketell Road as this may inhibit the Wandi DC from reaching its full commercial potential.

Planning Implications

As discussed, the service commercial area is split in to two sites – east and west.

Western Site

With respect to other non-commercial planning considerations, I would recommend consideration be given to the removal of the Service Commercial zone (the 1.5Ha western site) along Anketell Road on the LSP. A possible alternative which achieves the current planning objectives of providing a buffer to residential activity long Anketell Road, may include the relocation of the District Open Space and Recreation activities further north to front Anketell Road. This solution would have the following consequences:

- It would provide stronger exposure and legibility for a district recreation facility rather than tucking it/hiding behind a service commercial facility
- It would allow for an increase in residential development to the south of a relocated open space area.

Information Paper

- It would maintain the synergy between the Open space and community facility site as currently shown on the LSP.
- This would be a far better amenity outcome than having a valuable district open space and recreation facility fronting to a typically untidy low amenity rear servicing area of a service commercial area

Eastern Site

The above approach would satisfy the western site but would not resolve the Service Commercial area on the eastern site currently allocated for service commercial activity. This area is irregular in shape and remains unsuitable for residential activity as per previous discussions.

Given the planned nature of Anketell Road as a freight route this site may be best suited to a Freight Transport related Commercial Activity Hub. A freight transport related commercial activity hub may include a range of uses including (but not limited to) a petrol filling station and truck wash facilities as well as fast food and takeaway, geared solely (or at least predominantly) to large freight vehicles rather than cars. This activity in this location could benefit from significant exposure to freight transport by virtue of the road alignment, depth of the site and high visibility created by the recreation fields, and the sites access to two road frontages. This potential activity type on this eastern site forms no direct synergy with the broader Wandi District Centre and planned adjacent commercial activity as they will primarily cater to local and district residents shopping and commercial needs. The distance of the eastern site from the Wandi District Centre would ensure that freight transport movement into and out of a transport hub would not impede or conflict with private car movements entering and egressing from the Wandi District Centre.

This activity type together with the relocation of the district playing fields to Anketell Road provides a suitable buffer between planned residential uses and intensive and general rural land uses immediately to the east of the site. The size of the eastern site (1.5Ha) should be large enough to accommodate a combination of these activity types, without being large enough to create a facility too large for the intended purpose.

I would therefore consider exploring this activity type for the 1.5Ha eastern Service Commercial site. It should be noted that the opportunity for this activity type at this stage is predicated solely on the planned nature of Anketell Road as a freight route. Further market analysis would be required to determine whether such a transport hub would be feasible in this location.

I trust that these views assist you with your planning for the LSP amendment. I look forward to elaborating further should you wish to explore the suggested recommendations.

Regards

Greg Davis Director

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APPENDIX E LANDSCAPING PLAN









10.1636







6 Median Island Landscaping & Street Trees



APPENDIX F LOCAL WATER MANAGEMENT STRATEGY



Local Water Management Strategy

Lots 30-41, 100, 189 & Part of Lot 13 and 188 Treeby Road & Lots 89 and part of lot 90 Anketell Road, Anketell, WA, 6167

Issue No. 2 May 2019



Local Water Management Strategy (LWMS)

Anketell North Urban Cell

Lots 30-41, 100, 189 & Part of Lot 13 and 188 Treeby Road & Lots 89 and part of lot 90 Anketell Road, Anketell, WA, 6167

Prepared for:

Acumen/Taylor Burrell Barnett on behalf of the land owners of Lots 30-41, 100, 189 & Part of Lot 13 and 188 Treeby Road & Lots 89 and part of lot 90 Anketell Road.

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Document Control

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1	28/11/2018	D. Alanoix	P. Keating	P. Keating
2	24/05/2019	D. Alanoix	P. Keating	P. Keating

Addendum to DWER RD8296 received March 8, 2019

Section	DWER Comments	Bioscience Reply
Section 4.4.1: Groundwater Levels	Please use maximum groundwater levels (MGL) rather than annual average maximum groundwater levels (AAMGL) when calculating distance from drainage basin inverts to groundwater. The use of MGL gives higher confidence with regards to drainage infrastructure that a range of groundwater levels, from different climate/weather scenarios and the likelihood of an increase in groundwater levels due to urbanization, are considered. There are instances within the City of Kwinana where groundwater levels have been rising over the last few years due to the change in land use from rural (or bushland) to urban.	Maximum groundwater levels (MGL) were determined. Calculation details are provided in Section 4.4.1. MGL values were used to design the infrastructure.
Section 6.1: Conceptual Management Strategy	 Rain gardens along roads to infiltrate 1 year ARI events was proposed in the approved LWMS of March 2014. The current LWMS must justify why this water sensitive urban design feature has been removed from the revised LWMS. Please provide written confirmation from Western Power that storage of stormwater in their service corridor is supported. Section should describe how off-site discharges from Basins B7(2) and B7(4) connect to the Peel Sub R Drain to the north of the site. 	 Rain gardens are proposed to be located along roads. Figure 15, Table 15 and Appendix D provide details on the structures. Note that basins B2(5) takes all the POS space; rain-gardens will therefore located along the roads but near house frontage or side. This will be discussed in the future UWMP(s). Rain-gardens were sized to be at least 1% of the connected impervious area. A written confirmation from Western Power will be provided. This was addressed in Table 14.
Section 6.4.3: Detention Structure Configuration	Section notes that the drainage basin required volumes are included in Table 14 however they are missing. Please include these volumes in the table.	Volumes were included in Table 14.
Section 8:		Future UWMP(s) will provide updated data on

Subdivision and UWMP	 Groundwater data used is derived from monitoring during 2006 and 2007 and is quite dated. This section should confirm future UWMP(s) will provide updated data on groundwater levels and quality. Given that surface water discharges off-site are proposed this section should confirm future UWMP(s) will include pre-development surface water quality results. 	groundwater level and quality. This comment was added to the content of the LWMS. 2) Likewise, future UWMP(s) will include pre-development surface water quality results.
Figure 15: Surface Water Runoff Post- Development and Basin Locations	This figure indicates that drainage basins in Catchment B public open space (POS) areas do not have rain-gardens or bio-infiltration basins to treat the minor rainfall events. Please indicate how the minor rainfall events undergo water quality treatment in Catchment B.	Rain gardens are provided in this catchment. They will be located along roads, at house frontage/side/POS entry.
Appendix	 Please include conceptual drainage basin, rain garden and landscape designs including how stormwater infrastructure is integrated into the POS. For drainage basins please include top water levels (TWL) for all rainfall events, use of amended soils (depth and phosphorous retention index), depth to MGL from basin invert and slope gradients. POS areas should be configured to ensure a high proportion of useable open space, rather than large areas being dedicated to drainage. This can be achieved by landscaping/contouring these areas to drain 63% AEP events to bioretention areas, with stormwater overtopping the bioretention area into the larger POS area in greater rainfall events. Figures 17 & 18 should indicate where any discharge off-site is to occur for any relevant rainfall event at the Anketell North Urban Cell site 	 Conceptual drainage basins were included into Appendix D of the LWMS. Figures 17 and 18 were updated to reflect the comment. A diagram including the CCW area and a 50m buffer (to Treeby Rd Lake) was included in the report as Figure 20. As seen on the Figure, part of the CCW has been cleared. It is also noted that the 50m buffer is outside the proposed development area. If still required, DBCA will be contacted to confirm the setting of the CCW area and buffer.

50m buffer from deve diagram indicating CC include any written agre of Biodiversity, Cons	st discharge rates. Wetlands (CCW) require a lopment. Please include a W area and buffer. Also, ement with the Department servation and Attractions the CCW area and buffer.	



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LWMS Better Urban Water Management Checklist

LWMS Item	Deliverable	Section	
Executive Summary			
Summary of the development design strategy, outlining how the design objectives are proposed to be met	Design elements and requirements for best management practices and critical control points	Executive Summary	
Introduction			
Total water-cycle management principles and objectives Planning background Previous studies		Section 1.1 Section 1.2 Section 1.3	
Proposed Development			
Structure plan, zoning and land use Key landscape features Previous land use	Location plan Structure Plan Site context plan or a combination of above	Section 2.1 Figures 1 - 3	
Landscape – proposed public open space areas	Landscape Plan	See basin cross sections for drainage areas	
Design Criteria			
Agreed design objectives and source of objectives.		Section 3	
Pre-Development Environment			
Existing information and more detailed assessments (monitoring) of site; explanation of how the site characteristics affect the design.		Section 4 Figures 4-13	
Site conditions – existing topography/contours, aerial photo underlay, major physical features.	Site condition plan	Section 4	
Geotechnical – topography, soils including acid sulphate soils and infiltration capacity, test pit locations.	Geotechnical plan	Section 4.1	
Environmental – sensitive or significant vegetation areas, wetland areas and buffers, waterways and buffers, contaminated sites.	Environmental plan plus supporting detail where appropriate.	Section 4.2	
Surface water – topography, 100 year floodway and flood fringe areas, 100 year proposed flow paths, water quality of flows entering and leaving site	Surface water plan	Section 4.3 Figure 7	
Ground water – topography, test bore locations, ground water pre- and post development, water quality, ground water variation hydrograph.	Ground water plan plus details of ground water monitoring and testing.	Section 4.4 Appendix A	



Water Sustainability Initiatives		
Water efficiency measures – private and public open spaces including method of enforcement		Section 5
Fit-for-purpose strategy and agreed actions and implementation		
Waste water management		Section 5.7
Stormwater Management Strategy		
Flood protection – peak flow rates, Volumes and top water levels at control points, 100- year flow paths – flood ways and flood fringe zones and/or along roads and reserves, 100-year detention areas.	100-year (1% AEP) flood plan Long section of critical points	Section 6 Figures 14 - 19
Manage serviceability – storage and retention required for the critical 5-year ARI storm events. Minor roads should be passable in the 5-years ARI event.	18% AEP event plan	
Protect ecology – detention areas for the 1-year 1-hour ARI event, areas for water quality treatment and types of agreed structural and non-structural best management practices and treatment trains (including indicative locations). Protection of waterways, wetlands (and their huffers) remaint vegetation and ecological linkages.	63% AEP event plan	
buffers), remnant vegetation and ecological linkages.		
Groundwater Management Strategy		
	Ground water plan	Section 7
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil	Acid sulphate soil and dewatering management plans	Section 7 Section 7
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil drain areas/exclusion zones.	Acid sulphate soil and dewatering	
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil drain areas/exclusion zones. Actions to address acid sulphate soils or contamination	Acid sulphate soil and dewatering	
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil drain areas/exclusion zones. Actions to address acid sulphate soils or contamination Subdivisions and UWMP Content and coverage of future urban water management plans to be completed at subdivision. Include areas where further investigations are	Acid sulphate soil and dewatering	Section 7
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil drain areas/exclusion zones. Actions to address acid sulphate soils or contamination Subdivisions and UWMP Content and coverage of future urban water management plans to be completed at subdivision. Include areas where further investigations are required before detailed design Monitoring Program Recommended future monitoring plan including timing, frequency, locations and parameters, together with arrangements for ongoing actions.	Acid sulphate soil and dewatering	Section 7
Groundwater Management Strategy Post development ground water levels, existing and likely final surface levels, outlet controls, and subsoil drain areas/exclusion zones. Actions to address acid sulphate soils or contamination Subdivisions and UWMP Content and coverage of future urban water management plans to be completed at subdivision. Include areas where further investigations are required before detailed design Monitoring Program Recommended future monitoring plan including timing, frequency, locations and parameters, together	Acid sulphate soil and dewatering	Section 7 Section 8



Executive Summary

On 18 March 2014, Bioscience submitted an LWMS for the Anketell North Cell. In the report, the Cell consisted of lots 30-41, 100, 188, 189 and part of Lot 13 Treeby Road & Lots 462-464, 467, 89, part of lot 90 and 652 Anketell Road.

Since then, one section of the Anketell North Cell, consisting of Lots 652, 2, 3 and part of lot 188 Anketell Road had its water management strategies and development approved. Accordingly this LWMS was prepared on behalf of Acumen/TBB for the remaining lots.

This LWMS has been developed to be consistent with the framework and process detailed in the Better Urban Water Management (WAPC, 2008a) guideline which sets the level of investigations, key principles and objectives, and documentation required at various decision points in the planning process.

The Local Structure Plan (LSP) seeks approval for the proposed development under the provisions of the City of Kwinana (CoK) Town Planning Scheme No.2 (TPS2). The LSP provides a framework for future development and establishes a context for subdivision. This LWMS, to support the LSP, will guide future subdivision to ensure that the land is developed in a sustainable manner, fulfil the objectives of the WAPC as described in Liveable Neighbourhoods Edition 3 (WAPC, 2009) and in accordance with the objectives of the Department of Water (DoW) and the CoK, and as such provides the necessary water management strategies to guide the subsequent Urban Water Management Plan (UWMP) required for subdivision.

The Anketell North Urban Cell has no natural rivers or creeks in the catchment. The Peel Sub P drain, a constructed open drain originates in close proximity to the south east of the development and ultimately drains the catchment through the Anketell South Urban Cell at the Thomas Road "Legal Point of Discharge" (LPD 3). Part of the north east area of the site drains north, ultimately to Peel Sub R Drain through LPD2. Surface water is also present in the surrounding wetlands during the wetter winter months. The Anketell South Urban Cell has also been hydraulically assessed to ensure predevelopment discharge rates are maintained. The Jandakot DWMP also highlighted the north west portion of the site as "soakage" where all of a 1% AEP event would infiltrate in predevelopment conditions.

Hydrological and hydraulic modelling has been undertaken for the pre-development scenario and calibrated to the values reported by the DoW in the Jandakot Drainage and Water Management Plan (DWMP), Peel main drain catchment (DoW, 2009). The results of this modelling indicate the peak discharges for the 100 year ARI event at the LPDs are:



• LPD 1: 103 l/s (to be infiltrated directly in the soakage area) Note that LPD1 is not applicable to the proposed LSP. No discharge from the LSP area will occur to this discharge point.

LPD 2: 145 l/s (Discharge north towards the Peel Sub R Drain)

• LPD 3: 371 l/s (culverts under Thomas Road)

Development of the site will result in a significant increase in impervious surfaces and therefore runoff volumes leaving the site. To ensure the pre-development peak discharges are maintained drainage infrastructure will include bioretention areas, soakwells, overland flows and detention basins.

The effectiveness of the basins in maintaining the pre-development discharge flows for the 1% AEP event has been assessed. The post development basins are capable of maintaining the pre-development peak discharge for the critical storm duration for the design events with outflows regulated to those proposed in the DoW (former DWER) DWMP.

A treatment train has been devised for the development that employs industry standard Best Management Practices (BMPs) and will ensure the development does not result in any adverse impacts for the downstream receiving water bodies and ecosystems. The DoW Jandakot DWMP indicates that the department is currently developing water quality targets and in the interim, treatment trains should be based on the methodology established in the Stormwater Management Manual for Western Australia. Surface water quality should be managed through:

- On site retention of 63% AEP 1 hour event flows
- Bioretention systems sized as 2% of the connected impervious areas, and
- Non-structural measures to reduce applied nutrient loads.



1.0 Introduction

1.1 Integrated Water Cycle Management: Principles and Objectives

On 18 March 2014, Bioscience submitted an LWMS for the Anketell North Cell. In the report, the Cell consisted of lots 30-41, 100, 188, 189 and part of Lot 13 Treeby Road & Lots 462-464, 467, 89, part of lot 90 and 652 Anketell Road.

Since then, one section of the Anketell North Cell, consisting of Lots 652, 2, 3 and part of lot 188 Anketell Road had its water management strategies approved. To this end, a new LWMS was prepared on behalf of Acumen/TBB for the remaining lots (**Figure 1**).

Water management is paramount in all levels of planning to protect this valuable resource. Management endeavours to protect the environment, avoid flooding and meet the requirement of sustainable use of water. It is important to identify and clarify water management strategies and methodologies as they provide the framework for decision making at local structure and subdivision planning levels. This LWMS provides concept designs, guideline controls and management measures for:

- Water Quality: maintain or improve surface and ground water quality.
- Water Quantity: maintain the total water cycle balance within developments relative to the pre- development conditions.
- Water Conservation: maximise the efficient use of water resources.
- Ecosystem Health: retain natural drainage systems and protect ecosystem health.
- Economic Viability: implement long term economically viable stormwater management systems.
- Public Health: minimise public risk, including risk of injury or loss of life.
- Protection of Property: protect the built environment from flooding and water logging.
- Social Values: recognise and maintain social, aesthetic and cultural values.
- Development: deliver best practice stormwater management taking due cognisance of sustainability and precautionary principles.

This LWMS has been developed to be consistent with the framework and process detailed in the Better Urban Water Management (WAPC, 2008a) guideline which sets the level of investigations, key principles and objectives, and documentation required at various decision points in the planning process. A number of State Government Policies are relevant in addition to a number of published guidelines and standards which provide direction or guidance to achieve sustainable environmental and urban development and that define key principles and objectives. These include:



- State Water Strategy (Government of WA, 2003). State Water Plan (Government of WA, 2007).
- Statement of Planning Policy No 3 Urban Growth and Settlement (WAPC, 2006a).
- State Planning Policy 2.9 Water Resources (WAPC, 2006b).
- Planning Bulletin 92 Urban Water Management (WAPC, 2008b). Planning Bulletin 64/2009 Acid Sulphate Soils (WAPC, 2009). Liveable Neighbourhoods (WAPC, 2009).
- Better Urban Water Management (WAPC, 2008a).
- Developing a Local Water Management Strategy (DoW, 2008).
- Stormwater Management Manual for Western Australia (DoW, 2004-2007).
- Decision Process for Stormwater Management in Western Australia (DEC and SRT, 2005 and DoW, 2009).
- Stormwater Quality Management Manual for WA (DoE, 2004). National Water Quality Management Strategy (ANZECC, 2000).

This document takes due cognisance of and has been prepared and compiled consistent with these polices and their requirements.

1.2 Planning Background

The Local Structure Plan (LSP) seeks approval for the proposed development under the provisions of the City of Kwinana Town Planning Scheme No.2 (TPS2). The LSP (Figure2) provides a framework for future development and establishes a context for subdivision. This LWMS, to support the LSP, will guide future subdivision to ensure that the land is developed in a sustainable manner, fulfil the objectives of the WAPC as described in Liveable Neighbourhoods (WAPC, 2009) and in accordance with the objectives of the Department of Water and Environmental Regulation (DWER) and the City of Kwinana (CoK) and as such provides the necessary water management strategies to guide the subsequent Urban Water Management Plan (UWMP) required for subdivision.

1.3 Local Studies

Regional and local studies related to subject site are:

Jandakot drainage and water management plan. Peel main drain catchment (DoW, 2009).

Site-specific studies include:

- Jandakot Structure Plan. Anketell South Cell. Thomas Road, Anketell (360 Environmental Pty Ltd,2009).
- Lots 1, 2, 3 and 17 Thomas Road, Anketell: Pre-Development Hydrological Monitoring (JDA,2009)
- Lots 13 and 100 Treeby Road: Pre-Development Hydrological Monitoring (JDA, 2008)
- Wandi/Anketell South Pre-Development Hydrological Monitoring (JDA, 2008)



- Anketell North District Water Management Strategy (JDA, 2009)
- Anketell South Urban Cell -LWMS Issue No. 1. (VDM, 2010)
- LWMS for the Anketell North Cell (Bioscience 2014)



2.0 Proposed Development

2.1 Structure Plan, Zoning and Land Use

The Anketell North Urban Cell site is located approximately 32km south of Perth and covers an area of approximately 100ha of which 86 ha is assessed within this LWMS. Historically much of the site has been cleared to provide rural residential and agricultural activities. The site is bounded by the Anketell Road to the north, the Jandakot Regional Park to the west, the Jandakot Groundwater Protection Area to the east and the Bush Forever Reserve site 270 to the south.

The proposed Local Structure Plan (LSP) shown in **Figure 2** has been designed to be sensitive to the site constrictions and is to incorporate the following development categories:

- Residential of R20, R25, R30 and R40 densities
- Service Commercial
- Primary school
- Community Facility
- Public Open Spaces (POS)
- Drainage reserves
- Western power line easement

2.1.1 Metropolitan Region Scheme Zoning

Under the Metropolitan Region Scheme (MRS), maps 24 & 28, the Anketell North Urban Cell is currently zoned "Urban", as detailed in **Figure 3**, except for a 100m wide strip of "Urban Deferred" directly abutting Anketell Road. The area labelled urban deferred has potential to be required for the widening of Anketell Road in future freight routes.

Part of the site (near the eastern boundary) retains a "Rural Water Protection" zoning reflecting the Jandakot Underground Water Protection Area. Whilst this area is not zoned for urban uses, it does form part of the landholdings and as such consideration has been given to the treatment of these areas within the LSP.

The Kwinana Freeway, to the west of the site, is classified as a "Primary Regional Road". Land to the immediate north and south of the subject site is zoned "Urban".

2.1.2 City of Kwinana Town Planning Scheme No. 2 Zoning

The site is currently zoned "Development" under the provisions of the City of Kwinana Town Planning Scheme No.2 (TPS 2). TPS 2 applies to all land within the Local Authority area, and contemplates both zoning and development control for land.



The purpose of the Development zone is to provide a flexible planning mechanism for the development of larger areas. The Development zone requires the preparation of comprehensive structure planning in order coordinate development and to provide adequate planning control within the specified area. Subdivision, use and development of the subject site is to be generally in accordance with the adopted Structure Plan.

The objectives of the Development Zone as stated under TPS 2 are as follows:

- Designate land for future development
- Provide a planning mechanism for the identification and protection of areas of conservation value whilst facilitating the growth of the Town
- Provide for the orderly planning of large areas of land for residential, commercial, industrial and associated purposes through a comprehensive structure planning process
- Enable planning to be flexible and responsive to changing circumstances throughout the developmental stages of the area
- Provide sufficient certainty for demand forecasting by service providers

The proposed Structure Plan is consistent with the above objectives and allocates land uses, conservation reserves, provides a flexible mechanism of planning, and identifies the provision of service infrastructure within the subject site.

In order to ensure integration with the balance of the Anketell Cell Development zone, Scheme Amendment No.100 was initiated by Council on the 23 July 2008 which proposes the inclusion of Development Contribution Areas and Plans relevant to each of the future urban cells within the JSP / Eastern Residential Intensification Concept (ERIC) area under Schedule 5 of TPS 2. The contributions amendment provides a framework for cost sharing of those key infrastructure items (road upgrades, public open space, etc) identified within ERIC for each urban cell. The CoK are completing their assessment of community infrastructure needs such as community sites.

2.1.3 Eastern Residential Intensification Concept (ERIC)

ERIC was prepared by the CoK in 2005, to provide strategic direction and refinement of the future urban areas identified within the JSP. ERIC comprises the Cells of Mandogalup, Wandi, Anketell, Casuarina and Wellard (east) and defines a framework by which urban subdivision and development is able to occur in an orderly and co-ordinated manner. ERIC is intended to be used as a guide in the preparation of a more detailed Local Structure Plans.

ERIC predominantly deals with district level issues which are not dealt with by the JSP such as:

- The co-ordination of development;
- Provision of community infrastructure;



- District and local open space distribution; Treatment of the district and local road network; Pedestrian cyclist movement;
- Hierarchy of centres;
- Remnant vegetation protection;
- Adverse landscape impact minimisation; and
- The framework for development contributions to district and local infrastructure and facilities, the need for which will be generated by subdivision and development within the structure plan area

ERIC was advertised for public comment in 2006, and is being revised by the CoK having regard to submissions received on the draft plan and subsequent events including the relocation of the station site to Rowley Road south, the requirements of the JDWMP and the need to resolve inconsistencies with the JWSP.



3.0 Design Principles and Criteria

The primary objective of this LWMS is to design a development that manages the total water cycle in a sustainable, well integrated manner, whilst adhering to the principles of Water Sensitive Urban Design (WSUD) as outlined in the State Planning Policy 2.9 Water Resources (WAPC, 2006), Liveable Neighbourhoods (WAPC, 2007) and Stormwater Management Manual for WA (DoW, 2007). The LWMS should tie in with regional and local principles and objectives of total water cycle management including the CoK Town Planning Scheme No.2.

This report is drafted to:

- Identify existing site conditions including land use, geotechnical parameters, ecological habitats, groundwater and surface water characteristics
- Apply relevant regulations and guidelines governing water management
- Incorporate total water cycle management and water-sensitive urban design principles and ensure that development is consistent with current best management practices and best planning practices for the sustainable use of water resources
- Identify possible impacts on local groundwater quality and quantity to ensure postdevelopment conditions are equal to or better than pre-development conditions
- Promote management of the urban water cycle as a single system in which all urban water flows are recognised as a potential resource and where the interconnectedness of water supply, stormwater, wastewater, flooding, water quality, waterways, estuaries and coastal waters is recognised
- Maximise compliance with best practice stormwater management including stormwater retention
- Promote use of water conservation mechanisms to increase efficiency and identify site constraints and opportunities for the re-use and recycling of water, particularly stormwater, consistent with state water strategy recycling objectives
- Conserve and/or re-vegetate local native vegetation in developments to minimise water use and maximise infiltration, particularly where landscaping is proposed provided fire protection is not put in jeopardy

The foundation for stormwater management within urban areas is the Stormwater Management Manual for Western Australia (DoW, 2004-2007) and coupled with the Decision Process for Stormwater Management in WA (DoE and SRT, 2005 and DoW, 2009) provides guidance as to how urban development can achieve compliance with the principle, objective and delivery approach. The objectives and design criteria identified for total water cycle management at the subject site are based upon the *Jandakot Drainage and Water Management Plan Peel Main Drain Catchment* (DoW, 2009), as summarised in **Table 1.**



Table 1: Objectives and Design Criteria

Principle	Key LWMS Element
Water Conservation	Target consumption rates for scheme water both internally and
Restrict the use of potable scheme	externally of buildings
water throughout the development	Integration of water and landuse management into all planning stages
	Manage vegetation in drainage areas to minimise irrigation
	dependency
	Use of rainwater harvesting systems
Water Quality	Monitor pollutant and nutrient outputs of the development to not
Maintain surface and ground water	exceed ambient conditions to establish ambient conditions and trigger
quality at pre-development winter	values. If catchment ambient conditions have not been determined,
concentration levels and if possible,	relevant Healthy Rivers Action Plan and/or ANZECC water quality
improve the quality	guidelines shall apply.
	Pollutant source controls to be implemented including reduced nutrient
	application, WSUDs, collection pots, education schemes
	All run-off from catchment to receive treatment prior to discharge to a
	receiving environment
	Manage contaminated areas and acid sulfate soils in accordance with
	Department of Environment and Conservation and Department of
	Water Plans
	Implement end-of-pipe measures to mitigate any contaminants
	remaining in the stormwater prior to discharging to receiving
	environments.
Water Quantity	Management of run-off up to 1% AEP events throughout the
A relative comparison between pre	development
and post-development for annual	Maintenance of existing flow regimes at or below current discharge
discharge volume and peak flow	levels
should be maintained	Implement plan to maximise infiltration where possible
	Sub-soils drains to be installed where required at above current AAMGL
	Groundwater level to be maintained relative to predevelopment levels
	Manage groundwater levels by providing free-draining drainage and a
	minimum separation of 1.2m between finished floor levels
	Invert levels of basins and other drainage structure to be set
	appropriate to the AAMGL
Ecosystem Health	63% AEP events post development kept relative to pre development
Determine of ecological	discharge levels by retention and offering of primary treatment
requirements to maintain and	Identification of impacts affecting significant environments and
improve sensitive areas	maintenance of desirable hydrological flow regimes
Economic Viability	Implement a proven technology
To implement stormwater systems	Minimise pollutant and sediment entering the drainage infrastructure
that are economically viable in the	requiring further maintenance
long term	
Public Health	Design in accordance with relevant design standards, best
To minimise the public risk,	management practices, council regulations and government agency
including risk of injury or loss of life	requirements



to the community	•	All drainage infrastructure to infiltrate retained water within 96 hours
		to minimise disease vectors and nuisance insect growth
Protection of Property	•	Developments designed to offer protection against storm events up to
To protect the built environment		the 1% AEP
from flooding		
Social Values	•	Integration of drainage and POS functions to enhance and improve the
To ensure that social aesthetic and		local residential community
cultural values are recognised and	•	Minimise the impacts of construction activities
maintained when managing		
stormwater		



4.0 Pre Development Environment

4.1 Geotechnical Aspects

4.1.1 Soils

The geology at the site and surrounding area as per the Geological Survey of Western Australia 1:50000 Environmental Geological Series Armadale Map part of sheets 2033 I and 2133 IV (1986) (Figure 4) is:

- S8 SAND white to pale grey at surface, yellow at depth, fine to medium grained, moderately sorted, sub-angular to rounded, frequent heavy mineral, rare feldspar, of alluvial origin over SANDY CLAY to CLAYEY SAND of the Guildford Formation, of eolian origin
- S10 SAND as S8 over sandy clay to clayey sand of Guildford Formation, of eolian origin
- S7 SAND pale yellowish brown, medium to coarse grained sub-angular quartz, trace of feldspar, moderately sorted, of residual origin
- MS5 SANDY SILT dark, brownish grey silt, with disseminated fine grained quartz sand, firm, variable clay content, of Lacustrine origin

The 360 Environmental *Phase 1 Environmental Assessment* identified the soils on the site as being divided into 3 main sub-groups of the Bassendean Sand group, as summarised in **Table 2**.

Table 2: Soil Profiles

Soil Sub Grade Name	Soil Description	Main Landform Unit and Location
Spearwood S2a	Lower slopes (1-5%) of dune ridge with	Gentle slopes of coloured and earthy sands. Low
Phase	minor limestone outcrops. Moderately	risk of salinity, water logging, erosion and
(211Sp_S2a)	deep to deep siliceous yellow-brown sands	phosphorus loss.
	or pale sands with yellow-brown subsoils.	
		Majority of the site. North western and central
		site
Spearwood S1b	Dune ridges with slopes up to 15%. Deep	Gentle slopes of coloured and earthy sands. Low
Phase	siliceous yellow brown sands or pale sands	risk of salinity, water logging, and phosphorus
(211Sp_S1b).	with yellow-brown subsoil.	loss. Moderate risk or erosion.
		Central Western boundary. (Lots 30-35)
Bassendean B1	Extremely low to very low relief dunes,	Gentle slopes and flats of Pale sands. Low risk of
Phase	undulating sand plain and discrete sand	salinity and water logging. Moderate risk of
(212Bs_B1)	rises. Deep bleached grey sands sometimes	water erosion, low to moderate risk of
	with a pale yellow B horizon or a weak iron	phosphorus loss.
	organic hardpan at depths generally greater	
	than 2 m. Banksia dominant.	North eastern corner (Lot 90)



Bassendean B2	Flat to very gently undulating well drained	Gentle slopes and flats of pale sands. Low risk of
Phase	sand plain. Deep bleached grey sands with a	salinity and water logging. Moderate risk of
(212Bs_B2)	pale yellow B horizon or a weak iron-	water erosion, lot to moderate risk of
	organic hardpan 1.2m.	phosphorous loss. Well drained and flat
		Lots 7 and 89
Bassendean B3	Closed depressions and poorly defined	Swamp and wet soils. Low risk of salinity and
Phase	stream channels. Poorly to very poorly	wind erosion. High risk of Water logging and
(212Bs_B3)	drained. Moderately deep, bleached sands	phosphorous loss. Model rate risk of water
	with an iron-organic pan, or clay subsoil.	erosion. Poorly drained.
	Surfaces are dark grey sand or sandy loam.	
		Isolated pockets in southwest corner and
		southwest (Lots 13, 41, 40 and 39).
Bassendean B6	Imperfectly drained sand plain and broad	Gentle slopes and flats of pale sands. Low risk
Phase	extremely low rises. Deep or very deep grey	salinity and water logging and water erosion.
(212Bs_B6)	siliceous sands.	Moderate to high risk of phosphorous loss and
		moderate risk of wind erosion. Well drained and
		flat.
		South and southeast. (Lots 41, 35 and 100)

Hand augering around and in Treeby Road Lake conducted by Endemic Environments in February 2010 revealed a 1.2m thick layer of highly plastic clay near the lake, indicating the lake is perched and not in direct hydraulic contact with the regional aquifer.

4.1.2 Acid Sulphate Soils

The DEC acid sulphate soils (ASS) risk map indicates a large portion of the north west of the site is classified as Class 3 and has low to no risk of ASS occurring within 3m of the surface. There are two locations within the site classified as high risk ASS (Class 1), and these are located adjacent to Treeby Road Lake and along the eastern boundary (north of the Peel Sub P Drain). The remainder of the site has a moderate to low risk of ASS occurring within 3m of the natural surface (Class 2).(Figure 5).

4.2 Environmental Assets

The following paragraphs summarise the findings of the *Anketell North Cell Local Structure Plan Environmental Assessment* prepared by 360 Environmental and the *Flora and Vegetation of Anketell Urban Deferred Cell*, prepared by Bennett Environmental Consulting.

4.2.1 Significant Flora and Fauna and Bush Forever

Given the current use of the land is largely for rural residential/agricultural purposes, a large portion of the site has been predominantly cleared. However, patches of native vegetation remain



in the northern portions. The existing vegetation is typical of that related to the Bassendean Central and South Complex- Banksia/Eucalypt Woodland (360 Environmental, 2009). A Bush Forever reserve and Regional Park lie adjacent the site indicating that much of the vegetation in this area is protected. Bush Forever site 270 borders directly to the south and west of the site and incorporates a portion of Lot 13. Bush Forever site 270 has previously been realigned as part of this planning process. Bush Forever 269 occurs further west and contains the Beeliar Regional Park. An Environmentally Sensitive Area (ESA) occurs along a section of the southern boundary of the site, acting as a buffer for the neighbouring Bush Forever site 270.

Flora

A botanical survey of Lots 2-4, 7, 30-41, 89, 90, 100,188,189 and 652 (360 Environmental) identified a number of flora species within the study area. The vegetation condition ranged from *very good* to *completely degraded*. The Commonwealth listed Banksia Woodlands on the Swan Coastal Plain TEC is present within the site.

In addition, there are two Priority Ecological Community (PEC) located to the south of the site. Priority 2 *Banksia illicifolia* woodlands (SCP22) and Priority 3 *Low lying Banksia attenuate woodlands or shrublands* (SCP21c). A site survey undertaken by 360 Environmental in spring 2009 confirmed the Priority 3 PEC occurring on site through PATN analysis of collected flora and vegetation data.

The DECs Declared Rare Flora (DRF) and Priority Flora Databases were accessed to determine the potential for DRF or priority species to be present on the site. No DRF were documented as occurring on site. However the search indicated there is evidence of one Priority Flora species occurring on site:

Jacksonia gracillima

These findings are supported by the results of the 360 Environmental Spring 2009 Flora and Vegetation Survey. No DRF species were recorded as occurring on site. *Jacksonia gracillima*, a Priority 3 Flora, was recorded from two quadrants, one within the site and one to the south of the site. Although the databases indicate there are no DRF listed species occurring on the site, the following protected species are known to occur in the Anketell region:

- Aotus codifolia
- Aponogeton hexatepalus
- Caladenia huegelii
- Cyathochataeta teretifolia
- Diuris micrantha
- Diuris purdiei
- Dodonaea hackettiana



- Drakaea elastica
- Eremaea asterocarpa subsp. Brachyclada
- Styldium longitubum (360 Environmental, 2009)

Three significant species that were identified as having the potential to occur on the site are listed on the DEWHA's *Environment Protection and Biodiversity Conservation* (EPBC) Act 1999 Protected Matters Search Tool (2009). These were:

- Caladenia heugelii
- Drakaea elastic
- Lepidosperma rostratum

Fauna

A search of the DEC's Threatened and Priority Fauna database has indicated that the following fauna have been recorded within a five kilometer radius of the site, and have the potential to occur on the site:

- Forest Red-tailed Black-Cockatoo (Calyptorhynchus banksii naso)
- Chuditch (Dasyurus geoffroii)
- Lined Skink (*lerista lineate*)
- Western Brush Wallaby (Macropus Irma)
- Quenda (Isoodon obesulus fusciventer)

A search of DEWHA's (2009b) Protected Matters Search Tool was undertaken and identified three vulnerable and three endangered species listed under the EPBC Act as potentially occurring on the site:

- Carnaby's Black Cockatoo (Calyptorhynchus latirostris)
- Baudin's Black Cockatoo (Calyptorhynchus baudinii)
- Graceful Sun Moth (Synemon gratiosa)
- Chuditch or Western Quoll (Dasyurus geoffroii)
- Red-tailed Phascogale (*Phascogale calura*)
- Quokka (Setonix brachyurus)

For more information regarding the sites Flora and Fauna, please refer to the *Anketell North Cell Local Structure Plan Environmental Assessment*, prepared by 360 Environmental.

4.2.2 Wetlands

The DEC maintains a Geomorphic Wetland Dataset which classifies all recorded wetlands into specific management categories based on their ecological attributes and functions. These classes consist of Conservation Category (CC), Resource Enhancement (RE) and Multiple Use (MU) wetlands.

The following wetlands are identified either within or directly adjacent to the site on the DEC's Geomorphic Database of Wetlands of the Swan Coastal Plain maps:



- UFI 14148 a Conservation Category Wetland located over much of Lot 13 and extending south where it continues to Thomas Road
- UFI 15290 a Conservation Category Sumpland (Treeby Road Lake) which is located on the westernmost margin of Lot 100 and portions of which extend onto Bush Forever Site 270A to the west
- UFI 6666 a Conservation Category Sumpland centred around the Peel Sub P drain on Lot 13.

In addition, five Conservation Category Wetlands occur within the adjacent area to the south (sumpland UFI 6721 (Sandy Lake (SWC EPP Lake)), sumpland UFI 13082, sumpland UFI 13079, dryland UFI 13506 and sumpland UFI 13080). An additional three geomorphic wetlands (MU sumpland UFI 6668, MU sumpland UFI 6669 and RE dampland UFI 6667) occur to the immediate south. To the west of the study area lies the most important Bush forever and Environmental Protection Policy lake in the Jandakot area, being The Spectacles wetlands, consisting of Spectacles north (Sumpland CC UFI 6639) and Spectacles south (Sumpland CC UFI 6637). These wetlands are part of the Beeliar Regional Park and lie within Bush forever site 269.

Aerial processed contours of the site and a detailed survey of the Peel Sub P Drain identify an outlet from Treeby Road Lake (UFI 15290) into the Peel Sub Drain at an invert level of 16.002m AHD. The peak water level in Treeby Road Lake is likely to be controlled by the drain during wetter than average rainfall years. The combination of a drying climate and declining groundwater levels have likely reduced the frequency of any outflows from the Treeby Road Lake to the Peel Drain (Endemic, 2010). Significant surface water storage in Treeby Road Lake has been identified in the *Jandakot Drainage and Water Management Plan (DWMP)* (DoW, 2009) Ultimate Drainage Plan (Appendix C). For the 10 and 100 year ARI events, 23,600m³ and 31,500m³ respectively. These volumes are to be targeted in the post development scenario.

In 2005 a wetland reclassification and boundary assessment was completed for the wetlands on Lots 13 and 100 and submitted to the Waters and Rivers Commission. The Assessment was undertaken based on the questionnaire set out in EPA Bulletin 686: Guide to Wetland Management in the Perth and near Perth Swan Coastal Plain Area (Environmental Protection Authority, 1993). The investigation, undertaken by RPS Bowman Bishaw Gorham in September 2004 found that Lots 100 and 13 had been disturbed in the past and that Lot 100 still had an active horticulture usage, consisting of hydroponic vegetables being grown in an old nursery. This assessment indicated the wetland management category for wetlands on the site should be reduced to Multiple Use. After initial inspection and agreement to the reclassification, the Waters and Rivers Commission withdrew its agreement and stated that the wetlands would remain mapped as Conservation Category (Endemic, 2010).



During the planning process for both the Anketell North and Anketell South Urban Cells, the Department of Planning and the Department of Environment and Conservation have been involved in the project and developed a Negotiated Planning Solution (NPS). The NPS is a compromised balance between development and conservation and coincides with the realignment of the Bush Forever boundaries for site 270 and permits the use of the CCW in this development. The area is zoned "urban deferred" under the Metropolitan Regional Scheme. Some of the communications relating to the NPS have been included as an Appendix to this LWMS report.

All wetlands within the study area are classified as sumplands or damplands, which are basin type wetlands. Sumplands are subject to seasonal inundation, while damplands are subject to seasonal water logging for part of the year. However, the wetland located over much of Lot 13 (Sumpland CC UFI 14148) has been described as exhibiting 'dampland' characteristics by Endemic, as the habitat is unlikely to show signs of waterlogging except under extreme rainfall conditions.

The City of Kwinana's proposed target for the protection of all Conservation Category Wetlands (CCW) requires an appropriate setback for future urban developments within the subject site. A Wetland Management Plan for all CCW's that are retained as part of a subdivision is also required. A wetland management strategy for the Anketell precinct has been provided by Endemic (March, 2010) and outlines the necessary management strategies for Treeby Road Lake. Recommended management strategies include:

- Delineation of a suitable buffer according to Guidance statement 33 (EPA, 2005) for a minimum 50 m buffer distance around Treeby Road Lake (Figure 20)
- Maintenance of an appropriate cycle of seasonal inundation within the Treeby Road Lake
- Prevention of uncontrolled access to sensitive wetland and bush habitats
- Rehabilitation of the buffer and degraded portions of the Treeby Road Lake with local native species. Protection mechanisms between the buffer and proposed development to ensure the wetland and buffer area are not damaged during or post construction
- Weed treatment of bushland areas using suitable bio-safe herbicides

For more information, please refer to Wetland Management Strategy, Anketell Central Precinct (Lots 13 & 100 Treeby Road), prepared by Endemic (March 2010).

4.2.3 Contaminated Sites

The nearest contaminated site as shown on the DEC contaminated sites database is located at 80 Anketell Road, over 3.5km north west of the site (**Figure 6**). The hydraulic gradient of the ground water in the area means that there is no possibility this contaminated site will impact upon the development site in any way.



4.3 Surface Water

This LWMS has been produced to better understand surface runoff generation in 1, 5 and 100 year ARI events and guide future planning.

4.3.1 Surface Water Quantity

Regional surface water and drainage was assessed in the Jandakot District Water Management Plan (DWMP) (DoW, 2009). The Jandakot DWMP split the region into sub-catchments in order to calculate surface water flow into regional drains. In the DWMP the Anketell North Urban Cell was shown to be split into three sub catchments based on topographical information (**Figure A3.1 Appendix C**) with runoff either flowing to northern (CATR1B) or southern (CATP4A) discharge points and also an area of soakage in the north west. VDM identified the predevelopment flow paths and sub-catchments in **Figure 7**.

The peak elevation of 41mAHD occurs on Treeby Road approximately 250m south of Anketell Road. From here, the site falls towards Anketell Road at grades between 2.5% and 5%, while to the south the site falls to an elevation of approximately 16mAHD at a grades of approximately 2.0%.

The Peel Sub P drain is a Water Corporation tributary open drain to the Peel Main Drain. It originates to the east of the study area and runs parallel to the southern boundary before heading south into the Peel Main Drain. The southern catchments of the study area drain via the Peel Sub P drain. Overflow discharge from the Treeby Lake also contributes to the open drain flow. There are no natural water courses within the development area. The predevelopment flow from the study area into the Peel Sub P drain was identified in the Jandakot DWMP (**Figure 4.3a Appendix C**) as being 0.030 m³/s and 0.060 m³/s for the 10 (10% AEP) and 100 year (1% AEP) events respectively. The values are calculated from the Longitudinal Sections and the increase in flow within the channel.

The Peel Sub R drain is located north of the study area and was identified in the Jandakot DWMP as the ultimate discharge point for the north sub-catchment of the site. The Peel Sub R Drain will also be the discharge point for the proposed Wandi Urban Development north of Anketell Road. The predevelopment flow into the Peel Sub R drain was identified in the Jandakot DWMP longitudinal sections (**Figure 4.2b Appendix C**) as being 0.13 m³/s and 0.17 m³/s for the 10 (10% AEP) and 100 year (1% AEP) events respectively (Anketell North Urban Cell contributes approximately 50% of the contributing catchment area and flow rates were halved). Total discharge rates north (LPD 2) are 0.065 m³/s and 0.085 m³/s for 10 (10% AEP) and 100 year (1% AEP) ARI events respectively.

The north eastern sub-catchments are fully infiltrated in the sandy soil with no discharge into bushland i.e. infiltrated within basins and swales in the post development scenario.



The above stated discharge flow rates are to be maintained in the post development my mitigating flows in compensation basins as per the Jandakot DWMP.

4.3.2 Pre Development Surface Water Flows

The pre-development flows for the site were estimated by VDM using the ARR Regional WA South West Rational Method (EA, 2001) coupled with a hydrological/hydraulic model XP-Storm. The following information was abstracted from the VDM report. Note that although LPD1 is mentioned in this section, no discharge from the LSP area will occur to LPD1 at post-development. We assumed that the north-western section of Anketell North Cell meets the pre-development requirements.

This was used to simulate runoff from design storm events in the catchment assuming runoff is proportional to slope, area, infiltration rates and a percentage impervious. Design rainfall for the hydrologic model has been determined based on Australia Rainfall and Runoff Intensity Frequency Duration (IFD) data for Jandakot. Hydrologic and hydraulic analysis has been undertaken with 1 (63% AEP), 5 (18% AEP) and 100 year (1% AEP) ARI storm events for durations between 15 minutes and 72 hours.

Sub-catchments and slopes were determined from Landgate contours and the detailed topographical survey of the Peel Sub P Drain. Based on this data, VDM identified 3 points at which surface water runoff will ultimately collect for either infiltration or discharge into regional drains. This supports the work undertaken by the Department of Water in the Jandakot DWMP. The points were termed; Legal Points of Discharge (LPD) in the VDM report:

- LPD 1: North western site boundary (total infiltration or "soakage")
- LPD 2: Anketell Road, approximately 190m south west of Treeby Road
- LPD 3: 3 x 600mm diameter culverts under Thomas Road

LPD 3 is located within the Anketell South Urban Cell (to be developed as part of a separate application), these properties are owned by the same parties and the drainage strategy for both Anketell North and South Cells are reliant upon each other due to the complex nature of flows with the catchment. Therefore, it is considered appropriate that LPD 3 be chosen as a comparison point for the pre-and post-development flow regimes.

The catchments considered as part of the VDM assessment are summarised below and illustrated in **Figure 7**:

• Catchment 1: A largely external catchment to the west of the site, draining to Sandy Lake. Overflow from Sandy Lake enters the Peel Sub P drain at the culverts under Thomas Road.



- Catchment 2: Extending from the north of the site to the topographic highs to the north west, north and north east. The catchment drains to Treeby Road Lake, with overflow discharging into the Peel Sub P drain.
- Catchments 3 and 4: Covering the topographic highs to the north east of the site and discharge into the Peel Sub P drain at its origin.
- Catchment 5: Extending across the north and centre of the site and includes the external eastern catchment of the Peel Sub P drain. Catchment 5 discharges into the culverts under Thomas Road, which is the legal point of discharge for the Peel Sub P drain catchment.
- Catchment 6: Includes the eastern portion of the site and is the largely flat external catchment to the east. Catchment 6 also discharges into Peel Sub P drain at the culverts under Thomas Road.
- Catchment 7: Incorporates the north eastern portion of the site and discharges to the north across Anketell Road under the Western Power easement.
- Catchment 8: The north western portion of the site and all runoff will be fully infiltrated

Catchment areas, time of concentration (tc) and pre-development flows were estimated and are summarised in **Table 3**. **Table 4** summarises the peak flow rate at each of the LPDs.

Table 3: Pre Development Catchment Runoff Calculations

			ARI Flows (I/s)					
Catch.	The second secon		1 Year		5 Year		100 Year	
ID	(ha)	(min)	Rational	XP-Storm	Rational	XP-Storm	Rational	XP-Storm
1	40.238	84.8	54	55	121	123	358	361
2	121.364	153.9	130	133	290	302	837	839
3	53.693	99.1	69	74	157	165	460	466
4	83.521	125.8	96	102	216	227	627	622
5	44.715	89.7	58	60	131	136	386	388
6	68.569	113.1	78	84	175	186	511	517
7	33.265	76.5	49	51	112	114	333	330
8	18.798	56.2	38	39	86	87	258	261

Table4: Summary of Predevelopment Legal Points of Discharge

Legal Points of Discharge	1-yr ARI Peak Discharge (I/s)	5-yr ARI Peak Discharge (I/s)	100-yr ARI Peak Discharge (I/s)
LPD 1	39	87	261
LPD2	51	114	330
LPD3	183	517	1,092



The Jandakot DWMP identified the predevelopment discharge rates in 10 and 100 year events (Section 4.3.1):

LPD 1 - Discharge: All events fully infiltrated

• LPD 2 - Discharge: 10 year: 0.065m³/s

100 year: 0.085m³/s

• LPD 3 - Discharge: 10 year: 0.180m³/s

100 year: 0.360m³/s

Comparison of the Rational Method calculations and the XP-Storm generated flow rates indicates the hydrologic model is producing peak flow rates very similar to those obtained through application of the recommended ARR procedures. However, comparison of the flow rate observed downstream of Thomas Road (the Legal Point of Discharge (LPD)) indicates the peak discharge from the hydrologic model is considerably higher than the 360l/s reported by the DoW in the Jandakot DWMP. As the modelling undertaken by the DoW has been calibrated against gauged stream flow data, it is considered appropriate that the loss parameters applied to the XP-Storm model be adjusted to achieve calibration with the peak discharge reported by the DoW. To achieve calibration to the DoW model, the proportional loss values of the hydrologic model were amended, as summarised in **Table 5**.

Table 5: ARR vs DoW Proportional Loss Parameters

Catch.	h. 1-yr ARI Proportional Loss		5-yr ARI Proportional Loss		100-yr ARI Proportional Loss	
ID	ARR	DoW	ARR	DoW	ARR	DoW
1	0.037	0.01	0.053	0.015	0.087	0.020
2	0.043	0.01	0.062	0.015	0.102	0.020
3	0.040	0.01	0.057	0.015	0.093	0.020
4	0.041	0.01	0.059	0.015	0.097	0.020
5	0.037	0.03	0.053	0.035	0.088	0.040
6	0.038	0.03	0.054	0.035	0.089	0.040
7	0.039	0.03	0.055	0.035	0.091	0.040
8	0.043	0.03	0.061	0.035	0.101	0.040

NOTE: ARR weighted coefficient values refer to those obtained using Australian Rainfall and Runoff Regional WA South West Method. DoW values refer to those required to achieve calibration to the peak flow rates reported in the *Jandakot Drainage and Water Management Plan* for the Peel Sub P Drain

The XP-Storm model was subsequently run for the 1-yr, 5-yr and 100-yr ARI events. Results of these simulations indicate the model is well calibrated to the DoW model, with a variation in pre-development peak discharge for the 100 year ARI event of only 2.3% (**Table 6**).



Table 6: Summary of Pre-Development Legal Point of Discharge

Legal Points of Discharge	1-yr ARI Peak Discharge (I/s)	5-yr ARI Peak Discharge (I/s)	100-yr ARI Peak Discharge (I/s)
LPD 1 Soakage Area	27	50	103
LPD 2	39	72	145
LPD 3	80	168	371

NOTES: LPD 3 is calibrated to the values reported in the *Jandakot DWMP*. No recorded data is available for LPD 1 and LPD 2, however the runoff coefficients adopted for these catchments are consistent with those applied for the calibrated LPD 3. LPD1 is a soakage area and flows to it will be infiltrated.

4.3.3 Surface Water Quality

Surface water monitoring was to be undertaken by JDA, however during the period of their engagement, there was no rainfall events resulting in the generation of surface water flows.

4.4 Groundwater

4.4.1 Groundwater Levels

JDA undertook predevelopment groundwater monitoring with several bores located throughout the local area and continued by VDM Consulting (**Table 7**). Groundwater flow direction is east to west with a gradient of approximately 0.003. **Figure 8** shows minimum groundwater levels across the study area in the autumn to early winter months (April-July). Typically, bores located near wetland features show groundwater to be within 0.7m of the surface in wetter periods.

Groundwater levels do not express great seasonal variability indicating there is an interconnection between localised perched water bodies and the underlying shallow aquifer. Localised perched water systems appear trapped between confined fine grained sand bodies and some lenses of clay. JDA investigations noted that during bore installation no clearly defined underlying confined layers were observed. Groundwater behaviour indicates that a combination of a drying climate (Endemic, 2010), recharge frequency, abstraction of groundwater in or near site investigated and declining regional groundwater levels are likely to control the replenishment and outflow patterns of the wetland systems located adjacent to the site.

The Wetland Management Strategy, Anketell Central Precinct (Lots 13 & 100 Treeby Road), by Endemic (March 2010) discusses the peak water levels and outflows from Treeby Road Lake and concludes that the combination of a drying climate and declining groundwater levels have likely reduced the frequency of any outflows from the Treeby Road lake to the Peel Drain (Endemic, 2010).



The Department of Water and Environmental Regulation (DWER) monitor and maintain long term water monitoring bores across the area. The closest DoW bores are Sites 11812632 and 61419711 (JE22C) located approximately 1.5km north east and on the eastern boundary of the site respectively.

Table 7: Groundwater Bore Data

	Location (GDA	Location (GDA Coordinates)		
Monitoring Bore	Easting	Northing	Casing (mAHD)	Depth (mBNS)
WAM5s	392819	6436201	29.26	12.00
WAM5d	392819	6436200	29.25	15.00
WAM6s	392948	6435906	29.14	12.00
WAM6d	392946	6435906	29.10	15.00
WAM7s	392498	6435094	34.57	18.00
WAM7d	392498	6435095	34.57	21.00
WAM8s	392718	6434838	21.51	5.00
WAM8d	392718	6434838	21.48	8.00
WAM9s	392002	6434770	18.58	5.00
WAM9d	392001	6434769	18.79	9.50
WAM10s	392545	6433942	19.37	5.00
WAM10d	392546	6433942	19.32	9.50
WAM11	392144	6435637	30.88	22.0
WAM12(s)	391937	6436182	14.79	4.00
WAM12(d)	391938	6436181	14.81	10.00
WAM13(s)	392021	6436000	15.60	4.00
WAM13(d)	392022	6436000	15.51	9.00
WAM14	392597	6433559	18.61	5.30
WAM15s	392571	6433790	18.19	4.30
WAM15d	392570	6433791	18.18	10.30
WAM16s	392117	6433764	16.66	4.30
WAM16d	392117	6433763	16.71	12.80
JE22C	392520	6434584	20.33	6.15
11812632	392887	6435694	24.44	9.00

From long term DoW data (1994-2014) the annual average maximum groundwater level (AAMGL) for the bore JE22C was calculated to be 17.965mAHD while the historical maximum was recorded on 16/10/1996 and reached an elevation of 21.399 mAHD.

In order to provide higher confidence with regards to drainage infrastructure a maximum groundwater level (MGL) has to be calculated. To this end, DWER's JE22C bore and JDA WAM



bores dataset must be used to determine the MGL to occur within the site. This is achieved by adding the difference between JE22C historical level and JE22C level recorded at "t" time to the JDA WAM bore levels recorded at "t" time (with "t" time being a date of +/- one month).

JDA WAM bores 5 to 13 were recorded between 2005 and 2007, while JDA WAM bores 14 to 16 were recorded between 2007 and 2009. To his end, one JE22C water level in each time period recorded within a month of the JDA bore's records is required to calculate the MGL.

Table 8 details the calculation while **Figure 9** provides a visual representation of the calculated MGL.

The infrastructure will be designed to provide enough clearance from the MGL.

Table 8: Calculated MGL (mAHD) for the JDA Monitored Data

Bore	Historical level recorded date	Level (mAHD)			
JE22C	16-10-96	21.399			
Bore	Recorded date for 2005-2007 time period	Level (mAHD)	Difference between JE22C historical level and "t" time level	Calculated MGL (mAHD)	
JE22C	30-09-05	20.99	0.409		
WAM5	27-09-05	20.06		20.469	
WAM6	27-09-05	21.08		21.489	
WAM7	27-09-05	18.97		19.379	
WAM8	20-09-05	20.06		20.469	
WAM9	26-09-05	15.8		16.209	
WAM10	26-09-05	17.37		17.779	
WAM11	27-09-05	13.72		14.129	
WAM12	27-09-05	14.15		14.559	
WAM13	27-09-05	14.13		14.539	
Bore	Recorded date for 2007-2009 time period	Level (mAHD)	Difference between JE22C historical level and "t" time level	Calculated MGL (mAHD)	
JE22C	05-09-09	20.509	0.89		
WAM14	11-09-08	16.81		17.7	
WAM15	11-09-08	16.71		17.6	
WAM16	11-09-08	15.19		16.08	

4.4.2 Groundwater Quality

Groundwater quality testing was completed by JDA Consultant Hydrologists (JDA). Results indicate that waters are mildly acidic to acidic with pH ranging from 3.5 (WAM15 (s)) to 6.5 (WAM6 (s)).



The pH tends to fluctuate seasonally and with groundwater levels. pH affects the amount of nutrients that are soluble in soil water i.e. nutrients for plant growth. Seasonal variation in pH was from 0.67 to 1.37 units at each bore. pH of waters from deep bores were closely related to those of the shallow bores. Many wetlands have near-neutral pH (approximately 7), but considerable variation in either direction occurs naturally and in diurnal cycles. Rainwater is naturally slightly acidic (as low as pH 5.5), due to dissolved atmospheric carbon dioxide, but the pH may be rapidly modified by chemical and biological processes once the water enters the wetland (e.g. carbonate buffering, photosynthesis) (DEC, 2013). In wetlands with little biological activity and few reactive minerals, the pH may remain mildly acidic.

Very low pH in wetlands is a cause for concern, as it may cause the mobilisation of toxic metals or other contaminants (DEC, 2013). Wetlands can also be acidified by acid sulfate soils. These soils contain acidity stored as sulfide minerals in permanently waterlogged sediments that, if exposed to the air by falling water levels, can result in generation of strongly acidic soils and waters that can potentially flow into receiving waters. In areas expressing highly acid groundwater values further acid sulfate soil investigation should be implemented if excavation is proposed. Future planning and engineering design across the study shall also pay careful attention to the groundwater levels and make efforts to maintain the predevelopment levels not discharging/exporting groundwater into receiving waters.

Salinity, or electrical conductivity (EC) (mS/cm) in all bores assessed generally increases with time to reach a maximum of 2.81mS/cm in WAM16 (d) bore. This latter bore is located at about 100m east from the Sandy Lake and is subject to study in the Anketell South Urban Cell Report. EC values estimate soluble salt content and can be elevated by fertilisers that can flow to low lying areas during rainfall events before percolating into soils and groundwater. The availability and concentration of salt in a wetland helps to shape its ecological character (DEC, 2013). The type and concentration of salts in a wetland has a very strong bearing on the wetland, and particularly on the life forms which will inhabit it. Wetland species are adapted to particular ranges and types of salts in their environment; some saline wetland species may rely on a high level of salinity to function. Wetland species are physiologically adapted to particular ranges or concentrations of salinity meaning that if these concentrations change too much or too rapidly, this can cause a decline in health and even result in mortality. Seasonally dry areas increase the concentration of salts in the soil and hence groundwater by evaporative processes and decreasing water volumes. This is a natural process but should be monitored. Excessive drying by future drainage shall be avoided.

Nutrients in groundwater are any substances that provide nourishment for the promotion of life. Generally, in regards to wetlands, the two main nutrients of interest are phosphorus and nitrogen. These nutrients influence the type and abundance of living things contained within the study area.



Nutrients are carried into the study area by water movements i.e. rainwater generated surface water flows and groundwater flows. The concentration of dissolved nutrients is elevated in groundwater due to uptake from soils and rocks. The greater the input of water then the greater the potential increase in nutrient levels. This leads to the requirement of a treatment train approach to promote a higher quality water reaching receiving waters. Export of nutrients can be regulated by implementing structural control systems to reduce discharge flow rates and hence reduce water level fluctuations.

The median of total Phosphorous was also reported to be relatively high as compared to the EPA targets (0.1 mg/L) for the Peel Main Drain and Serpentine River sites (0.135 mg/L). High phosphorus levels can be indications of past human or animal activity i.e. surface water runoff from developed areas, application of nutrients in agricultural management systems and animal grazing. The median filterable of Reactive Phosphorous were reported to be low. Ammonium as NH4-N concentrations across most of the bores is relatively low, normally below 1.0 mg/L. However bores WAM5 (s) and WAM7 (d) presented high concentrations to reach a maximum peak of 3.50 mg/L for the WAM5 (s) bore.

Nutrients assessed presented various trends with time. Nitrate occurs naturally in plants but levels can become elevated if the plants are affected by drought before decomposing and leaching with runoff. Often higher levels are expected with application of fertilisers (ammonia based) and animal grazing. Nitrite and Nitrate were generally low across all assessed bores. However, Nitrate concentrations for bores WAM 5, 6 and 7 are very high but with a decreasing trend over time. WAM6 (s) bore, which shows the highest concentrations, show a decreasing trend over time with the highest peak of about 86 mg/L during the early period of the monitoring program. Subsequent concentrations decreased to a low of about 20 mg/L to then increase with time to an approximate of 60 mg/L.

In general, nutrient concentrations present various trends with an overall decreasing value with time and substantial variability with depth. In Section 4.4.1 it was stated that there is evidence of localised perched water and shallow aquifer interaction. This appears to be the solute transport path from the localised perched to the shallow aquifer.

4.4.3 Groundwater Licences

According to a search of the Department of Water the Water Register website there are 8 licenses within the proposed LSP area (see Section 7.3 for details). This allows the extraction of 326,700kL of water from 13 draw points in the superficial aquifer. Groundwater licences will be transferred prior to the commencement of the UWMP.



4.5 Summary of Opportunities and Constraints

The geology within the investigated area mainly comprises sandy to clayey layers and groundwater levels are mainly found at about 4.0m deep below natural ground surface. This gives the opportunity for infiltration of stormwater at local (soakwell) and regional (basin) scale and minimizing/limiting fill required to provide sufficient clearance between finished lot levels and groundwater.

Groundwater quality assessment has shown that there is substantial variability in water quality with time and depth. Overall pH readings indicate that the waters are mildly acidic to acidic. Three bores WAM 5, 6 and 7 were detected to contain substantial concentrations of nutrients, particularly Nitrite-Nitrate and Ammonium.

Subsoil drainage will not be required as adequate separation between MGL and finished lot levels is provided naturally.

5.0 Water Sustainability Initiatives

Developments generally increase stress levels on the water resources available for that area. Better Urban Water Planning (WAPC) guidelines indicate that a development should sustainably manage and utilise the supply and usage of water within it. This LWMS includes strategies aimed at achieving a better management of water resources to reduce the impact that the development has on resources and the surrounding environment.

Water is an essential requirement and valuable resource for all developments and practical water conservation methods should be considered to maintain an appropriate efficiency of water consumption. Conservation methods should incorporate both the use of potable and non-potable water sources. There are several methods utilised in planning to achieve the Better Urban Water Management (WAPC, 2008) target consumption reductions discussed within this section. These techniques are adopted to have a similar reduction when used in industrial and school environments.

The Water Corporation promotes urban development criteria aimed at an overall reduction in scheme water use by the use of "Waterwise" devices and practices. These management systems are used internally or externally to the property and operate much the same as traditional methods but have a lower percentage of water use.

5.1 Water Conservation

A large proportion of the total water used within a development is in the home. The State Water Plan 2007 (Government of Western Australia, 2007) has set a target for domestic use of scheme water of 100 kL/year per person. The Water Use in House Code (5 Star Plus: Dept of Housing and



Works, 2007) requires the use of water efficient appliances and fixtures in new homes and will be adopted throughout the development. Council requirements for efficiency will also be adhered to in conjunction with Australian Codes and Standards. Water conservation will be encouraged by providing educational material by means of advertising and information at the point of sale.

5.1.1 Fixtures and Fittings

As part of the BCA 5 Star Plus initiative water efficient fixtures and fittings will be mandatorily incorporated into the development from the design stage to Australian Standard Codes. Water sensitive urban design (WSUD) techniques implemented throughout the development will create an environment that encourages interest in water saving measures such as the use of water saving shower heads, taps and toilets, AAA rated appliances (washing machines, toilets, dishwashers), pressure reduction, drip reticulation, gardening practices.

The BCA 5 star Plus initiative implemented by the Government of Western Australia 1 Sep 2007 requires:

- All tap fittings other than bath outlets and garden taps must be 4 star WELS rated
- All showerheads must be 3 star WELS rated
- All sanitary flushing system must be a minimum 4 star WELS rated
- Outdoor pools & spas for class 1 dwelling must be provided with a cover to reduce evaporation
- The pipe from the hot water system or recirculating hot water system to the furthest hot water outlet must not exceed 20m or 2L of internal volume

The water use within a four member residence and the quantity of water that can be saved by using water efficient devices (based on *Domestic Water Use Study* (Water Corporation, 2003)) is given in **Table 9**.

Table 9: Domestic Water Consumption Rates

No	Appliances	Type of Appliances	Assumption	Water Consumption (kL/year)	Water Saving (kL/year)
1	Shower	Conventional shower head	One 7.5 minute shower	99	-
1	Head	AAA rated shower head	per person per day	77	22
2	Fluckies	Conventional single flush toilet	Three flushes per	48	-
2	Flushing	Duel flush toilet	person per day	31	18
	Washing	Conventional top loader	One load per household	53	-
3	Machine	AAAA rated front loader	per day	15	38
		Conventional	16% of all water used in	32	-



4	Taps	Water saving	the home is used via taps	16	16
		Conventional Devices		232	-
Total		Water Saving Devices		138	94

(Data Source: Domestic Water Use Study, Water Corporation, 2003, and Household Water Use Calculator).

5.1.2 Rainwater Harvesting

As large percentages of potable scheme water are used externally for irrigating gardens, it is possibly the greatest opportunity to reduce total usage. Rainwater tanks retain runoff onsite to be used in dry periods. They also, in effect, work as a peak water retention device as the resident will release the flow gradually whilst reducing owner dependence on potable scheme water. Rainwater from roofs and other impermeable areas can be collected in rainwater tanks for future use. The water can also be utilised internally for toilet flushing etc provided suitable plumbing is provided. Rainwater tanks can be supplied upon request by the purchaser as an optional addition for the property but cannot be sufficiently relied on to effectively reduce run-off flow rates however, the developer should encourage the installation of such devices.

5.1.3 Water Landscaping

Water landscaping forms a large portion of water conservation strategy as successful approaches reduce the quantity of water required for irrigation and also reduce the total runoff. Landscaped drainage is located in lots, road reserves, rain gardens, drainage basins and any open space where possible and designed to meet the requirements of Liveable Neighbourhoods (WAPC, 2009a) and the council planning department. Any irrigation required should be from an appropriate source i.e. treated wastewater, licensed bore, rainwater harvesting.

The development will achieve water conservation through landscaping by planting drought tolerant indigenous species, reducing the area of lawn, increasing pervious areas, improving soil water holding capacity and, where irrigation is required, the installation of water efficient systems. Infiltration systems should also be incorporated to maximise use of high soil permeability onsite.

Indigenous vegetation has minimal or no irrigation requirements and should be planted throughout the development including within the road reserves and basins (provided fire protection is not jeopardised). Such plants also help to promote a natural ecological environment and minimise the introduction of alien species whilst offering a habitat for native species. Where irrigation of vegetated areas cannot be avoided, it should be restricted during the day as evaporation rates are at their greatest.

Road reserve vegetation shall be protected from vehicular damage by a kerb stone perimeter. The road gradient should also act to convey surface water directly into the entry points in an efficient manner to achieve rapid entry into infiltration drainage systems. Appropriate ground surfaces should also be chosen where possible to achieve higher infiltration and lower the evaporation rate



i.e. mulch, porous paving, gravel. Maintenance of landscaped areas should be easily achieved by incorporating access points. The plant species should also facilitate this with low requirements for irrigation and upkeep.

5.2 Lot Water Consumption

A typical four person family house without water saving measures uses 492kL/year: 232kL inhouse and 260kL outside. This equates to approximately 123kL/year per person which is greater than the State Water Plan target.

A four person family home that employs water saving measures uses only 225kL/year: 120kL in-house and 115kL outside. This equates to approximately 56kL/year per person well below the State Water Plan target and below the upper limit of the target.

Using the Water Corporation's Water Balance Tool, per person potable water consumption was calculated at 86kl/year. This is 14kl/year less than the target of 100kL/year per person potable water use set out in the State Water Plan 2007 (Government of Western Australia, 2007).

5.3 Water Supply Management

The Water Corporation has made provision for water supply to the Anketell (North) Cell in its planning for servicing the south-east corridor. The site is located within the Water Corporation's Thomson's Gravity Scheme. Preliminary investigations with the Water Corporation have resulted in a review of the current Water Corporation scheme planning. To service Anketell (North) a water supply will have to ultimately extend from the distribution mains required for the Wandi Cells north of the Anketell (North) cell. In addition to this an injection via an additional distribution main (diameter 700mm) from the west side of the Kwinana Freeway is required. Preliminary investigations suggest this distribution main would cross under the Kwinana Freeway near to the existing Peel Main Drain Crossing. Main Roads WA has confirmed that a crossing at Rowley Road is not feasible and Water Corporations preference is for a crossing south of Rowley Road. Ultimately the actual crossing location is to be determined by Water Corporation.

The internal water reticulation will be designed and constructed in accordance with normal Water Corporation standards. For more information regarding the reticulated water supply for the site, please refer to the *Cell 3 Anketell (South) Local Structural Plan Servicing Report*, prepared by Ewing VDM (dated January 2010).

5.7 Waste Water Management

The Water Corporation made provision for a reticulated sewerage scheme for the Anketell (North) Cell in its planning for servicing the south-west corridor. The site is located within the Water Corporation's "Thompsons Lake" sewerage catchment which is connected to the Bibra Lake Main



sewer that discharges into the Woodman Point Wastewater Treatment Plant. The Water Corporation advised servicing of Anketell (north) Cell would occur from the north.

Preliminary investigations with the Water Corporation have confirmed the establishment of 'four' prefunded pump stations as follows:

- (A) Type 90 Pump Station East of Kwinana Freeway
- (B) Type 90 Pump Station West of Kwinana Freeway
- (C) Type 10 Pump Station West of Kwinana Freeway, Southern area
- (D) Type 40 Pump Station East of Kwinana Freeway adjacent to Thomas Road

The entire Anketell (North) and (South) cells are proposed to be serviced from pump stations 'A' and 'D'. The northern half of the Anketell (North) cell will be serviced through a gravity sewerage system to pump station 'A'. The southern half of Anketell (North) and Anketell (South) will be serviced through a gravity sewerage system to pump station 'D' which will be pumped via a pressure main back up into the Anketell (North) gravity system which ultimately discharges into pump Station 'A'.

The preferred sewer pressure main route option from pump station 'A' is along Darling Chase up the main spine road and across into Mandogalup south of Rowley Road and then up along Barfield Road to Macquarie Boulevard via Jackadder Avenue.

All lots will be developed with a conventional gravity sewerage system of reticulation sewers located within road reserves. In some cases lot levels will need to be adjusted to service appropriately.

For more details regarding the servicing of the proposed development, please refer to *Cell 3 Anketell (North) Local Structure Plan Servicing Report* prepared by Ewing VDM (dated January 2010).



6.0 Stormwater Management Strategy

This LWMS addresses how urban surface and stormwater quantity and quality should be managed to protect ecological, socio-economic and cultural values. It will assist decision making ensuring structural and non-structural remedial measures in developments are undertaken in a cost-effective, integrated and coordinated manner within a close proximity to the guidance given in the Stormwater Management Manual for WA (DoW). The approach will also be consistent with the key design objectives of water sensitive urban design practices detailed in the previous sections.

6.1 Conceptual Management Strategy

Surface runoff water flows over the catchment and can potentially inundate a development by exceeding the water holding capacity and drainage infrastructure. This becomes a greater problem in and around Perth where shallow superficial aquifers can reduce the infiltration rate of soils that intercept surface water flow. Suspended particles and pollutants in carrier water often cause long term damage to drainage systems, groundwater and ecosystems. Developments decrease the effective permeability of the overall site, and hence, increase peak runoff rates, flooding and erosion potential. Efforts will be made to manage risk by disconnecting constructed impervious areas from receiving water bodies (preventing direct discharge) and by reducing the amount of constructed impervious areas (DoW, 2009). This will be achieved using basins and infiltration systems.

Surface water flows are to be managed at both lot level and development scale to maintain predevelopment hydrology by retaining or detaining surface water, and to infiltrate runoff close to source. Drainage is split into two categories, minor and major, based on capacity requirements of varying AEP events;

- Minor Drainage- rooftop guttering, underground pipes, rain gardens and swales
- Major drainage- specific road arrangements for overland flows, drainage basin reserves, overland swale systems, attenuation and infiltration areas

Minor drainage systems are designed to accommodate AEP events of a frequency up to 18% whilst major drainage is designed to convey stormwater from events up to, and including, magnitudes of 1% AEP events. Drainage systems are designed to attenuate the peak volume safely allowing time for slow release into the downstream network whilst offering water quality treatment prior to discharge. The release of water into receiving bodies should be at predevelopment rates and controlled by invert levels, orifice plates, riser pipes, weirs or similar infrastructure.

The design concepts for managing stormwater across the Anketell North Urban Cell are:



- Employ soakwells in lots to retain and infiltrate the 63% AEP event and avoid direct runoff
 to the street conveyance system; this will increase infiltration and detention periods whilst
 reducing peak flow rates
- Rain gardens long roads to infiltrate 63% AEP events
- Provide pipe systems within the road reserve to convey runoff for storm events up to the 18% AEP event to the basins and legal discharge points (when possible) (LPDs)
- Provide safe overland flow paths for the 1% AEP events to the basins and discharge points
- Retention/Detention: Provide adequate storage to attenuate post-development flows to predevelopment conditions and maintain the required free-board to finished lot levels
- Discharge to receiving environment: Provide an outlet to the nearest regional drainage line and ensure that flow rates and water qualities are within the design limits

6.2 Structural and Non-Structural BMPs

To maintain and improve water quality this development will use the treatment train approach to 'source control' pollutants using best management practices (BMPs) as detailed in the DoW report Stormwater Management Manual for WA (DoW, 2009). BMPs can be a cost effective means of reducing operation and maintenance expenditure post-development especially when utilising non-structural methods. BMPs are used in two forms; structural and non-structural.

The proposed development should employ a combination of the following BMPs at each level to achieve the required stormwater treatment;

Table 10: WSUD Elements, Scale and Ownership

Scale	Ownership	Best Management Practice: Water Quantity and Quality		
Lot	Lot owner	Soakwells Rainwater tanks and porous pavement where appropriate. Gardens and amended soils		
Street		Infiltration/vegetated roadside swales when possible. Rain gardens, Sediment traps		
Catchment	Local Authority	Compensating, storage and infiltration basins.		

The City of Kwinana offers advice on an extensive selection of Water and Energy Initiative BMPs that their residents can adopt throughout the household. The advice is made available through the council website and can be supplied to the new residents during handover.



6.2.1 Lot Level BMPs

- Soakwells are widely used for direct infiltration of the relatively clean runoff from roofs generated in frequently occurring events (up to the 18% AEP) especially in the free draining sand soils. Soakwells will be to CoK specifications
- Soil sampling is required to ascertain the phosphorus retention capacities and particularly that of any fill to be used
- Reducing areas of lawns that may require fertiliser and irrigation
- Minimise connected impervious areas to no more than 70% of the lot. Applications where impervious surfaces exceed 70% of the lot should only be considered where compensation measures are taken to reduce the amount of stormwater runoff generated
- Rainwater harvesting tanks shall be made available during planning and construction stages
- Education campaigns to increase residential awareness of pollutant control i.e. by using fertilisers correctly and using techniques for minimising stormwater runoff pollutants. Information is to be provided to new homeowners by developers and builders
- Inclusion of native planting suitable to Perth soil conditions in garden design and landscaping strategies

6.2.2 Street Levels BMPs

Treatment of storm runoff from road surfaces that potentially contain nutrients, heavy metals, hydrocarbons and other pollutants is paramount in WSUD. Grassed swales and bioretention measures will be used to promote settlement of suspended particulate matter and offer a degree of nutrient removal from carrier water and reduce eutrophication in the receiving bodies of water whilst improving the aesthetics of the development.

Infiltration/bioretention systems, such as rain gardens along roads, vegetated swales and leaky manholes, will be incorporated into road design across the development to assist in providing attenuation and temporary storage, critical to water quality treatment. Street sweeping will reduce particulate contaminants entering stormwater networks to improve the overall effectiveness of bioretention systems and reduce costs associated with maintenance.

6.2.3 Catchment Level BMPs

Catchment level BMPs are predominantly storage basins to improve water quality prior to any discharge into regional drains or infiltration. Detention basins are most effective when the contaminants are primarily particulate but removal of soluble (bio-available) contaminants, such as phosphorous and nitrogen, may also be achieved when retention times are sufficient and basins are vegetated. Rainfall events less than the 1% AEP will be conveyed to basins through rain gardens.

In general, bioretention areas in storage basins are required to constitute a minimum of 2% of the impervious connected area. The basins will also utilise high PRI materials in their design to



improve nutrient stripping. Source controls compliment basin and swale use by limiting the use of nutrient application through appropriate landscape design and plant species selection. The basins provide visual/landscape amenity and ecological diversity. In the case of linear storage basins, consideration should be given to vegetation to reduce aesthetic intrusiveness.

The LWMS assumes that drainage for the LSP can be accommodated in part while some runoff will exit the proposed LSP area to maintain the predevelopment peak flow rates at LPD2 and LPD3.

Some water from large storm events will be directed to Treeby Lake as per the predevelopment flow conditions. This will also improve the hydrologic regime of the lake by ensuring a continued water supply to the lake in a time of declining rainfall and groundwater. The *Jandakot Drainage* and *Water Management Plan* (DoW, 2009) identified the requirement for 31,500m³ of storage for the 1% AEP event to be provided across the development. The structures required to direct the water to the lake will be defined at the UWMP stage, however current planning identifies overland flow or pipe system as the likely method.

Note however, overland flow will most likely be facilitated by the basin overflow system i.e. weir or riser pipe/ orifice plate structures to allow flows once a set invert level is reached in low frequency events. Overland flow paths will require some protection from erosion i.e. rock lined swales. The road surfaces will also be used to channel surface water flows towards basins in the 1% AEP events.

6.2.4 Site Constraints and Structural BMP Selection

The primary requirement of stormwater management is to maximise infiltration through the use of structural source control BMPs. To identify the most appropriate source control BMPs, the following is required:

- Investigations to determine baseline water quantity and quality
- Site specific geotechnical and hydro-geological assessments to ascertain whether the site is capable of infiltrating the runoff generated primarily based on local soil types and conditions and ground water levels
- Subdivision layouts detailing streetscapes

The site conditions and constraints that must be considered (in addition to the efficiency of BMPs to reduce nutrient loads) prior to the selection of appropriate BMPs is summarised in **Table 11**.



Table 11: BMPs and Site Constraints

Structural BMP	Consideration
Infiltration (soakwells, porous pavements)	Ground water level and quality Soil types (i.e. permeability, phosphorous retention capacity, acid sulfate and contaminated zones)
Bio-retention	Groundwater level and quality Soil types (i.e. permeability, phosphorous retention capacity, acid sulfate and contaminated zones) Subdivision layout

6.3 Hydrological Modelling

To develop a relevant stormwater management strategy for the proposed development, hydrologic and hydraulic modelling have been undertaken for the catchment with existing and post-development scenarios. A computer simulated model was produced by Bioscience using XP SWMM software package to calculate runoff rates for different average recurrence interval (ARI) rainfall events. XP is a comprehensive package for dynamic modeling of stormwater by developing link-node (1D) and spatially distributed hydraulic models (2D) for analysis and design to aid in water resource management.

The XP model setup utilises topographical data to create an elevation base map or digital terrain map (DTM). The DTM is split into post development catchment boundaries based on topography and the local structure plan (LSP) as shown in **Figure 14**. The link and node details for the site are input manually to represent the real world (and proposed) drainage network onsite from information collected during site investigations and provided by the developer/ engineer. The runoff sub-catchments are each designated a landuse runoff coefficient and drainage node based on surface covering and geotechnical information i.e. sand, sandy clay, clay, grass, road. All links and nodes are joined together in a continuously branched drainage system with outfall points to match the proposed legal discharge points (LPDs) onsite. The software is capable of comprehensively modelling the hydrologic and hydraulic components of stormwater management systems to determine sub-catchments peak discharge flows and detention basin volumes required to manage surface water flows. The XP model was calibrated against the DoW and VDM predevelopment flow conditions.

Preliminary analysis of the development and its constraints are summarised in this LWMS and further detailed analysis will be undertaken as a part of the cell structure and UWMP. Data used as input into the hydrologic module of the XP model to generate runoff hydrographs for the subcatchments can be found in **Appendix B**.

6.3.1 Rainfall

Design rainfall for the hydrologic model has been determined based on Australia Rainfall and Runoff (ARR, IE 2000) Intensity Frequency Duration (IFD) data for Jandakot. Hydrologic and



hydraulic analysis has been undertaken with 63%, 18%, and 1% AEP events for duration between 30 minutes and 72 hours. The IFD data used in the modelling are tabulated in **Appendix B**.

6.3.2 Post Development Land Use Assumptions and Loss Models

Different soil types and land uses have different infiltration characteristics and runoff rates that have been factored into the model and calculations. Land uses for the post-development scenario have been extracted from the Local Structure Plan (Figure 2). The aerial images show the existing catchments are comprised of rural and bush land with predominantly sandy soils and have very little impervious surfaces. The proposed land uses in the post-development scenario include single and group housing residences, commercial and retail areas, a community purposes site, public open spaces (POS) and road reserves and result in increased runoff.

Catchments 7.1, 3.4, 4, 2.1, 5.1, 5.2, 1 and 6 are external to the North Anketell development and are not to be developed and runoff will remain the same as predevelopment rates except for catchment 3.1 (size of the pre-development catchment 3 being smaller at post-development).

Table 12 presents the initial (IL) and continuing (CL) loss values use in the modelling for post development.

Туре	IL	CL	CAT	Comments
Impervious urban	15.85	0.15 (proportional)	2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 7.2, 7.3, 7.4, and 7.5	Takes in consideration the 63% infiltration by raingardens
Pervious urban	15.86	6 (absolute)	2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 7.2, 7.3, 7.4, and 7.5	Takes in consideration the 63% infiltration by soakwells for the initial loss. ARR value was used for the absolute loss

6.4 Hydraulic Modelling

The sub-catchment hydrographs generated during the hydrologic modelling were routed through a hydraulic network representing the development in the hydraulic mode of XP-SWMM to ascertain the peak flow rates, flood levels and required peak storage volumes.

6.4.1 Drainage Flow Paths

In predevelopment conditions surface water flows overland either towards the soakage area (LPD1) and the northern discharge point (LPD2) or south to Treeby Road Lake and the Peel Sub P Drain (LPD3). The sandy nature of the soil across the study area resulted in high infiltration rates that, in frequent rainfall events, can have little or no notable runoff.



Note that we assumed that the northern western section of Anketell North Cell (located outside this LSP area) meets the pre-development requirement at LPD1. As such, no flow path to this discharge point was modelled in this LWMS.

Significant storage of 31,500m³ exists in Treeby Road Lake (see DoW Ultimate Drainage Plan 100 year events **Appendix C**). Results of predevelopment modelling indicate (**Figure 7**) that for all storms up to and including the 1% AEP event, no runoff is discharged from Treeby Road Lake. We maintained the same outcome at post-development. Some discharge will occur from Catchments 2.4 and 2.5. Note that catchment 2.7 will discharge into basin B2(4) As discussed previously, the structures required to direct the water to the lake will be defined at the UWMP stage.

Former pre-development catchment 3 is smaller at post-development (i.e. catchment 3.1) and therefore provide some mitigation of peak discharges and lowers slightly peak discharges at LPD3 (from 371 l/s to 363 l/s) (**Appendix B**). This slight difference in peak flow rate will provide some leeway to the Anketell South Cell development.

Catchments 7.4 and 7.2 consisting respectively of the community facility and the commercial area will discharge into basins that will discharge into LPD2 to maintain pre-development peak flow rate. The structures required to direct the water to the lake will be defined at the UWMP stage.

The remaining catchments will retain and infiltrate all runoff.

Development of the study area requires modifications to the existing surface elevations and land uses resulting in changes to the existing flow patterns. Increased post development surface water will be managed through the drainage network as described in Section 6.2. All devices are sized to maintain pre-development peak discharges. The alignment of the Peel Sub P Drain is to remain the same ensuring the flow within it supports the hydrologic regimes and maintains ecological habitats. Surface water flow paths, catchment names and basin locations for post development events are shown in **Figure 15**. Event plans for 63%, 18% and 1% AEP events within the LSP area are presented in **Figures 16-18**.

6.4.2 Soak Wells

Soak wells have been sized to capture and retain (at a minimum) the 63% AEP runoff from roof areas to promote at source infiltration within individual lots. A permeability of 2 x 10^{-4} m/s was used for sizing of the soak wells and based on a proposed development density for the site of R20, an average roof area for each lot of 200m² was used for each residence.

A summary of the possible configurations for the site is shown in **Table 13**



Table 13: R20 Soakwell Calculations for the Subject Site

Nominal Diameter	(mm)	1500	1500	1500	1800	1800	1800	1800	1800
Internal Diameter (n) Liner	1.5	1.5	1.5	1.8	1.8	1.8	1.8	1.8
Depth (m)		0.9	1.2	1.5	0.6	0.9	1.2	1.5	1.8
Allowable Roof Area	a (m²)	107	127	147	117	154	183	212	237
Storm	Rain-		LOCALITY	OF JANDA	AKOT ROC	OF/PAVEN	IENT ARE	A ABLE	
Duration	Fall		TO BE	DRAINE	BY VARI	OUS SIZE	SOAKWE	LLS	
(min)	(mm/hr)			1	1	1	1	1	
10	44.4	222	294	365	217	320	423	526	629
15	36.2	184	243	301	181	265	350	434	518
20	31.0	164	215	266	162	236	310	384	458
30	24.6	142	185	228	143	205	267	329	391
45	19.3	126	163	200	129	182	235	288	340
60	16.1	118	151	184	123	170	218	265	312
90	12.5	110	139	167	118	159	200	240	281
120	10.4	107	133	158	117	154	191	228	264
240	6.7	107	127	147	126	154	183	212	240
360	5.2	113	130	147	138	163	188	212	237
480	4.3	120	136	151	151	173	196	218	240
600	3.7	128	142	157	164	184	205	225	246
720	3.3	136	149	163	177	196	215	234	253
1080	2.6	159	171	182	213	229	246	262	279
1440	2.1	182	192	203	247	262	277	292	307
1800	1.8	204	214	223	280	294	308	322	336
Soakwells R	equired	2	2	2	2	2	2	1	1

6.4.3 Detention Structure Configuration

Detention basins are proposed across the Anketell Urban Cell (North and South). A summary of the basin volumes required is included as **Table 14**. The locations of the basins are shown in **Figure 15**.

Detention basins have been designed to have a maximum depth of 1.2m during the major 1% AEP event and to provide adequate freeboard to ensure the integrity of the top of bund (TOB) during a major storm event. Several of the basins have riser type structures to control discharge to predevelopment rates. Swales are to have a maximum depth of 0.5m.



Table 14: Detention Basin Summaries

Basin ID	Ground Level (mAHD)	Basin Surface Area (m2)	Invert Level (mAHD)	Basin Bottom Area (m2)	Max. Groundwater Level (mAHD)	Basin Total Depth (m) (inc. any freeboard)	Storage Depth (m)	Storage Volume (m3) (exc. freeboard)	Infiltration Rate (mm/s)	1% AEP Level (mAHD)	1% AEP Surface Area (m2)	Discharge Details	Freeboard to 1% AEP Level (m)	18% AEP Level (mAHD)	18% AEP Surface Area (m2)	Discharge Details	Freeboard to 18% AEP Level (m)
B2(2/3)	27	2,476	25.8	1,250	16.25	1.2	0.88	1,478	200	26.68	2,108	No discharge	0.32	26.34	1,750	No discharge	0.66
B2(4)	17.8	2,686	17.3	2,100	16.75	0.5	0.47	1,116	200	17.77	2,649	To Treeby Lake, 0.3m diameter pipe,	0.03	17.367	2,174	0 L/s	0.433
B2(5)	20	2,959	18.8	1,600	17 - 18.5	1.2	1.11	2,466	200	19.91	2,843	To Treeby Lake, 0.5m pipe, 383 L/s	0.09	19.44	2,273	0 L/s	0.56
B2(6)	23.5	1,183	22.3	400	19	1.2	0.86	567	200	23.16	919	No discharge	0.34	22.59	551	No discharge	0.91
B3(1)	22	2,581	21.1	1,600	20.5	0.9	0.83	1,700	200	21.93	2,496	To Treeby Lake, 0.3m diameter pipe,	0.07	21.31	1,808	0 L/s	0.69
B3(2)	30.8	1,592	29.6	650	20.25	1.2	0.83	791	200	30.43	1,257	No discharge	0.37	29.83	798	No discharge	0.97
B3(3)	22.5	1,351	21.3	500	20.5	1.2	1.02	865	200	22.32	1,197	To Treeby Lake, 0.3m diameter pipe,	0.18	21.66	712	0 L/s	0.84
B7(4)	28.5	1,509	28.15	1,200	18.5	0.35	0.32	429	200	28.47	1,481	To LPD 2 0.3m diameter pipe 181L/s	0.03	28.3	1,328	41 L/s	0.2
B7(5)	29.4	1,669	28.2	700	19.5	1.2	0.71	707	200	28.99	1,292	No discharge	0.41	28.42	847	No discharge	0.98
B7(6)	26.5	2,300	24.9	1,400	21	1.6	0.54	916	200	25.5	1,991	No discharge	0.2	25.22	1,702	No discharge	0.48

Rain gardens, swale (when applicable) and soakwells will infiltrate rainfall from the 63.2% AEP at source



6.4.4 Detention Basin Outlet Structures and Rain Gardens

Basins and outlet structures have been designed and modelled to achieve a comparable LPD outlet flow with the predevelopment conditions. Surface water volumes and storage requirements were calculated to provide adequate attenuation within the basins. The outlet type, invert and outflow rate for each basin and LPD are given in **Table 14**.

Basins are to be grassed or vegetated with nutrient stripping plants and utilise soil improvement to offer an efficient treatment to surface water flows throughout the development.

Rain gardens will be located at POS entry and be at least 1% of the connected impervious area. Note that basins B2((5) takes most of the POS space; rain-gardens will therefore located along the roads at POS entry but also near house frontage or side to reach the 1% area. This will be discussed in the future UWMP(s). Rain gardens calculations are provided in **Table 15** and details in **Appendix D**.



Table 15: Rain Garden Calculations

		Dood	led out	led out	Infiltrated	Stored				
Catchment	Catchment Area (m²)	Road Reserve Area (m²)	Inflow Volume (m³)	Inflow Rate (m³/s)	Volume (m³)	Volume (m³)	Garden Area (m²)	2% Area	1% Area	Provided rain-garden area
B2(2)	146,000	47,300	605	0.168	215	391	1562	946	473	473 m2 (i.e. 1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B2(3)	20,000	5,800	74	0.021	26	48	192	116	58	58 m2 (i.e. 1% connected impervious area). There is still POS space if 2% required
B2(4)	93,100	29,600	379	0.105	135	244	978	592	296	373 m2 (>1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B2(5)	156,000	80,900	1036	0.288	368	668	2672	1618	809	404 m2 (<1% connected impervious area). Rain gardens at house frontage and sides (along roads) should be installed to at least the 1%.
B2(6)	29,000	10,200	131	0.036	46	84	337	204	102	143 m2 (>1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B3(1)	106,000	32,800	420	0.117	149	271	1083	656	328	457 m2 (>1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B3(2)	42,600	12,800	164	0.046	58	106	423	256	128	256 m2 (i.e 2% connected impervious area)
B3(3)	48,400	11,100	142	0.039	50	92	367	222	111	127 m2 (>1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B7(2)	46,126	2,882	37	0.010	13	24	95	58	29	Provided in CAT7.6
B7(3)	48,053	15,185	194	0.054	69	125	501	304	152	Provided in CAT7.6
B7(4)	45,600	29,800	381	0.106	135	246	984	596	298	343 m2 (>1% connected impervious area). If 2% required, rain gardens at house frontage and sides (along roads) should be installed
B7(5)	42,000	15,500	198	0.055	70	128	512	310	155	310 m2 (i.e 2% connected impervious area)
B7(6)	17,922	15,065	193	0.054	68	124	498	301	151	428 m2



CONCLUSION OF THE MODELLING: The Jandakot DWMP figures 4.2b & 4.3a (Appendix C) identified the predevelopment discharge rates for each LPD. All post development flows (except for the 63% AEP event at LDP 2) closely meet the predevelopment flows identified in the Jandakot DWMP and will ensure protection of infrastructure downstream of the development and will not inundate the Anketell South proposed development drainage system (**Appendix B**).

6.5 Flood Management

Managing storm runoff aims at preventing and/or minimising the risk of flooding. Road pipe drainage systems typically manage stormwater up to the 18% AEP event while the road reserves are designed to cater for overland flow up to the 1% AEP. The UWMP will further develop these concepts to an engineered design.

6.5.1 Local 63% AEP and 18% AEP Events

- Soakwells will collect and infiltrate roof runoff at source up to the minimum 63% AEP event
- Rain gardens will collect and treat rain fall from 63% AEP from roads
- A road pipe drainage system with leaky manholes will collect and convey flows up to the 18% AEP event, discharging into bioretention pockets and infiltration systems incorporated into the median of the collector roads and within the designated drainage reserves
- Flush kerbing will be implemented to allow sheet flow and reduce pipe lengths and the need for side entry pits where possible
- Bubble-up pits are proposed at the entrance of the bioretention systems where runoff cannot enter as overland flow. These bioretention pockets have been sized to infiltrate/retain up to the 1 year 1 hour AEP event from all connected impervious areas on the site
- The 63% and 18% AEP event plans are included as **Figures 16** and **17** respectively

6.5.2 Local 1% AEP Events

- The road kerb system will convey flows that exceed the capacity of the pipe drainage system in the 1% AEP event, discharging into the proposed detention basins. Detailed design of the drainage system will be undertaken during the UWMP to ensure that adequate freeboard is achieved from the local 1% AEP year event
- The road network provides flood storage as well as conveyance in the 1% AEP storm events
- Minimum habitable floor level to be a minimum 0.5m above 1% AEP flood levels to ensure public safety
- The 1% AEP event plan is included as Figure 18

Analysis at UWMP stage of flow velocities will determine scouring protection measures in the development and determine final floor levels to ensure they are minimum 0.5m above flood level. Surface flow velocity and depth checks will also be undertaken to ensure public safety during critical 1% AEP storm events.



6.6 Surface Water Quality Management

The DoW Jandakot Drainage and Water Management Plan indicates that the department is currently developing water quality targets and in the interim, treatment trains should be based on the methodology established in the Stormwater Management Manual for Western Australia. Surface water quality should be managed through:

- On site retention of 63% AEP event flows in soakwells and rain gardens
- Bioretention systems sized as 2% of the connected impervious areas
- Non-structural measures to reduce applied nutrient loads

6.6.1 Lot Drainage Systems

Whilst lot runoff may contain some gross pollutants, organic matter, sediments, nutrients and other contaminants, these are to be contained and removed by the lot drainage system. Contaminant loads are most effectively reduced by facilitating infiltration by;

- Soakwells to infiltrate clean roof runoff which would otherwise be discharged and come into contact with contaminants
- Lot levels are generally flat which reduces runoff rates and allows more time for the water to infiltrate and inhibits re-suspension of contaminants

The above measures assist in containing pollutants within lots and prevent the contamination of downstream receiving waters. Furthermore, nutrients may be reduced by appropriate use of fertilizers and using plants with a high nutrient uptake. These measures are to be promoted by providing educational material at the point of sale.

6.6.2 Development Drainage System

Surface runoff from roads will be directed through the development via the swale, rain garden, pipe and basin drainage network. The pipe network will convey water up to the 18% AEP event. Recent policies promote stormwater treatment measures that are designed to treat the peak flow from the 63% AEP 1hour event. This would capture most minor and first flush events and will result in treatment of over 98% of the average annual stormwater runoff (DoE, 2004). Where practical, median infiltration/bioretention systems will be incorporated into the road reserve to promote at source infiltration.

To satisfy this requirement all flow from the 63% AEP 1hour event will be retained within the vegetated core of the infiltration basins. Bubble-up pits and side entry pits will be used to direct piped runoff into the vegetated area which efficiently remove sediments and thus aid in further nutrient reductions. In addition, the swales and entry grates will collect gross pollutants.



The swales and detention/infiltration basins are to be vegetated with local native species selected for their ability to take up nutrients as well as contain high PRI materials to aid in phosphorus removal. The landscape design and list of vegetation species will be provided in the UWMP.

In addition to structural controls, maintenance practices are equally important for maintaining the effectiveness of the stormwater quality system. Excessive vegetation should be trimmed and/or removed routinely to promote growth and continual take up of nutrients, including routine removal of sediments and vegetative material (e.g. turf clippings) from the drainage network and road surfaces that would otherwise ultimately end up in the basins. A detailed maintenance plan will be included in the UWMP however the developer is likely to undertake this work until an agreed handover date (or survival rate is achieved) with the local authority is reached.

6.7 Ecological Protection

As the urban landscape changes, increased peak surface water flows rates are generated that potentially impact receiving environments by causing erosion and increasing the period of inundation of vegetation. Management of this risk is essential in maintaining and improving current hydrological regimes and supporting biodiversity across the development. Protection shall be offered to ensure wetlands do not suffer negative impacts from drying out due to diverted surface flows and localised lowering of groundwater table.

As previously identified, predevelopment surface water flows generated in the northern portion of the study area drain to Treeby Road Lake prior to ultimate discharge at the southern LPD. Changes to the urban fabric will essentially increase flows to Treeby Road Lake and alter the current hydrological regime. Consultation with the authors of the *Wetland Management Strategy*, Anketell Central Precinct (Lots 13 & 100 Treeby Road) assisted in developing a flow management strategy that did not adversely affect the hydrology and ecology of Treeby Road Lake. The objectives of this management strategy consisted of:

- Ensuring the maximum depth of the lake does not increase by more than 10%
- Maximising infiltration of runoff to ensure the lake continues to be fed by groundwater
- Allowing the large ARI events to continue to enter the lake

Outlet structures of the detention basins have been designed such that the low flow culverts will discharge to either the pipe drainage network, or as overland flow into the Peel Sub P Drain. This satisfies the requirements that the small ARI events (<5 year) do not enter the lake.

Whilst it is acknowledged that directing water to the lake will change its current hydrology, the lake being replenished with water from large storm events will improve its inundation periods that have reduced due to the drying climate. Peak water levels in the lake will be controlled through its connectivity with the Peel Sub P Drain at Thomas road by the outlet structures.



As discussed in Section 4.2.2, a wetland management strategy has been developed for the Treeby Road Lake. For more details, please refer to *Wetland Management Strategy, Anketell Central Precinct (Lots 13 & 100 Treeby Road)*, prepared by Endemic (March 2010).

6.8 Disease Water Vector and Nuisance Insects Management

Mosquitoes breed in standing water in natural and man-made wetlands, as well as a range of water bodies and storage containers in urban environments. They can breed in fresh, brackish and saline water conditions and different mosquito species have different habitat requirements. To reduce health risks from mosquitoes, retention and detention systems are designed to ensure that between the month of November and May, detained stormwater is fully infiltrated in a time period not exceeding 96 hours.

The most effective mosquito management programs are integrated programs, involving more than just the application of chemicals to kill larval or adult mosquitoes. Appropriate land use planning is crucial for achieving adequate buffers between wetlands and residential and recreational land uses.

Direct methods, including physical control (such as source reduction by filling, draining or removing breeding sites, screening rainwater tanks, wearing protective clothing), biological control (such as adding fish to ponds), chemical control (the use of pesticides to kill mosquitoes and the use of personal repellents) and cultural control (such as planning outdoor activities to avoid mosquito activity times, or building screened outdoor living areas) are also important components of an integrated mosquito management program. Application of pesticides for mosquito control must be in accordance with the product label. Environmental approval may be required if mosquito management actions are to be undertaken in conservation areas.



7.0 Groundwater Management Strategy

Groundwater, much like surface water, must be assessed to show compatibility with planning policies for Western Australia and the City. The key groundwater strategy objectives are;

- Protection of infrastructure and assets from flooding and inundation by high seasonal groundwater levels, perching and soil moisture rise
- Management and minimisation of changes in groundwater levels during and following development
- Maintain and, if possible, improve groundwater quality during and post development
- Protection of groundwater dependent ecosystems from the impacts of urban runoff

7.1 Groundwater Levels

The groundwater levels are to be maintained at predevelopment levels by ensuring that runoff is infiltrated close to source for frequently occurring rainfall events. Discharge into receiving water bodies is to be restricted to predevelopment flows to ensure that potential groundwater recharge is maximised. A combination of WSUD techniques such as soakwells, rain gardens, swales and infiltration basins will offset declining ground water levels in the region and supplement any irrigation requirements.

Perched groundwater was identified in localised areas and shows interconnectedness within the shallow aquifer. Depth to perched groundwater is generally 1.5m and possibly recharges Treeby Road and Sandy Lakes. The average depth of groundwater at the site is adequate for the efficient application of soakwells. Imported and local free draining fill material will be used to ensure adequate separation between surface levels and groundwater to ensure effective infiltration in drainage areas.

Groundwater levels across the site are generally greater than 1.5m and sub soil drainage is not required. Bulk earthworks across the site will also increase the separation to groundwater. Applying a subsoil drains can affect the local groundwater dependent ecosystems and alter the hydrological regimes of receiving water bodies and will be avoided.

Infiltration structures will not intersect ground water and invert levels must be minimum 0.5m above AAMGL and will empty within the required 96hrs between May and November.

7.1.1 Groundwater During Construction

Groundwater levels are impacted on by construction activities i.e. localised drawdown from dewatering activities. With current depth to groundwater, the import of fill material and staged project works, there will not be equirement for deep excavation requiring dewatering.



7.1.2 Other Effects on Groundwater Level

Vegetation in the study area transpires water from both surface and ground resources and can be relied on as an efficient way of locally managing the groundwater levels. Leaves intercept rainfall and release water vapor whilst providing a large surface area for evaporation. Therefore the leaf area index (LAI) is an important feature when selecting plantings i.e. plants with large leaf surface areas. The root system is also fundamental to water uptake. The depth of water usually predicts how far the roots will "reach" to find water. Shallow rooted grasses thrive on shallow water tables and deep rooted vegetation have a further reach to deep groundwater. Owing to the high seasonal fluctuations of groundwater level on the development, a variety of root depth plants should be selected (20% deep rooted) i.e. grasses and native deep rooted perennial species.

7.2 Groundwater Quality

Downstream water regimes will receive surface water runoff and ground water that originate at the development. It is important that the quality of the water entering downstream receiving waters is comparable to the pre-development environment, including upstream ground water, and where possible improved such that the development does not trigger assessment levels and does not contribute to a decline in water quality.

Groundwater quality characteristics will be assessed against the Guideline Values from ANZECC ARMCANZ (former Ministerial Councils Australian and New Zealand Environment and Conservation Council & Agriculture and Resources Management Council of Australia and New Zealand) and The Department of Health. The Guideline Values represent the target values for groundwater quality for both short and long term in healthy environments.

Groundwater quality will be improved by the use of structural and non structural control BMPs to achieve target outcomes. This document aims to encourage infiltration at source where possible. This infiltrated water will enter underlying ground waters and may ultimately emerge and/or discharge further downstream in surface waters, such Sandy Lake. Whilst the soil profile may treat the infiltrated water and remove some nutrients through natural process, the use of PRI amended soils should be investigated in the UWMP. The locations of possible sources of nutrients are the swales and basins, POS areas, gardens and lot soakwells. The following measures can be implemented to ensure that the infiltrating water is treated to an acceptable water quality.

7.2.1 *Basins*

The vegetation species should be native, have a high nutrient uptake and should be able to survive in dry conditions. Vegetation should be trimmed and/or harvested routinely to encourage growth and nutrient uptake. Storage chambers and bubble-up pits, road medians and basins should be cleaned routinely to remove gross pollutants and sediments as they may contain



nutrients and other contaminants. Basins Iso to have high PRI material incorporated to aid in uptake of phosphorus.

7.2.2 POS

The POS areas will enhance the local environment by utilising native vegetation consistent with the local setting and minimum turf requirements (subject to fire management). Whilst natural vegetation will not require fertilisers, turf areas will. The amount of fertilisers can be reduced by using soils with high phosphorus retention capacities and using species with low water and nutrient requirements such as *Cynodon dactylon, Cynodon x, Cynodon transvaalensis, Paspalum vaginatum, Stenotaphrum secundatum* or *Pennisetum clandestinum* (Water Corporation, 2008).

7.2.3 Gardens

Owing to relatively dense development (range between R20 and R60) coupled with the latest trends in contemporary house designs, there is generally a decrease in the availability of gardens areas reducing the potential uptake of nutrients by vegetation. Where possible, the use of native vegetation and nutrient retaining soils in gardens, coupled with the responsible use of fertilisers should be encouraged. Information on garden fertiliser management shall be offered to residents by developers as a non-structural BMP to improve groundwater quality.

7.2.4 Lot Soak Wells

Soak wells receive direct clean high quality runoff from roofs with potential for storage and later use in and around the building. Roof runoff will be infiltrated by soakwells for frequently occurring events and recharge local groundwater (see Section 6 for soakwell requirements)

7.3 Groundwater Allocation

Increasing development and climate change have increased demand pressures on water resources. It is particularly relevant to Perth where a substantial portion of the potable water supply is derived from groundwater which, as a result of development and declining rainfall has experienced decreased replenishment. There is continual pressure on development to consider reductions in potable water consumption by replacing scheme water with non-potable water.

As per the Department of Water's Water Register there are currently 8 licences with 13 draw points registered across the Anketell North Urban Cell (**Table 16**). Total water allocation per annum is 326,700kL (see Figure 19). All allocation is from the Jandakot Mound 1. Irrigation is required over portions of the POS and school zones totalling 8ha and requiring approximately 60000kL based on a groundwater used for POS irrigation being restricted to no more than 7500kl/ha/year as per DoW requirements. This figure is likely to be a lot less as deductions of POS areas for basins have not been made.



Table 16: Groundwater Licences for the LSP Area

GWL Licence	Lot	Aquifer	Subarea	Allocation (kl/yr)	Drawpoint number	Expiry
GWL180329	Lot 30	Superficial	Jandakot Mound 1	68,000	2	19-12-24
GWL101078	Lot 32	Superficial	Jandakot Mound 1	10,350	2	06-06-26
GWL48228	Lot 34	Superficial	Jandakot Mound 1	19,950	1	05-05-26
GWL160839	Lot 100	Superficial	Jandakot Mound 1	8,000	1	27-11-26
GWL160331	Lot 38	Superficial	Jandakot Mound 1	30,000	1	01-03-26
GWL179454	Lot 39	Superficial	Jandakot Mound 1	61,150	2	10-12-24
GWL58529	Lot 41	Superficial	Jandakot Mound 1	9,200	2	19-02-27
GWL 48225	Lot 90	Superficial	Jandakot Mound 1	120,050	2	23-02-24



8.0 Subdivision and UWMP

This report aims to manage the study area following guidance from the Better Urban Water Management framework. To progress the application for subdivision an Urban Water Management Plan (UWMP) will be prepared. The main areas which require further investigation at UWMP stage include, but are not limited to:

- Continued compliance with the CoK and DoW design objectives and criteria
- Geotechnical investigation including an ASS soil exclusion assessment and management plan (if required)
- Determine the Phosphorus Retention Index (PRI) of the soils where swales and/or basins are to be constructed
- Detailed earthworks and stormwater management design including the size, location and design of public open space areas and integrated flood management capability
- The above investigations shall be used to refine the XP-Storm model to determine specifications of water storage, basin capacity, road drainage networks, roadside swales, off site discharge and associated scour protection
- Development of proposed WSUD elements to detail implementation
- Ascertain final non-structural water quality improvement measures and treatment trains to be implemented at a minimum of 1% of the connected impervious surface area
- The landscape management plan is to be developed to include aspects of water conservation strategies and stormwater management including the retention of existing vegetation
- Applications for a groundwater abstraction license should be lodged to secure irrigation
 water for the POS and well as for dust suppression and construction requirements as soon
 as possible to ensure water requirements are met
- Detailed monitoring and evaluation programs, targets for surface water quality, flows and levels that are to be maintained post development
- Construction management and management of subdivisional works (to ensure no impact on regional conservation areas, management of soil treatment, dewatering, dust, hazardous materials and waste)
- Ongoing management and maintenance requirements including the roles and responsibilities of each stakeholder including funding and maintenance arrangements
- Monitoring to provide updated data on groundwater level and quality. This will start upon approval of the LWMS.
- Sampling at discharge points to provide surface water quality results. This will start upon approval of the LWMS.



9.0 Monitoring Program

A pre and post development monitoring programme and contingency plan is designed to allow a qualitative assessment of water in the drainage catchment in line with the requirements set out regionally. The developer is to negotiate the monitoring programme with a suitably qualified and experienced provider of water sampling and analysis.

9.1 Pre Development Monitoring

JDA Consultant Hydrologists undertook initial groundwater and surface water predevelopment monitoring in May 2005- August 2007 (Appendix A). VDM Consulting continued the investigation with the installation of 9 monitoring bores and subsequent monitoring from October 2009-January 2010. Surface water across the study area and within the Peel Sub P Drain was not available for analysis during any of the monitoring periods. As discussed previously, in the absence of water quality data, surface water quality should be managed through:

- On site retention of 63% AEPI event flows
- Bioretention systems sized as 2% of the connected impervious areas, and
- Non-structural measures to reduce applied nutrient loads

9.2 Post Development Ground and Surface Water Monitoring

The objectives of post development monitoring centre on the potential impacts of the storm water management measures, such as infiltration and treatment of runoff water in soakwells, swales and detention basins, on ground water levels and surface and ground water quality within the development as well as on the downstream receiving environments. As such it is a specific objective that nutrient levels should not be increased as a result of urban development, and ideally should decrease after development.

9.2.1 Groundwater

Ground water levels are to be measured by means of a electronic ground water level dipper prior to purging for sampling quarterly, as well as in the months of September, October and November to capture peak groundwater levels. Parameters and trigger values are given in Tables 18 and 19. Triggers are to be set at median background value determined from pre development monitoring with the annual median parameter value determined from 4 sampling events per year to compare to the trigger value. Long term targets are set to ANZECC & ARMCANZ (2000) guidelines.

9.2.3 Surface Water

Surface water monitoring is to occur at the LPD at Thomas road, the entry of the PSPD into the site, and the drainage outlet from Sandy Lake. Monitoring is to occur on a quarterly basis and after first flush rains in May or June. Data loggers will be used at the LPD and Sandy lake to monitor flows and a gauge board is to be installed at Sandy Lake. Samples are to be taken if water is available. Parameters and trigger values are given in **Tables 17** and **18**.



9.2.4 Water Quality

Ground water samples, following purging at least five borehole volumes, are to be obtained by means of submersible pump for detailed laboratory analysis. An accredited laboratory is to be consulted to ensure that ground and surface water samples are taken, handled, packaged, stored, transported and delivered with an appropriately completed chain of custody, using the correct labels, container type with sufficient volume, preserved (if required), and to facilitate scheduling of laboratory analysis within stipulated holding times. Equipment used in the sampling process is to be decontaminated using Decon 90, a phosphate free detergent, followed by rinsing with laboratory grade distilled water on arrival at site and between sampling locations to reduce the risk of cross contamination.

Table 17: Monitoring Requirements

Monitoring	Locations/Sampling Sites	Sampling Frequency	Field Parameter	Laboratory Parameter
Ground Water	Existing monitoring bores: refer Figure 8	Quarterly: Jan, Apr, Jul and Oct In addition: Sep, Oct and Nov: peak ground water level	Ground Water Levels Surface	
Surface Water	Legal point of discharge (Thomas Road culverts) and at the entry point of the Peel Sub P Drain into the site. Drainage controls: Outlets at Sandy Lake	Quarterly: Jan, Apr, Jul and Oct In addition: May or Jun first flush	flows (record estimate) In situ water quality: pH, EC, DO, Turbidity	Nutrients: TP, FRP, TN, TKN, NH4, NO $_3$ and NO $_2$.

a1: water column nutrient concentrations and chlorophyll a shall be included for laboratory testing as an indication of the effectiveness of the drainage design to manage water quality impacts and off-site losses, and diffuse nutrient sources from catchment land use and runoff.

Monitoring of the Acid Sulfate Soils Management Plan and Section 5C Dewatering Licence.

Additional parameters to be monitored during surface and storm water management include:

- visual inspection (at end of summer before first flush and after winter) of stormwater management system and controls for erosion and debris and sediment built-up;
- vegetation and erosion in POS; and
- availability of water wise information and materials (water efficient fittings and appliances and gardens) to prospective buyers.

Review (and reporting to the CoK): six monthly (summer and winter) for 5 years immediately following development to ensure baseline conditions are not worsened by the development.

Laboratory analyses are to be undertaken by a certified National Association of Testing Authorities (NATA) accredited laboratory. Sampling is to be undertaken in accordance with Australian Standard AS/NZS 5667 series of water-quality-sampling guidance. Ground water sampling is to be undertaken in accordance with Australian Standard AS/NZS 5667.11:1998.



Table 18: Trigger Values

Parameter	Trigger Value
Nutrients	Surface Water
	Total Suspended Solids: measured as Turbidity: <5NTU.
	Total Phosphorous: 0.1mg/L.
	Total Nitrogen: 1.0mg/L.
	Ground Water
	(Monitoring locations to be established in UWMP)
	Total Phosphorous: No deterioration in median bore value;
	Total Nitrogen: No deterioration in median bore value;

Trigger values have been set, taking due cognizance of the ambient concentrations reported thus far, in accordance with the Healthy Rivers Action Plan (SRT, 2008), the Australian Drinking Water Guidelines (ANZECC, 2000), the Assessment Levels for Soil, Sediment and Water (DEC, 2003) and the Department of Health Reporting on Contaminated Sites Reporting Guideline for Chemicals in Ground Water.

9.3 Reporting

Reporting in a structure and format, to be agreed with the CoK and DWER, will be the responsibility of the developer. Reports for review by the CoK and DoW will compare monitoring results with target design and performance criteria to ascertain what, if any, further actions may be required, and will provide ongoing assessment of the suitability of monitoring and reporting plans and frequencies. Where a trigger value for contingency action has been reached, a more detailed report on the occurrence, its impact and proposed action to prevent recurrence is to be compiled.

Six monthly reviews of ground water levels and surface and ground water quality (summer and winter) are required post development. In addition, monitoring and reporting outcomes will be used to continually improve the proposed WSUD and amend, if necessary, the design for subsequent stages of development.

9.4 Contingency Plan

If in the assessment of performance compliance observational or analytical deviations are observed, an iterative approach shall be taken to ascertain the most appropriate contingency and/or remedial action to be taken. Where monitoring parameters reach and/or exceed trigger values, appropriate contingency actions as required will be initiated by further investigation such as additional sampling and analyses, or other as appropriate, to determine whether the breach:

- Is genuine, outside the natural variability of the parameter and signifies a real decline or is simply an isolated occurrence.
- May have been caused by external events.
- Was caused by failure of structural BMPs provided during sub-division works.



• Caused an impact on the local and downstream receiving environment together with an assessment of the impact.

The following contingency measures, in consultation with relevant authority, will address the majority of physical deteriorations that may occur:

- Identify/locate the source of water quality deterioration and remove/replace as appropriate. Prevent continuing deterioration with temporary controls.
- Remove/replace/repair existing structural control, provide/construct additional controls or modify/alter controls/procedures to prevent further and/or future deterioration in water quality.
- If, subsequent to the above deterioration in water quality continues, construction/operation management and maintenance plans and practices are to be revised and altered/modified if required.

The final monitoring program and actions to assess the hydrological impacts of developing the site, water quality triggers, reporting structures and formats and contingency plans are to be agreed with the CoK and DWER during the UWMP



10.0 Implementation Plan

10.1 Developer Commitments

The developer is committed to deliver the UWMP, in consultation with the CoK and DWER, and to subsequently develop detailed engineering designs for subdivision application.

10.2 Roles/Responsibilities and Funding

The key stakeholders are:

- Developer: Mammoth Nominees Pty Ltd and Well Holdings Pty Ltd and other land owners
- Department of Water
- City of Kwinana
- Water Corporation

Their roles, responsibilities and funding are summarised below:

Table 19: Key Stakeholders and Responsibilities

Organisation	Role/Responsibility	Funding
City of Kwinana	Assumes future long term responsibility for roads and storm water infrastructure including the ongoing operation and maintenance thereof subsequent to agreed handover by the developer.	Rates
Water Corporation	Assumes future responsibility for the potable water supply and sewerage infrastructure including the ongoing operations and maintenance thereof.	Rates
Developer: Mammoth Nominees Pty Ltd and Well Holdings Pty Ltd and other land owners.	Obtain approval of the UWMP over subject site Implement approved Acid Sulphate Soils and Dewatering Management Plans, and Taking Water and Disposal Licences during construction of subdivision works. Demonstrate that the proposed subdivision designs supportive of the UWMP can achieve the water quantity and quality objectives and criteria set by this document. Undertake post development monitoring, including the provision of appropriate monitoring locations, for a period of 2 years following sale of the last lot within the development. Utilise monitoring data to amend or provide BMPs to ensure that water quality objectives are achieved. Construct and subsequently maintain stormwater control measures until handover to the CoK.	Developer



10.3 Review

Subdivision approvals require a UWMP (largely an extension of the LWMS) to provide the detail to concepts included in this document, and implemented in the detailed engineering design and construction of the proposed development.

In addition to the above and in the event of non-completion of construction activities within 10 years of approval being granted then the local water management strategy will require review ensuring the contents remains relevant allowing updates to be made. The design objectives shall be revised to ensure that targets are consistently met. Similar boundaries shall be maintained to ensure the proposed development meets the specific drainage plan and that calculations achieve their intended targets and arising problems can be easily identified. The review shall be undertaken by competent persons and cover, but not be limited to, the following:

- Impacts of the development
- Design objectives
- Water management strategies
- Receiving water body management including the health of dependent ecosystems



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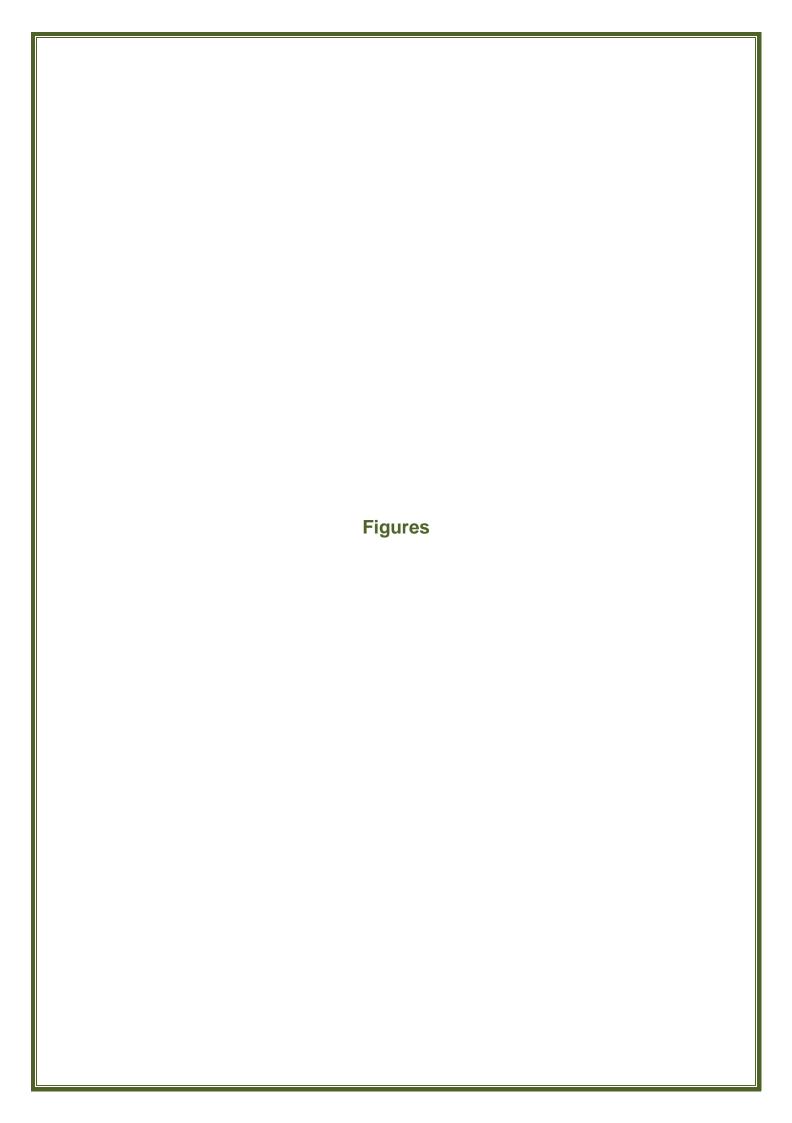
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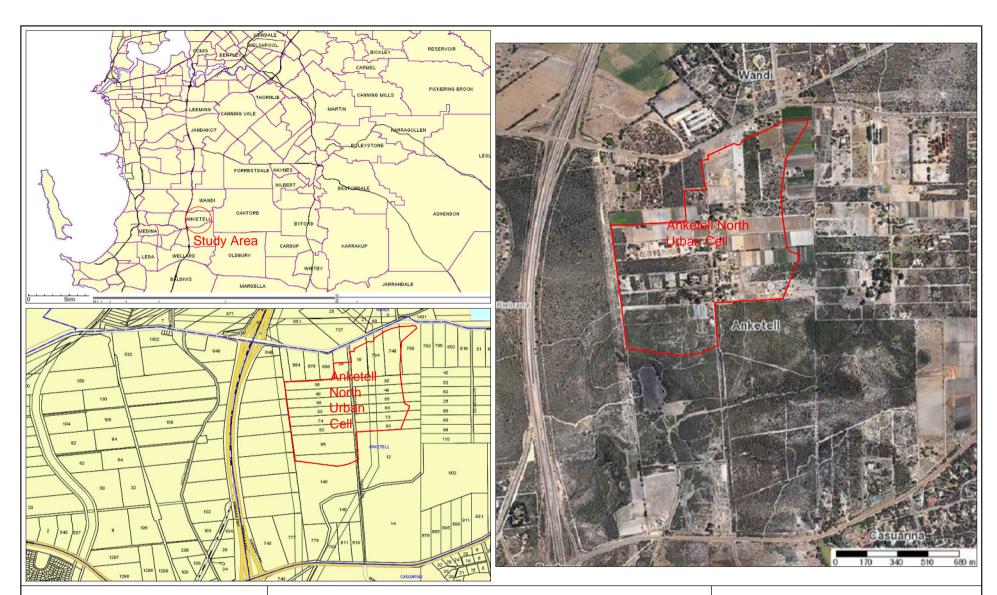
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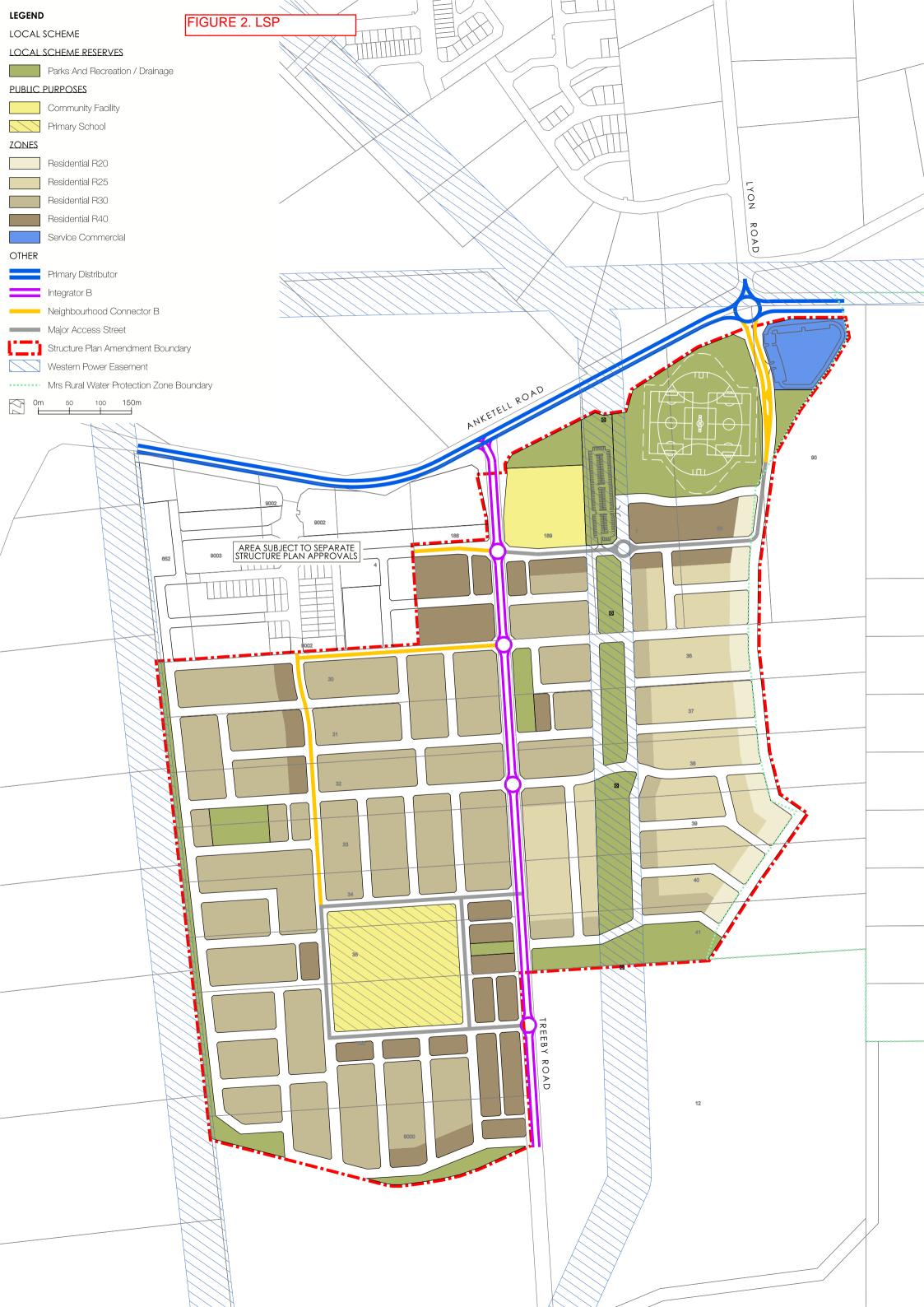
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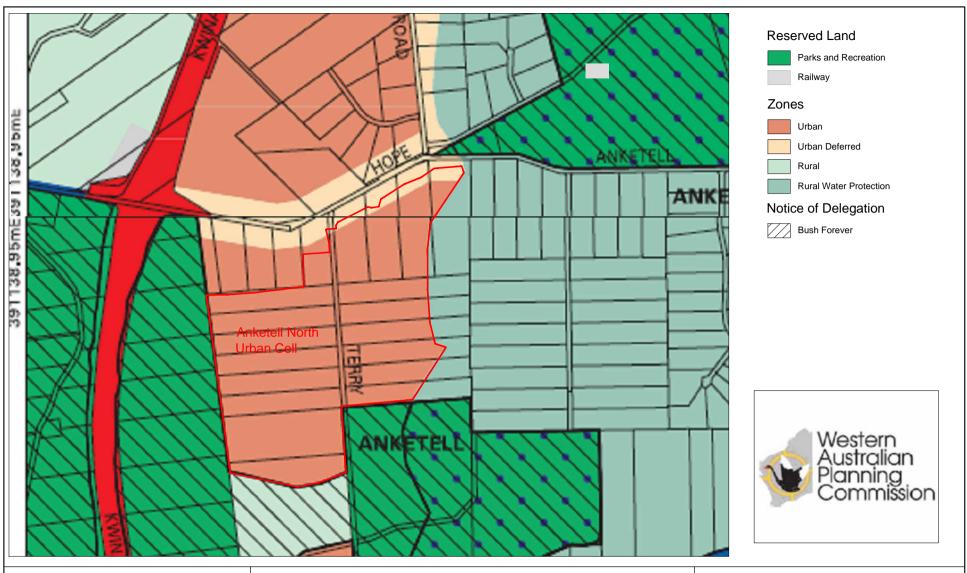
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Figure 1: Location Plan







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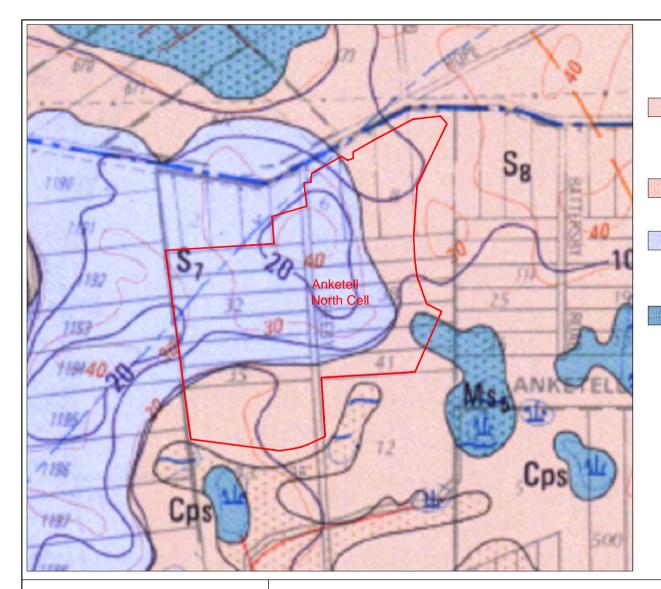
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Figure 3: Metropolitan Region Scheme Maps 24 & 28



ARMADALE GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

S8 - SAND - white to pale grey, yellow at depth, fine to medium grained, moderately sorted, subangular to rounded, frequent heavy minerals, of eolian origin

S10 - SAND - as S8 over sandy clay to clayey sand of Guildford Formation, of eolian origin

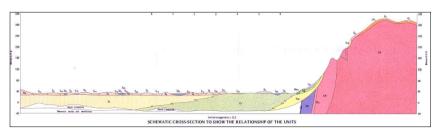
S7 - SAND - pale yellowish brown, medium to coarse grained sub-angular quartz, trace of feldspar, moderately sorted, of residual origin

MS5 - SANDY SILT - dark, brownish grey silt, with disseminated fine grained quartz sand, firm, variable clay content, of Lacustrine origin



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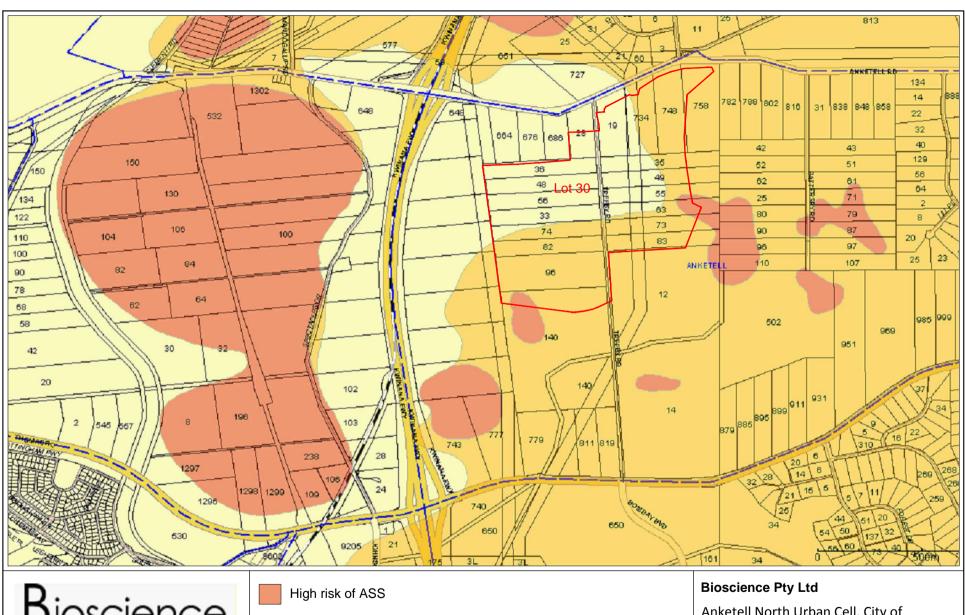


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Figure 4: Fremantle & Armadale Geological Survey Maps





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Moderate to low risk of ASS

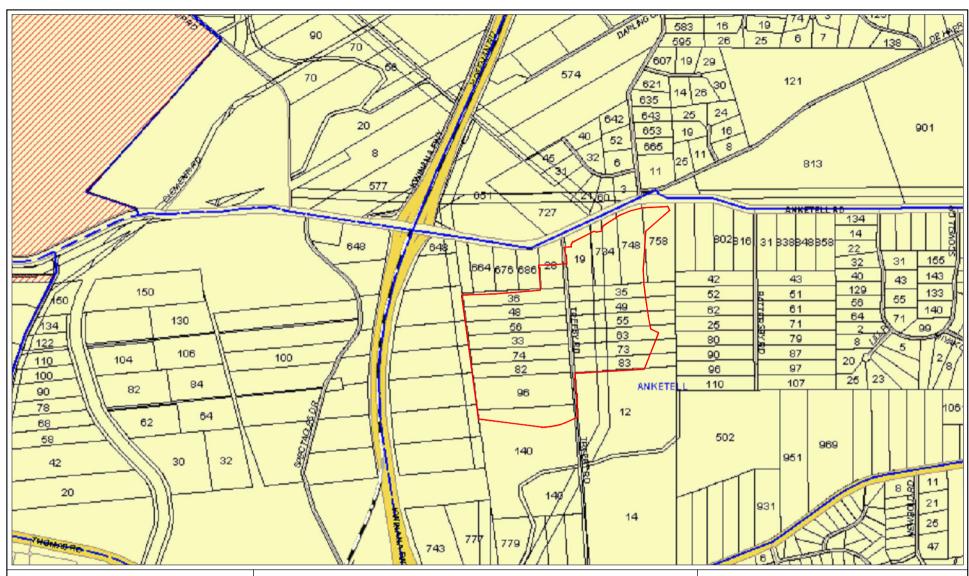
Low risk of ASS

Data Source: WA Atlas

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Figure 5: Acid Sulfate Soil Risk Map





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Contaminated Site

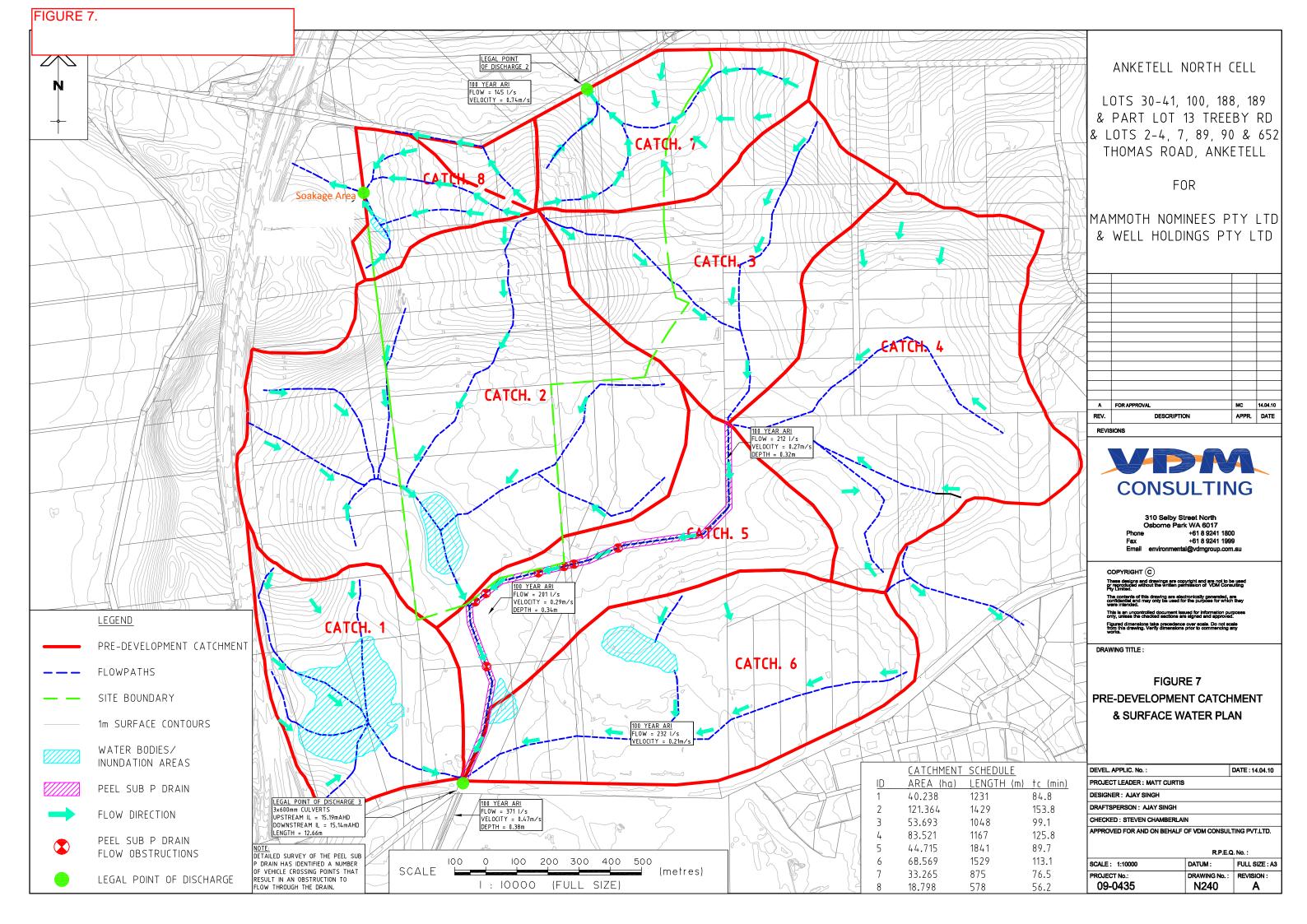
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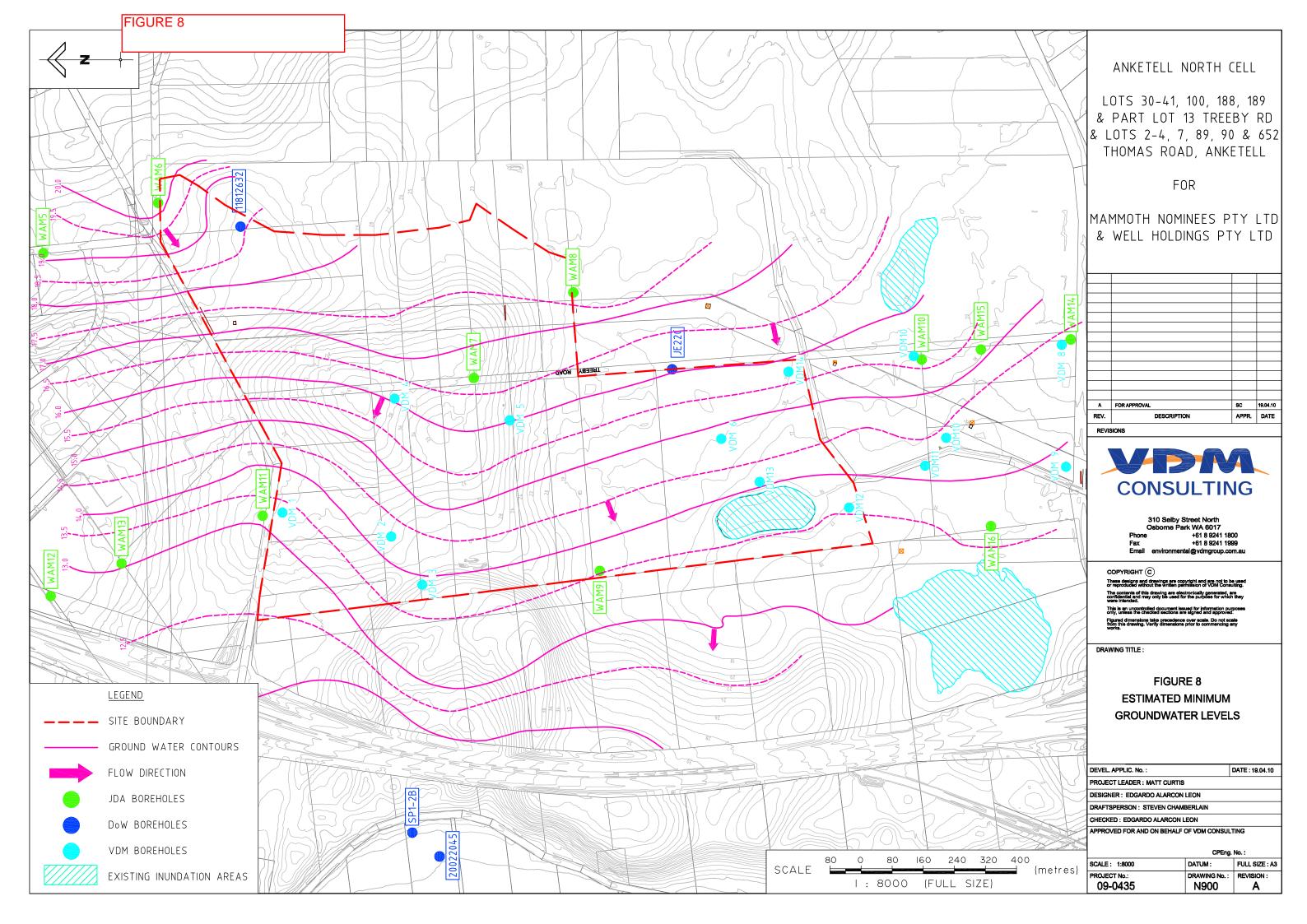
Bioscience Pty Ltd

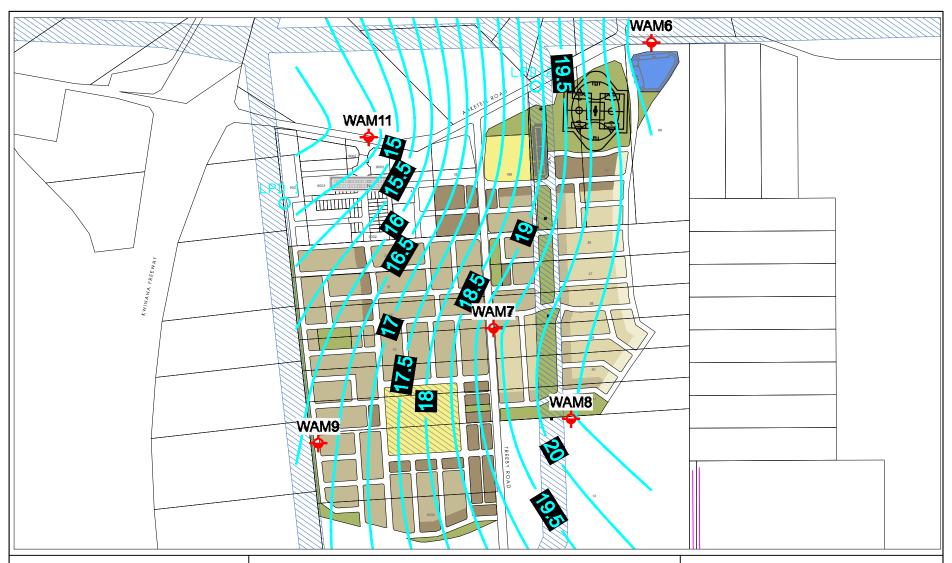
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Figure 6: Contaminated Sites









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Data Source: Client supplied drawings and calculations

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Figure 9: Calculated MGL Contours (0.5 mAHD interval)

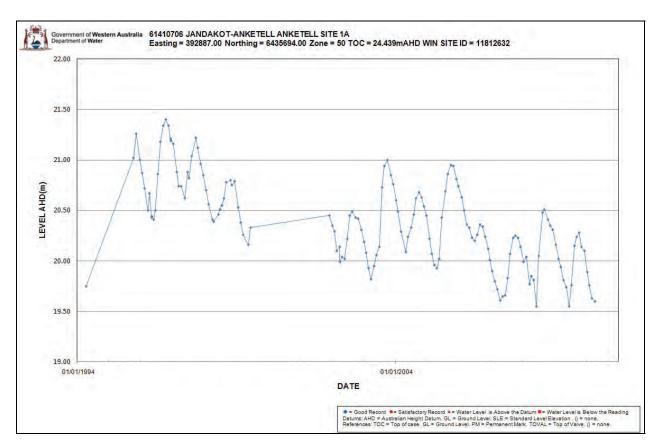


Figure 10 Groundwater Level Monitoring Plot – DoW Bore 11812632

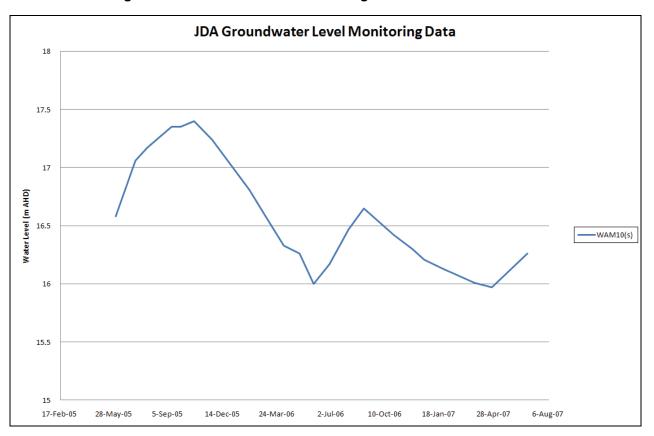


Figure 12 Groundwater Level Monitoring Plot – JDA Bore WAM10

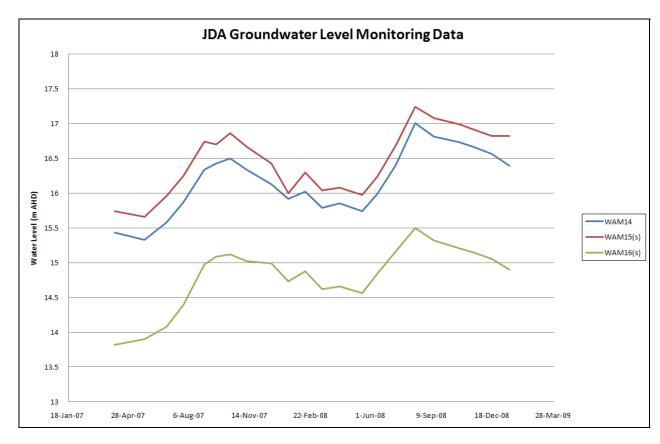


Figure 11 Groundwater Level Monitoring Plot – JDA Bore WAM14-16

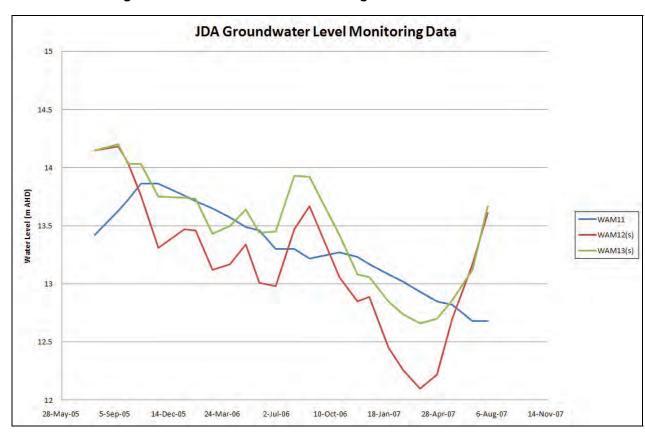
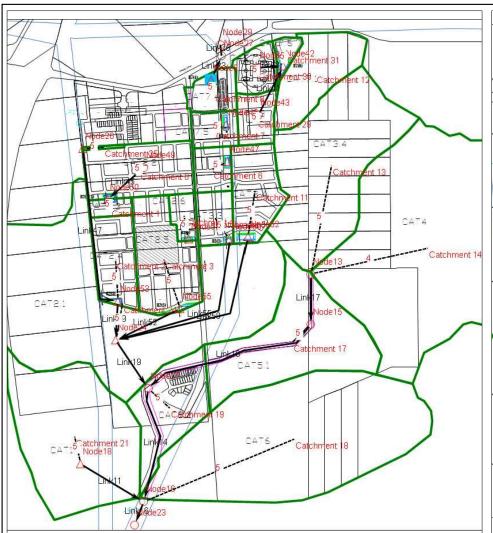
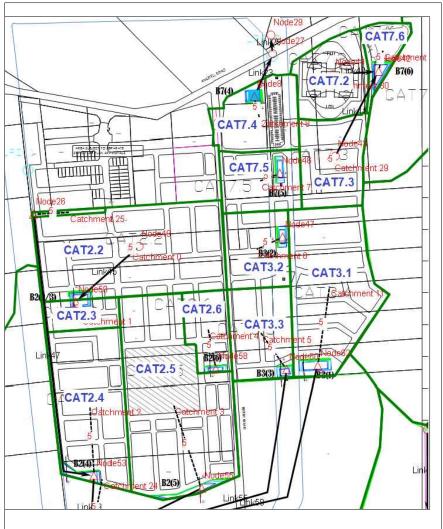


Figure 13 Groundwater Level Monitoring Plot – JDA Bore WAM11-13









488 NICHOLSON ROAD FORRESTDALE WA 6112 PD BOX 5466 CANNINGVALE SOUTH WA 6155 PHONE: (08) 9397 2446 FAX: (80) 9397 2447 EMAIL: bioscience@biosciencewa.com WEBSITE: www.biosciencewa.com Catchment Boundary & Number

> Modelled Water Flow Direction

Modelled Storage Basin

Modelled Node

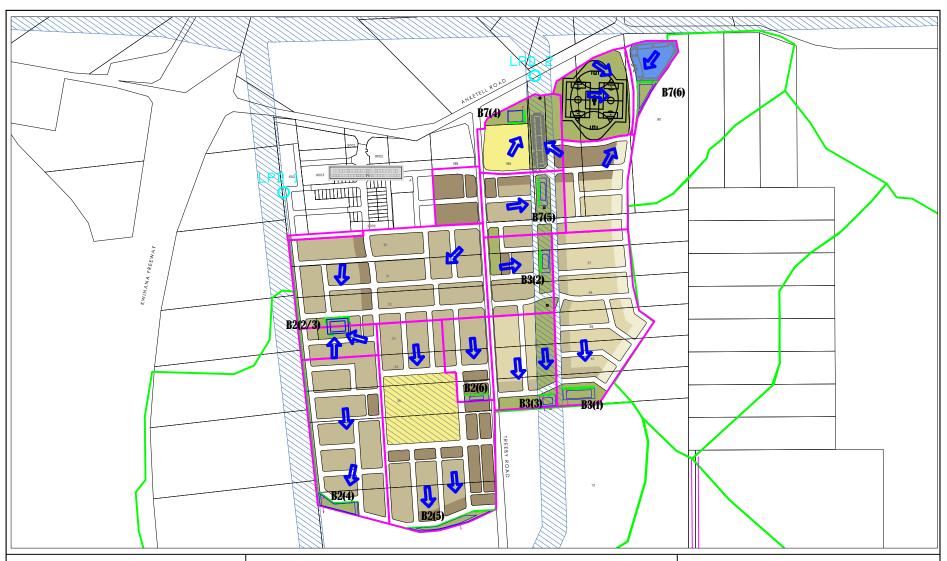
Data Source: Bioscience XP Model

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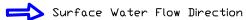
Figure 14: Sub-Catchments in XP Model





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Catchment Boundary & Number



Storage Basins (e.g. B2(5) means BAsin NAme)

POS (also include swale, western boundary strip)

Rain gardens at POS entry

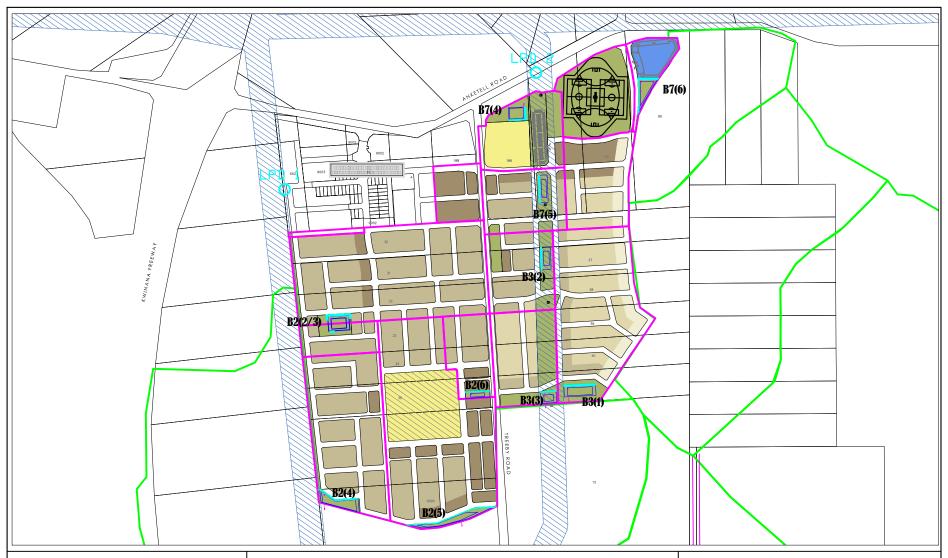
Data Source: Client supplied drawings

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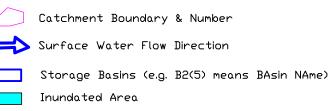
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Figure 15: Surface Water Runoff Post-Development and Basin Locations





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■ Rain gardens at POS entry

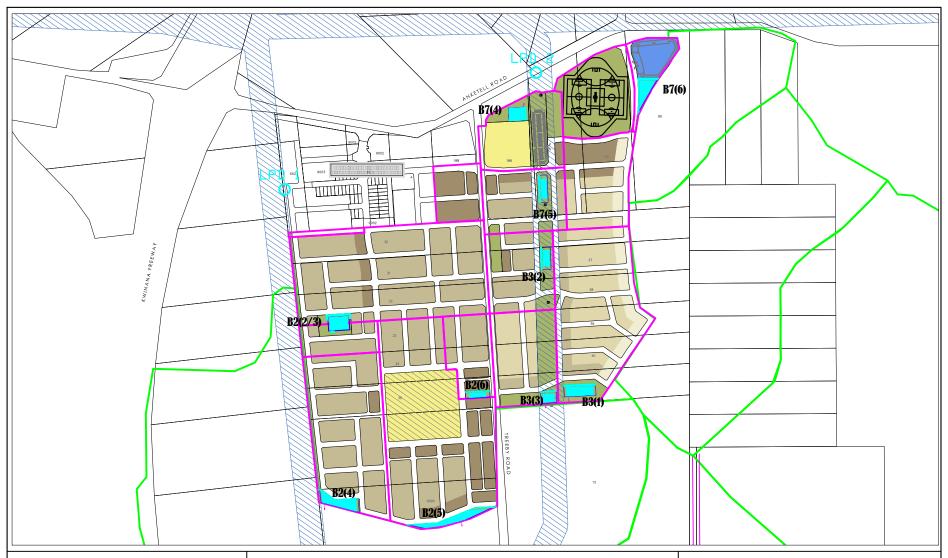
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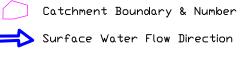
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Figure 16: 63% AEP Event Plan





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Storage Basins (e.g. B2(5) means BAsin NAme)

Inundated Area

Rain gardens at POS entry

Data Source: Client supplied drawings

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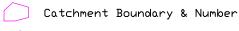
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Figure 17: 18% AEP Event Plan





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Surface Water Flow Direction

Storage Basins (e.g. B2(5) means BAsin NAme)

Inundated Area

Rain gardens at POS entry

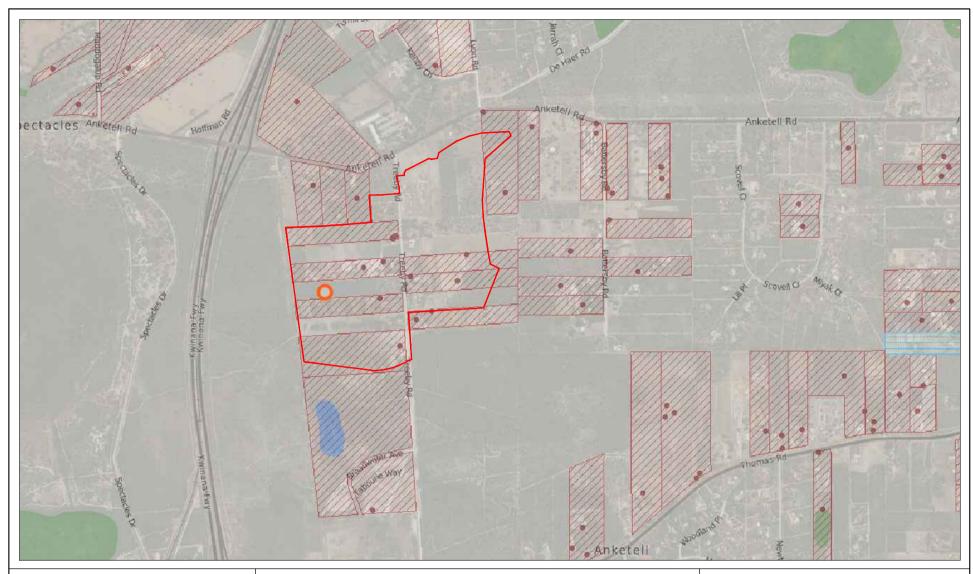
Data Source: Client supplied drawings

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Figure 18: 1% AEP Event Plan





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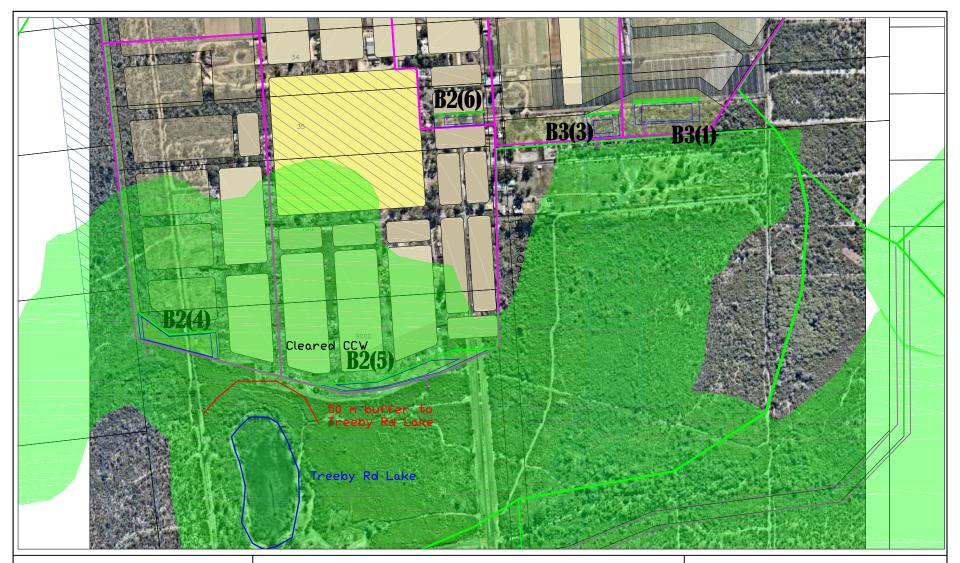
Data Source: Department of Water

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Figure 19: Groundwater Allocation





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CCW

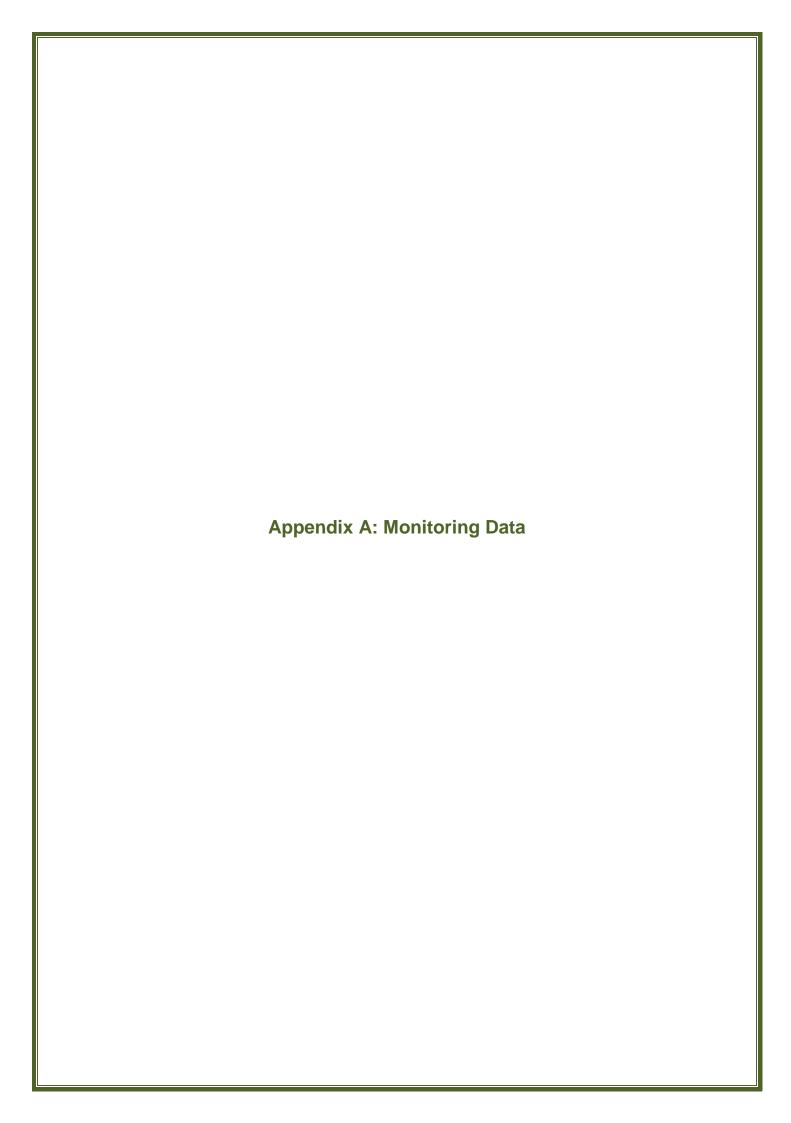
Data Source: Client supplied drawings

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Figure 20: CCW and 50 m Buffer to Treeby Rd Lake





Appendix A: Water Monitoring Data

Groundwater Bore Data

	Location (GDA	Coordinates)	Top of	Total
Monitoring Bore	Easting	Northing	Casing (mAHD)	Depth (mBNS)
WAM5s	392819	6436201	29.26	12.00
WAM5d	392819	6436200	29.25	15.00
WAM6s	392948	6435906	29.23	12.00
WAM6d	392946	6435906	29.14	15.00
WAM7s	392498	6435094	34.57	18.00
WAM7d	392498	6435095	34.57	21.00
WAM8s	392718	6434838	21.51	5.00
WAM8d	392718	6434838	21.48	8.00
WAM9s	392002	6434770	18.58	5.00
WAM9d	392001	6434769	18.79	9.50
WAM10s	392545	6433942	19.37	5.00
WAM10d	392546	6433942	19.32	9.50
WAM11	392144	6435637	30.88	22.0
WAM12(s)	391937	6436182	14.79	4.00
WAM12(d)	391938	6436181	14.81	10.00
WAM13(s)	392021	6436000	15.60	4.00
WAM13(d)	392022	6436000	15.51	9.00
WAM14	392597	6433559	18.61	5.30
WAM15s	392571	6433790	18.19	4.30
WAM15d	392570	6433791	18.18	10.30
WAM16s	392117	6433764	16.66	4.30
WAM16d	392117	6433763	16.71	12.80
SP1-2B	391329	6435252	14.90	17.50
JE22C	392520	6434584	20.33	6.15
JM42	393325	6437618	25.80	16.70
11812632	392887	6435694	24.44	9.00

JDA Lot 13 & 100 Treeby Road (April 2008)

Bore ID		Water Level (m AHD)													
Boile ID	30-May-05	5-Jul-05	27-Jul-05	9-Sep-05	26-Sep-05	21-Oct-05	23-Nov-05	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	Min.	Max.	Difference
WAM9(s)	14.43	14.96	15.12	15.4	15.46	15.51	15.34	15.01	14.85	14.62	14.44	14.3	14.3	15.51	1.21
WAM9(d)	14.76	15.33	15.47	15.75	15.8	15.86	15.66	15.36	15.19	14.97	14.78	14.65	14.65	15.86	1.21
WAM10(s)	16.58	17.06	17.17	17.35	17.35	17.4	17.24	16.94	16.81	16.57	16.33	16.26	16.26	17.4	1.14
WAM10(d)	16.56	17.05	17.16	17.34	17.37	17.4	17.23	16.94	16.79	16.58	16.39	16.26	16.26	17.4	1.14
SP1-2B	-	-	-	-	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.37	11.9	0.53
JE22C	-	17.84	17.98	18.18	18.24	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.81	18.24	1.43

Bore ID		Water Level (m AHD)													
Bole ID	29-May-06	28-Jun-06	2-Aug-06	30-Aug-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	22-Mar-07	23-Apr-07	28-Jun-07	Min.	Max.	Difference
WAM9(s)	14.27	14.15	14.35	14.54	14.46	14.37	14.32	14.13	14.06	13.98	13.9	14.04	13.9	14.54	0.64
WAM9(d)	14.59	14.53	14.69	14.86	14.88	14.72	14.62	14.53	14.41	14.33	14.27	14.39	14.27	14.88	0.61
WAM10(s)	16	16.17	16.47	16.65	16.42	16.3	16.21	16.13	16.07	16.01	15.97	16.26	15.97	16.65	0.68
WAM10(d)	16.23	16.21	16.4	16.62	16.46	16.29	16.22	16.15	16.07	16.01	15.97	16.26	15.97	16.62	0.65
SP1-2B	11.36	11.32	11.5	11.52	11.44	11.32	11.26	11.28	11.06	11	10.98	11.07	10.98	11.52	0.54
JE22C	16.8	16.77	-	17.37	17.27	16.86	16.83	16.56	16.61	16.53	16.68	16.7	16.53	17.37	0.84

JDA Wandi/Anketell South (April 2008)

Bore ID		Water Level (m AHD)													
Bore ib	27-Sep-05	21-Oct-05	23-Nov-06	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	29-May-06	28-Jun-06	2-Aug-06	30-Aug-06	Min.	Max.	Difference
WAM5(s)	20.07	20.08	19.99	19.85	19.82	19.65	19.54	19.53	19.47	19.46	19.62	19.58	19.46	20.08	0.62
WAM5(d)	20.06	20.08	20.01	19.83	19.77	19.64	19.55	19.51	19.45	19.46	19.59	19.57	19.45	20.08	0.63
WAM6(s)	20.97	21	20.98	20.87	20.69	20.59	20.46	20.36	20.5	20.67	20.32	20.4	20.32	21	0.68
WAM6(d)	21.08	21.15	21.12	20.97	20.88	20.72	20.6	20.52	20.27	20.37	20.45	20.45	20.27	21.15	0.88
WAM7(s)	19.52	19.62	19.54	19.09	18.89	18.66	18.63	18.51	18.4	18.09	18.23	18.12	18.09	19.62	1.53
WAM7(d)	18.97	19.04	18.64	18.07	18.82	17.49	17.35	17.55	17.7	17.82	18.01	18.01	17.35	19.04	1.69
WAM8(s)	20.15	20.15	19.96	19.6	19.44	19.23	19.13	19.05	18.99	19.11	19.2	19.35	18.99	20.15	1.16
WAM8(d)	20.06	20.05	19.87	19.53	19.4	19.21	19.09	19	18.97	18.93	19.2	19.26	18.93	20.06	1.13
SP1-2B	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.36	-	11.5	11.52	11.36	11.9	0.54
JE22C	-	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.8	-	17.04	17.37	16.8	18.2	1.4
JM42	22.09	22.22	22.17	22.01	21.95	21.82	21.67	21.62	21.58	21.48	-	21.07	21.07	22.22	1.15

Bore ID		Water Level (m AHD)													
Bore iD	6-Oct-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	23-Mar-07	23-Apr-07	22-May-07	28-Jun-07	26-Jul-07	30-Aug-07	Min.	Max.	Difference
WAM5(s)	19.55	19.52	19.42	19.28	19.18	19.09	19.02	18.98	19.04	19.07	19.17	19.38	18.98	19.55	0.57
WAM5(d)	19.52	19.52	19.42	19.31	19.18	19.09	19.03	18.99	19.02	19.08	19.18	19.4	18.99	19.52	0.53
WAM6(s)	20.34	20.32	20.31	20.1	19.97	19.87	19.79	19.76	19.74	19.74	19.87	20.16	19.74	20.34	0.6
WAM6(d)	20.47	20.37	20.15	20.23	20.07	20	19.9	19.82	19.84	19.85	19.96	20.22	19.82	20.47	0.65
WAM7(s)	17.98	17.84	17.55	Dry	18.35	17.55	18.35	0.8							
WAM7(d)	17.7	17.7	17.36	17.16	16.94	16.79	16.64	16.81	17.04	17.27	17.48	17.73	16.64	17.73	1.09
WAM8(s)	19.5	19.19	19.08	18.92	18.84	18.72	18.68	18.55	18.58	18.79	•	19.31	18.55	19.5	0.95
WAM8(d)	19.3	19.11	19	18.89	18.85	18.74	18.69	18.61	18.59	18.73	•	19.25	18.59	19.3	0.71
SP1-2B	-	11.44	11.32	11.26	11.3	11.06	-	10.98	-	-	11.26	-	10.98	11.44	0.46
JE22C	17.24	16.27	16.86	16.83	16.56	16.61	-	16.68	16.47	16.7	17	17.57	16.27	17.57	1.3
JM42	21.02	-	-	-	•	-	-	-	-	-	•	-	-	-	-

JDA Lots 1, 2, 3 & 17 Thomas Road

Bore ID		Water Level (m AHD)													
Bule ID	4-Apr-07	23-May-07	28-Jun-07	26-Jul-07	30-Aug-07	18-Sep-07	11-Oct-07	7-Nov-07	18-Dec-07	15-Jan-08	12-Feb-08	11-Mar-08	Min.	Max.	Difference
WAM14	15.43	15.33	15.58	15.87	16.34	16.43	16.5	16.34	16.13	15.92	16.02	15.79	15.33	16.5	1.17
WAM15(s)	15.74	15.66	15.96	16.25	16.74	16.7	16.86	16.67	16.43	16	16.3	16.04	15.66	16.86	1.2
WAM15(d)	15.24	15.22	15.44	15.75	16.25	16.34	16.43	16.24	16.02	15.75	15.81	15.61	15.22	16.43	1.21
WAM16(s)	13.82	13.9	14.08	14.39	14.97	15.09	15.12	15.02	14.99	14.73	14.88	14.62	13.82	15.12	1.3
WAM16(d)	13.64	13.7	13.93	14.28	14.8	14.91	14.94	14.84	14.74	14.48	14.67	14.41	13.64	14.94	1.3
SP1-2B	10.97	10.99	11.07	11.26	11.39	11.46	11.46	11.38	11.26	11.15	11.19	11.09	10.97	11.46	0.49
JE22C	-	16.47	16.7	17	17.57	17.85	17.92	20.33	17.76	20.33	17.36	16.74	16.47	20.33	3.86

Bore ID		Water Level (m AHD)													
Boile ID	9-Apr-08	16-May-08	10-Jun-08	11-Jul-08	11-Aug-08	11-Sep-08	23-Oct-08	17-Nov-08	16-Dec-08	13-Jan-09			Min.	Max.	Difference
WAM14	15.85	15.74	15.99	16.41	17.01	16.81	16.73	16.66	16.56	16.39			15.74	17.01	1.27
WAM15(s)	16.08	15.97	16.24	16.69	17.24	17.08	16.99	16.91	16.82	16.82			15.97	17.24	1.27
WAM15(d)	15.7	15.65	15.87	16.29	16.88	16.71	16.58	16.5	16.4	16.69			15.65	16.88	1.23
WAM16(s)	14.66	14.56	14.84	15.17	15.5	15.32	15.21	15.14	15.05	14.9			14.56	15.5	0.94
WAM16(d)	14.42	14.42	14.72	15.01	15.3	15.19	15.11	15.01	14.94	14.8			14.42	15.3	0.88
SP1-2B	11.13	11.12	11.08	11.4	11.69	11.58	11.58	11.56	11.53	11.43			11.08	11.69	0.61
JE22C	-	-	16.87	17.2	18.02	17.82	17.7	17.7	17.49	17.2			16.87	18.02	1.15

Anketell North DWMS

Bore ID		Water Level (m AHD)													
Boile ID	27-Jul-05	9-Sep-05	27-Sep-05	21-Oct-05	23-Nov-05	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	29-May-06	28-Jun-06	Min.	Max.	Difference
WAM11	13.42	13.63	13.72	13.86	13.86	13.76	13.71	13.65	13.57	13.49	13.46	13.3	13.3	13.86	0.56
WAM12(s)	14.15	14.18	14.04	13.76	13.31	13.47	13.46	13.12	13.17	13.34	13.01	12.98	12.98	14.18	1.2
WAM12(d)	14.12	14.15	14.08	13.91	13.55	13.49	13.47	13.01	13.12	13.26	13.14	13.12	13.01	14.15	1.14
WAM13(s)	14.15	14.2	14.03	14.03	13.75	13.74	13.73	13.43	13.5	13.64	13.44	13.45	13.43	14.2	0.77
WAM13(d)	14.08	14.13	14.08	13.91	13.68	13.64	13.62	13.31	13.36	13.47	13.33	13.33	13.31	14.13	0.82
SP1-2B	-	-	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.36	11.32	11.32	11.9	0.58
JE22C	17.98	18.18	18.24	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.8	16.77	16.77	18.24	1.47

Bore ID	Water Level (m AHD)														
Bule ID	2-Aug-06	30-Aug-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	23-Mar-07	23-Apr-07	22-May-07	28-Jun-07	26-Jul-07	Min.	Max.	Difference
WAM11	13.3	13.22	13.27	13.23	13.17	13.08	13.02	12.93	12.85	12.82	12.68	12.68	12.68	13.3	0.62
WAM12(s)	13.47	13.67	13.06	12.85	12.89	12.45	12.26	12.1	12.22	12.7	13.17	13.61	12.1	13.67	1.57
WAM12(d)	13.5	13.7	13.23	12.82	12.89	12.5	12.33	12.23	12.39	12.62	13.08	13.52	12.23	13.7	1.47
WAM13(s)	13.93	13.92	13.42	13.08	13.06	12.85	12.74	12.66	12.7	12.86	13.12	13.67	12.66	13.93	1.27
WAM13(d)	13.75	13.76	13.31	13	12.89	12.77	12.66	12.57	12.61	12.76	13.05	13.5	12.57	13.76	1.19
SP1-2B	11.5	11.52	11.44	11.32	11.26	11.3	11.06	11	10.98	10.99	11.07	11.26	10.98	11.52	0.54
JE22C	17.04	17.34	16.27	16.86	16.83	16.56	16.61	16.53	16.68	16.47	16.7	17	16.27	17.34	1.07

Adjusted AAMGL Calculations

Department of Water long-term bore JE22C MGL: 1994 = 18.768mAHD Department of Water long-term bore JE22C AAMGL: = 17.965mAHD

Bores across Anketell North Site:

JDA WAM11, WAM6, WAM7, WAM9, WAM8

DoW 11812632, JE22C VDM VDM 1-6, 12, 13, 14

Closest bore to JE22C is WAM8

Highest recorded groundwater level in WAM8: 20.06mHDD in September 2005

JE22C groundwater level in September 2005: 18.258mAHD which is above the AAMGL by 293mm

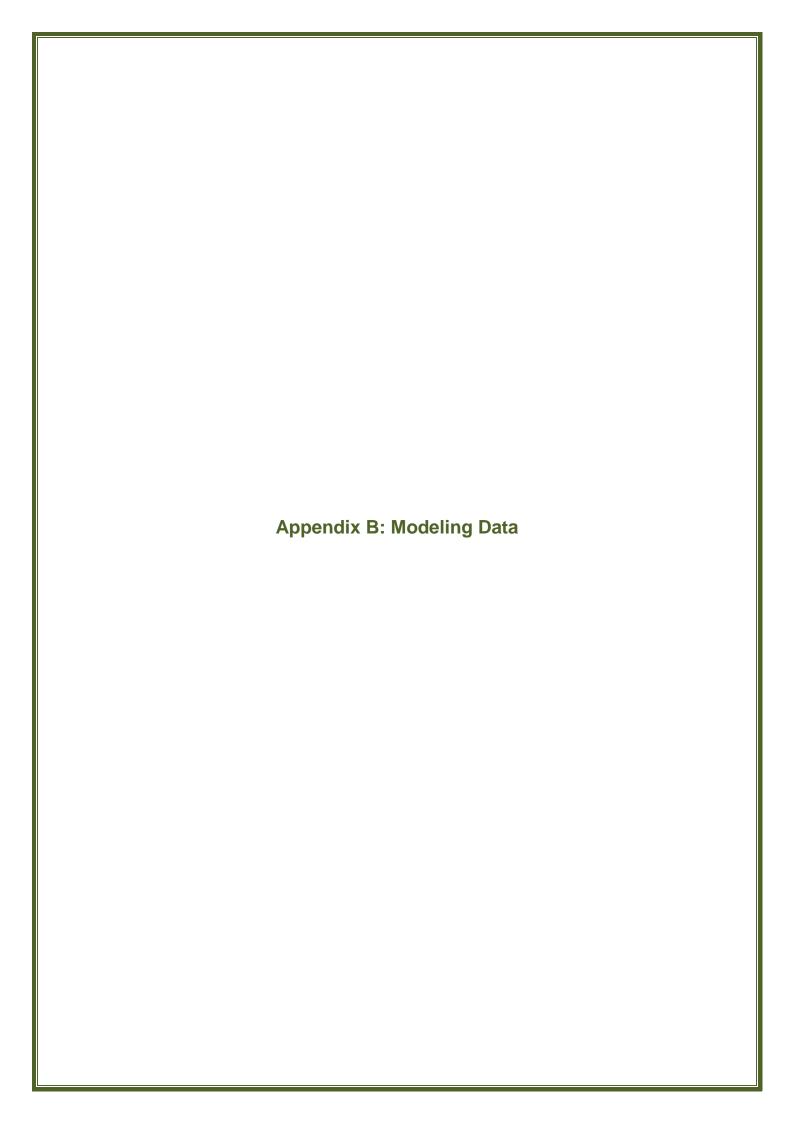
2005 recorded groundwater levels adjusted to AAMGL

	U		,	
WAM11	=	13.72 -	0.293	= 13.427 mAHD
WAM6	=	21.15 -	0.293	= 20.857 mAHD
WAM7	=	19.04 -	0.293	= 18.747 mAHD
WAM9	=	15.86 -	0.293	= 15.567 mAHD
WAM8	=	20.06 -	0.293	= 19.767 mAHD
WAM5	=	20.08 -	0.293	= 19.787 mAHD
WAM10	=	17.40 -	0.293	= 17.107 mAHD
WAM12	=	14.15 -	0.293	= 13.857 mAHD
WAM13	=	14.13 -	0.293	= 13.855 mAHD
WAM14	=	No 2005 reco	rded	
WAM15	=	No 2005 reco	rded	

To 2007 recorded levels

2007 MGL in JE22C: 17.78 17.965 - 17.78 = 0.185m

WAM14 = 16.5 + 0.185 = 16.685 mAHD WAM15 = 16.43 + 0.185 = 16.615 mAHD



Appendix B: Modeling Data

VDM Modeling Data

Rainfall

Design rainfall for the hydrologic model has been determined based on Australia Rainfall and Runoff (ARR, IE 2000) Intensity Frequency Duration (IFD) data for Jandakot. Hydrologic and hydraulic analysis has been undertaken with 1, 5, and 100-year ARI storms for duration between 15 minutes and 72 hours. The IFD data used in the modelling are tabulated below;

IFD Rainfall Intensities (mm/hr)

Duration (min)	1-yr ARI	5-yr ARI	100-yr ARI
15	9.1	15.2	29.9
20	10.3	17.2	33.1
25	12.3	20.1	37.9
30	14.5	23.3	43.1
45	16.1	25.8	47.0
60	18.7	29.7	53.1
90	20.8	32.7	57.8
120	24.1	37.5	65.3
180	30.9	47.5	81.1
360	35.8	54.8	93.0
720	39.8	60.8	103.1
1080	46.0	70.6	120.3
1440	50.7	78.6	134.8
1800	54.6	84.8	147.4
2160	57.8	90.4	158.5
2880	62.9	99.3	176.8
4320	69.6	111.2	201.7

Roughness Coefficient

Manning's roughness coefficients (n) used in the hydraulic model were:

- 0.014 for concrete pipes, and
- 0.030 for vegetated channels.

Additional sensitivity analysis was undertaken for vegetated channels with the Manning's n=0.055 to represent a situation where the channel becomes overgrown.

Tail Water and Boundary Conditions

The model extends 20m downstream of the site's LPD (i.e. the culverts under Thomas Road). As the Thomas Road culverts represent the control point for flows leaving the site, a free outflow tail water condition with normal depth of flow was employed.

Bioscience Modeling Data

Peak flow rates and hydrographs at both Pre- and Post-Development were generated with XP-SWMM using Laurenson as routing method.

Bioscience developed their own pre-development modelling to ascertain peak flow rates in the local point discharge (LPDs) at post-development level.

Rainfall intensities for the Perth area were downloaded from the Innovize website (former XP Solutions). Intensities are overall similar to the ones used in VDM modeling.

Similarly we used the same roughness coefficient and the same boundary conditions.

Note that VDM mentioned runoff coefficients in their modeling report; parameter which Laurenson doesn't used in its formula. We assumed that VDM used another routing method. Our calibration method therefore differs from them.

Pre-Development Model

Table A: Pre-Development Catchment Details

Catchments	Impervious areas (ha)	Pervious areas (ha)	Slope
1	0.5	39.17	0.025
2	1	120	0.025
3	0.01	39	0.01
4	0.24	84.18	0.01
5.1	0.04	30.06	0.0085
5.2	0.25	15.05	0.0098
6	0.5	66.1	0.008
7	0.5	32.5	0.015

Note that invert and spill crest levels, along with the bottom and surface areas of Treeby Road Lake and Sandy Lake were abstracted from the Jandakot UWMP written by DWER (former DoW).

Initial loss (IL) and continuing loss (CL)

Pervious Area

Initial loss and continuing loss at pre-development were the first parameters to be calibrated. Initial loss value (20 mm) was abstracted from the ARR while continuing loss was calibrated by assessing inflow from catchment 2 into Treeby Road Lake. We were looking at reaching a water level of 16mAHD (as calculated by DWER) under the critical 1% AEP event. An absolute loss of 6 mm/hr was determined.

<u>Impervious Area</u>

An Initial loss of 15.85 (63%AEP 1hr) for the impervious areas (roofs) was selected. It assumes that the impervious areas are connected to the pervious areas and as such the 63%AEP 1hr from these areas will infiltrate the pervious via existing soakwells for instance.

Table B: Modelling Run Results with determined IL and CL

Discharge Point	Peak Flow Rate at critical 1% AEP
LPD2	252 L/s (DWER: 145 L/s)
LPD3	751 L/s (DWER: 371 L/s)

As seen on Table B, peak flow rates for the LPDs were significantly above the ones found in the Jandakot UWMP. VDM also had the same issue. To this end, we decided to calibrate the B value of both pervious and impervious areas to obtain the adequate peak flow rates.

Table C provide the calibrate B values while peak flow rate results are provide in Table D.

Table C: B values

CAT	Impervious B calculated	Impervious B calibrated	Pervious B calculated	Pervious B calibrated
1	0.004420	CNR	0.167218	CNR
2	0.006338	CNR	0.299311	CNR
3	0.000605	0.021970	0.176262	0.415000
4	0.003159	0.021969	0.260587	0.370000
5.1	0.001254	0.010771	0.153790	0.153800
5.2	0.003230	CNR	0.106562	0.050000
6	0.004679	0.022216	0.232378	0.700000
7	0.004534	0.018537	0.150372	0.190000

CAT: Calibration not required

Table D: Peak flow rates at 1% AEP after Calibration

Discharge Point	Peak Flow Rate at critical 1% AEP
LPD2	144 L/s (DWER: 145 L/s)
LPD3	371 L/s (DWER: 371 L/s)

Results are as per DWER's predicted peak flow rates. However, when running the model for the 63% and 18% AEP, resulting peak flow rates were lower than DWER's (Table E).

Table E: Peak flow rates at 63% and 18%

Discharge Point	63% AEP	18% AEP
LPD2	16 L/s (DWER: 39 L/s)	37 L/s (DWER: 72 L/s)
LPD3	20 L/s (DWER: 80 L/s)	66 L/s (DWER: 168 L/s)

To solve this issue, we decided to calibrate the continuing loss for the lower events. After several runs, a value of 1.25 mm/hr (absolute) was selected for the 63% AEP runs and 3.4 mm/hr was selected for the 18% AEP runs. Results are provided in Table F.

Table F: Peak flow rates at 63% and 18% after Calibration

Discharge Point	63% AEP	18% AEP
LPD2	27 L/s (DWER: 39 L/s)	75 L/s (DWER: 72 L/s)
LPD3	80 L/s (DWER: 80 L/s)	165 L/s (DWER: 168 L/s)

The peak flow rate for the 63% AEP at LDP2 is still low, however, this had no impact for the post-development as we will try to target the 39 L/s. Not however that this peak flow rate at LPD2 is unlikely to be reached at post-development due to rain gardens and soakwells infiltrating the event.

Post-Development Model

This was extensively discussed in the content of the LWMS. As such, this section summarizes the most important point of the modeling. Note that parameters determined at predevelopment modeling are used at post-development modeling.

Table G: Pre-Development Catchment Details

CAT	Area (ha)	Impervious areas (ha)	Pervious (ha)	Slope Impervious	Slope Pervious
1	39.7	0.53	39.17	0.025	0.025
2.1	78.7	1	71.7	0.025	0.025

2.2	14.6	4.73	9.87	0.005	0.055
2.3	2	0.58	1.42	0.005	0.055
2.4	9.31	2.96	6.35	0.005	0.055
2.5	15.6	8.09	7.51	0.005	0.055
2.6	2.9	1.02	1.88	0.005	0.055
3.1	10.6	3.28	7.32	0.005	0.055
3.2	4.26	1.28	2.98	0.005	0.055
3.3	4.84	1.11	3.73	0.005	0.055
3.4	39.7	0.01	39.69	0.01	0.01
4	84.7	0.24	84.46	0.01	0.01
5.1	30.1	0.04	30.06	0.0085	0.0085
5.2	15.3	0.25	15.05	0.0098	0.0098
6	66.6	0.5	66.1	0.008	0.008
7.1	13.3	1	12.3	0.0288	0.0288
7.2	5.26	3.54	1.72	0.005	0.055
7.3	5.93	1.5	4.43	0.005	0.055
7.4	4.56	2.98	1.58	0.005	0.055
7.5	4.2	1.55	2.65	0.005	0.055

Urban catchments, please see Loss Parameters in Table H

Table H: Loss Parameters

Туре	IL	CL	CAT	Comments
Impervious urban	15.85	0.15 (proportional)	2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 7.2, 7.3, 7.4, and 7.5	Takes in consideration the 63% infiltration by raingardens
Pervious urban	15.86	6 (absolute)	2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 3.2, 3.3, 7.2, 7.3, 7.4, and 7.5	Takes in consideration the 63% infiltration by soakwells for the initial loss. ARR value was used for the absolute loss

We maintained these losses across all rainfall events.

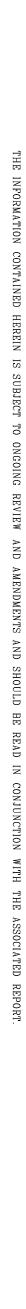
Final results are presented below.

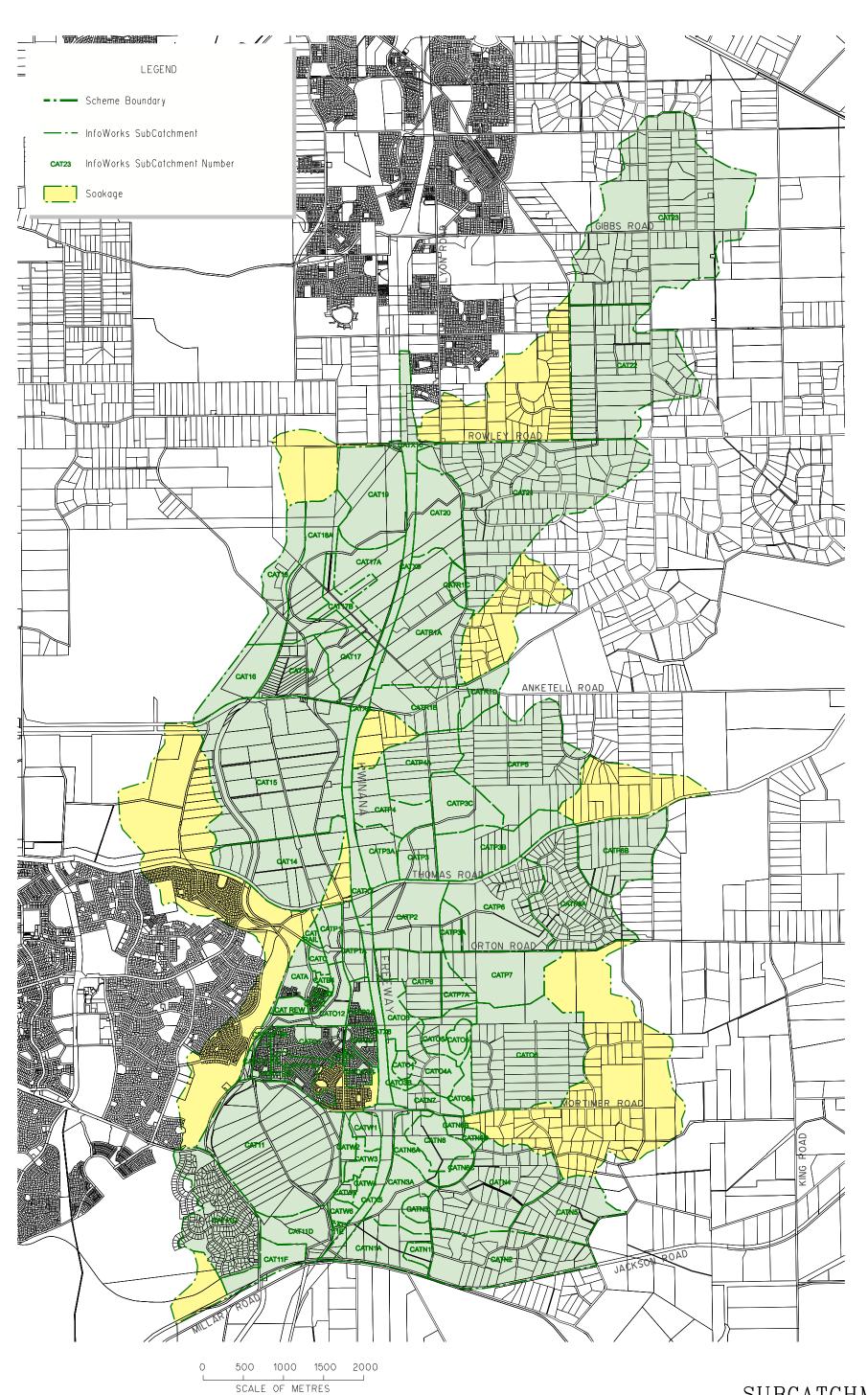
Table I: Peak Flow Rates at Post Dev.

Discharge Point	63% AEP	18% AEP	1% AEP
LPD2	0 L/s (DWER: 39 L/s) ¹	44 L/s (DWER: 72 L/s)	181L/s (DWER: 145 L/s)
LPD3	78 L/s (DWER: 80 L/s)	161 L/s (DWER: 168 L/s)	362L/s (DWER: 371 L/s)

¹ Significant drop in flow rate due to raingarden and soakwell infiltration of the 63% AEP. If required, runoff from Catchment 7.1 will be directed to LPD2 to maintain peak flow rate under a 63% AEP event. This can be discussed at UWMP stage upon DWER's advice.

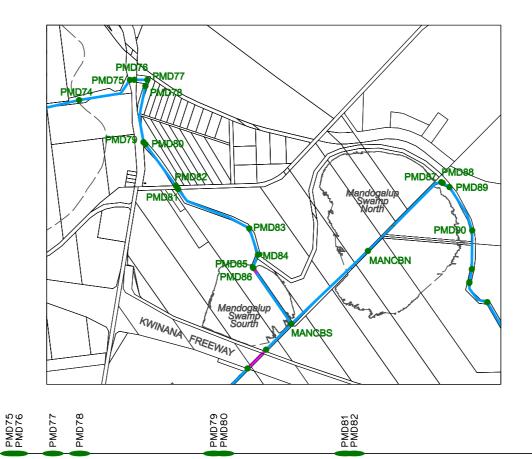


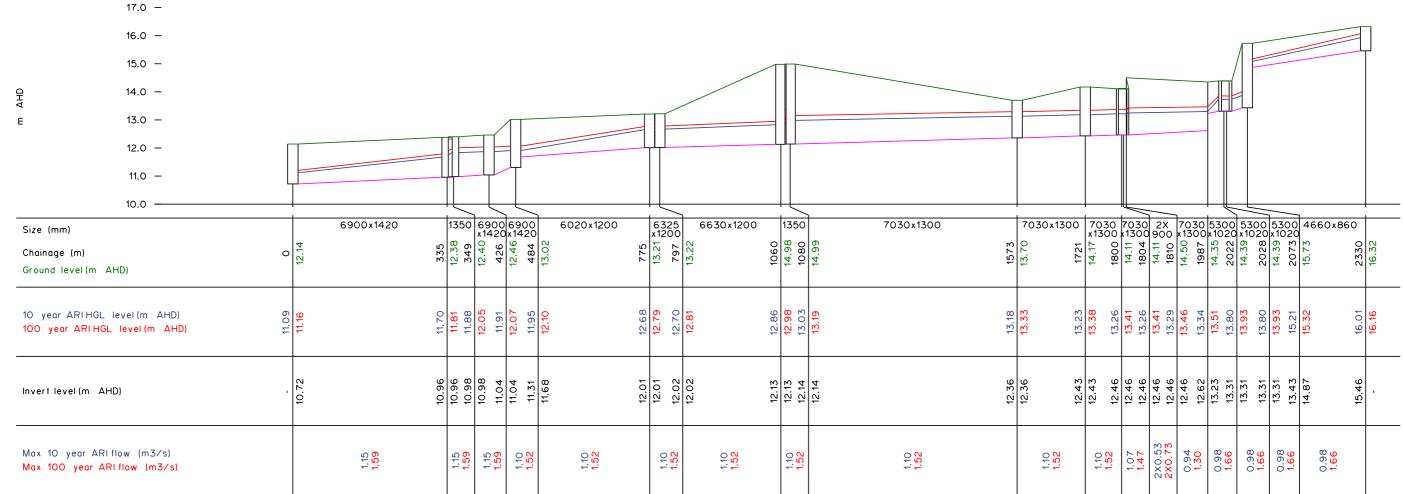








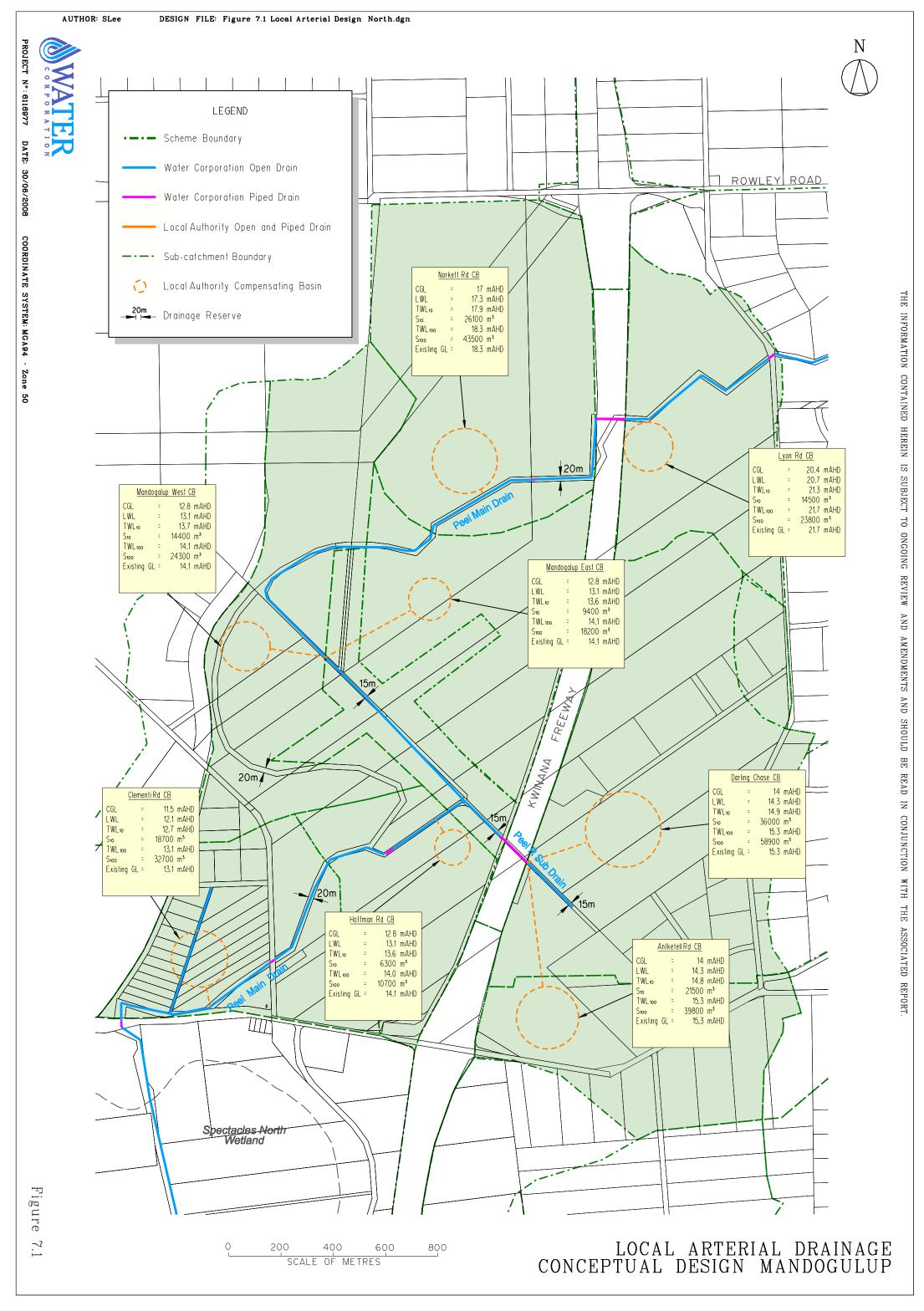


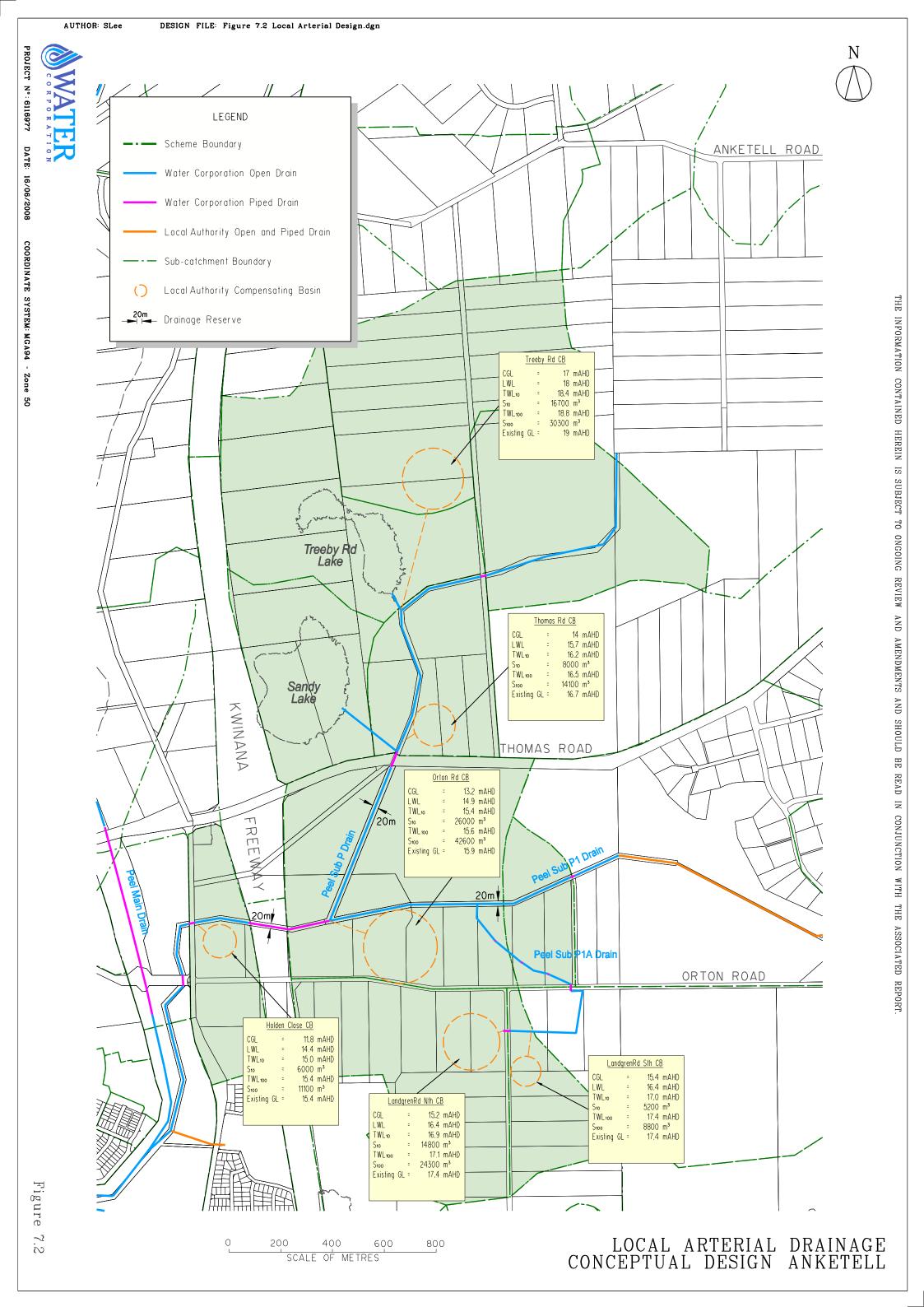


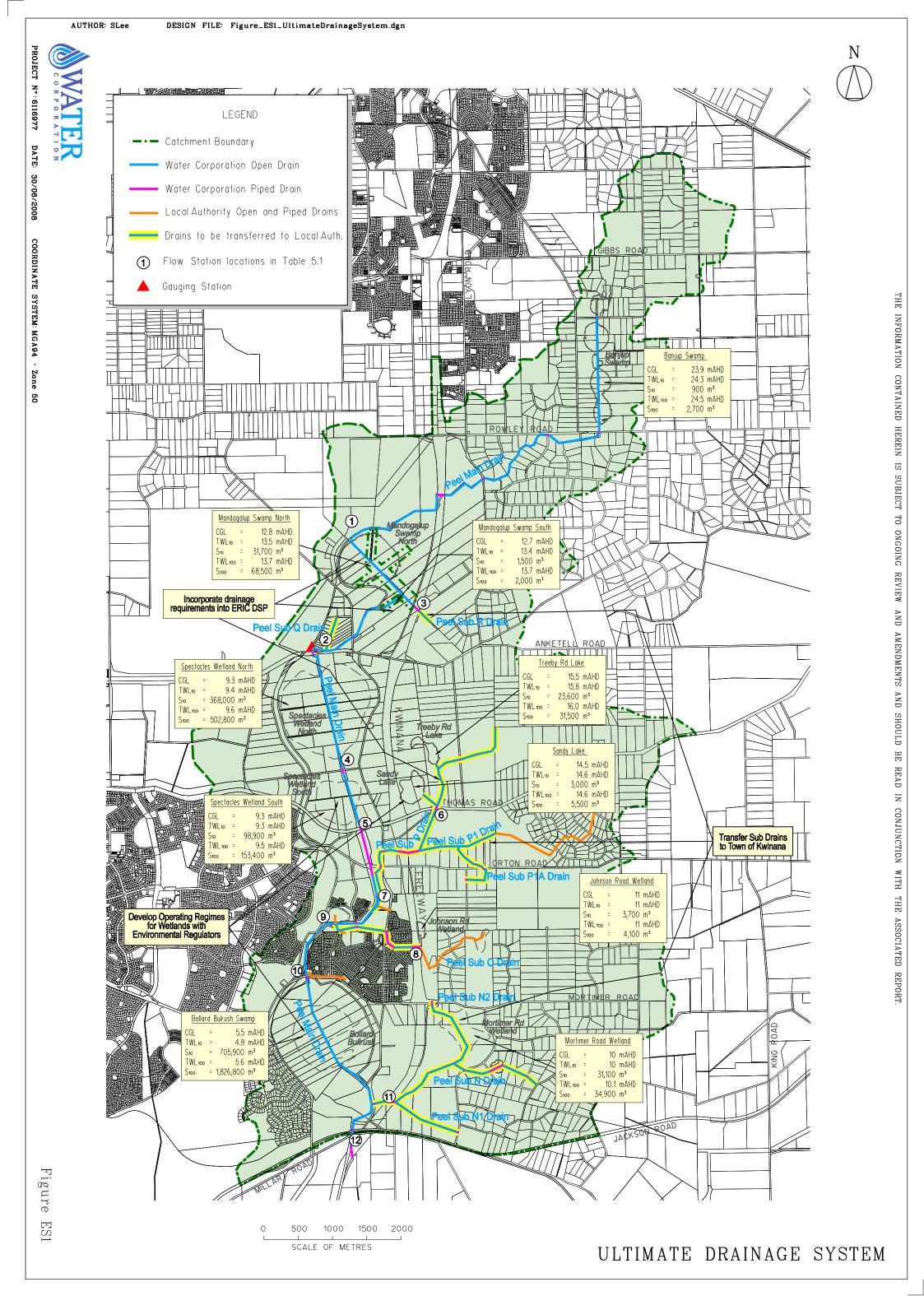


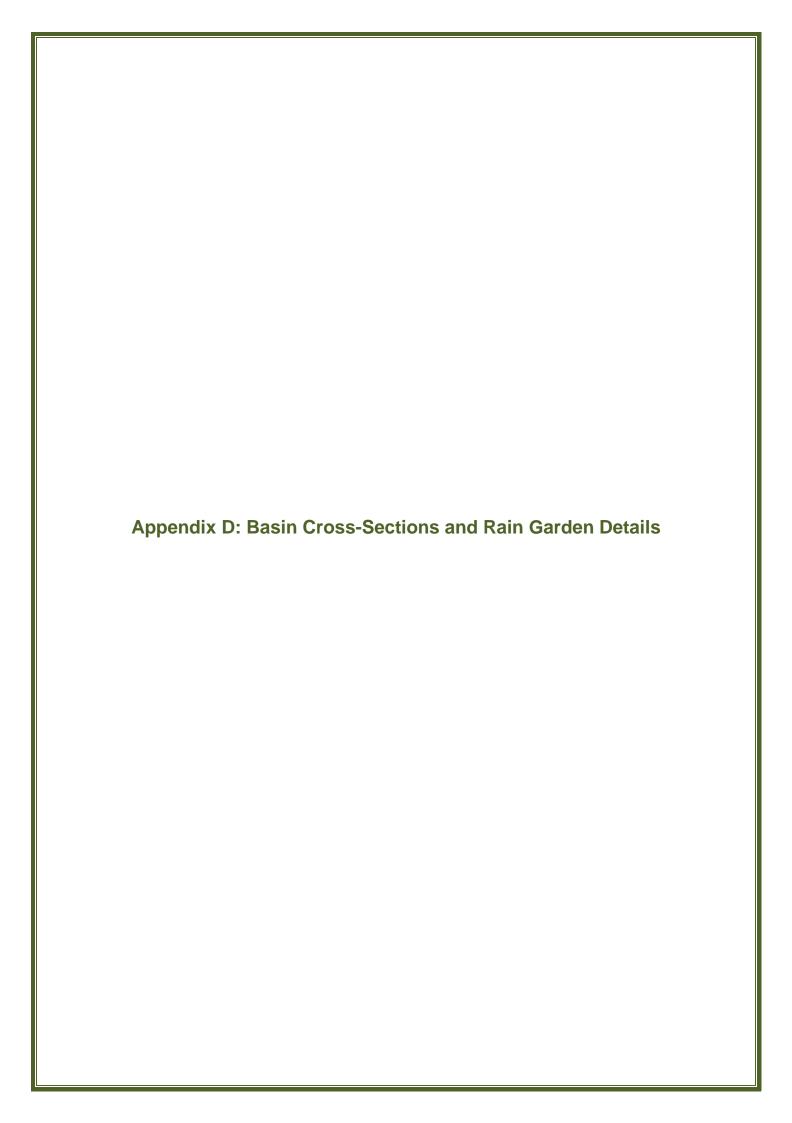
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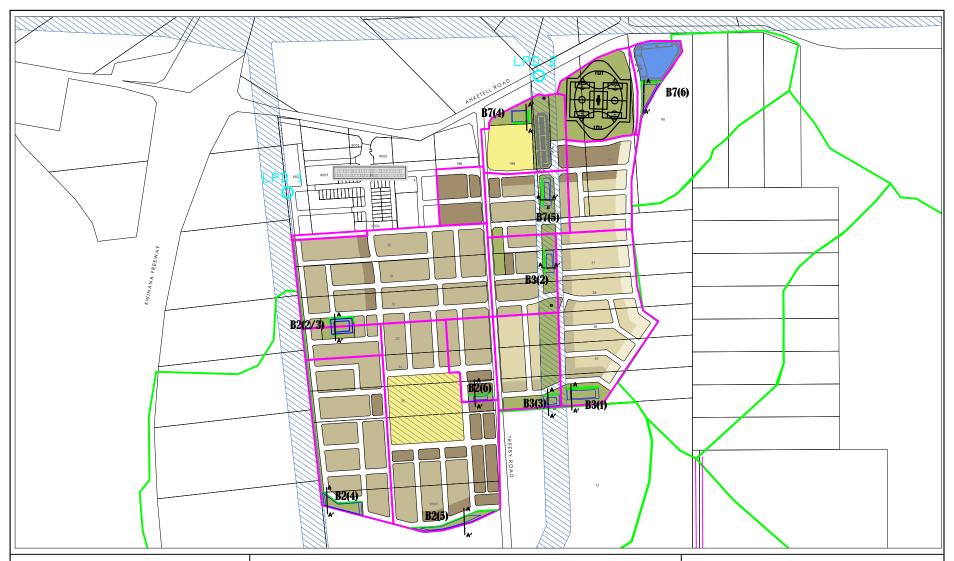
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Catchment Boundary & Number

Surface Water Flow Direction

- Storage Basins (e.g. B2(5) means BAsin NAme)
- POS (also include swale, western boundary strip)
- Rain gardens at POS entry

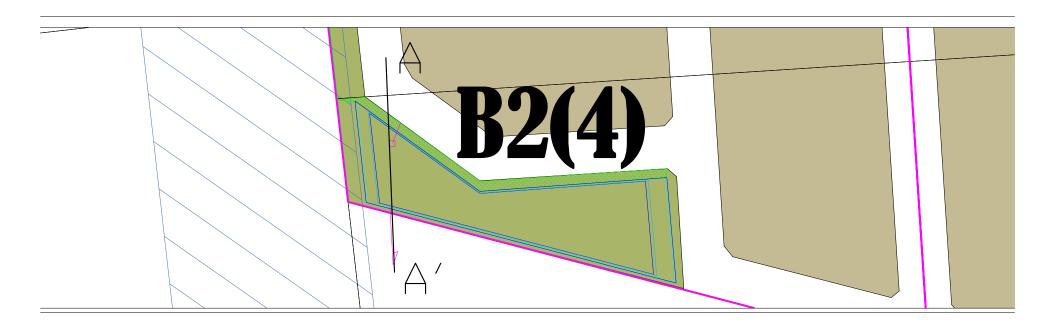
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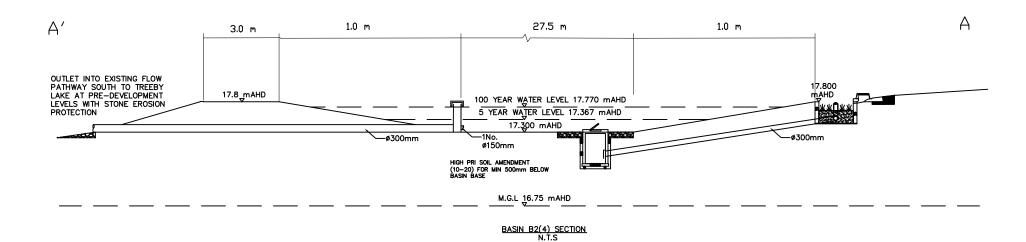
Bioscience Pty Ltd

Anketell North Urban Cell, City of Kwinana, Perth, WA

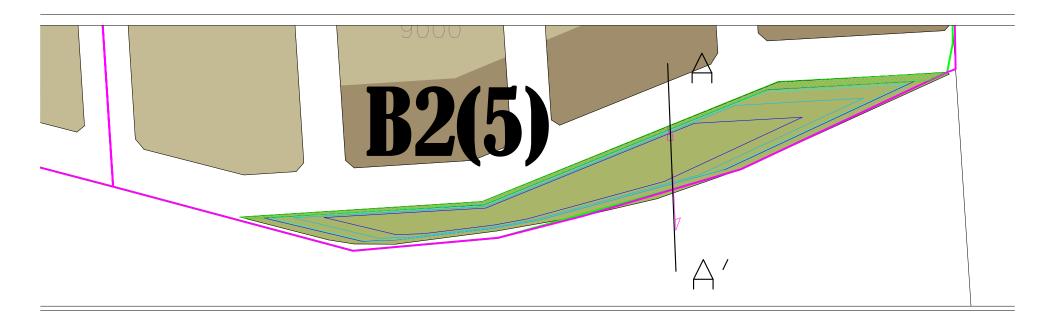
Local Water Management Strategy 24/05/2019

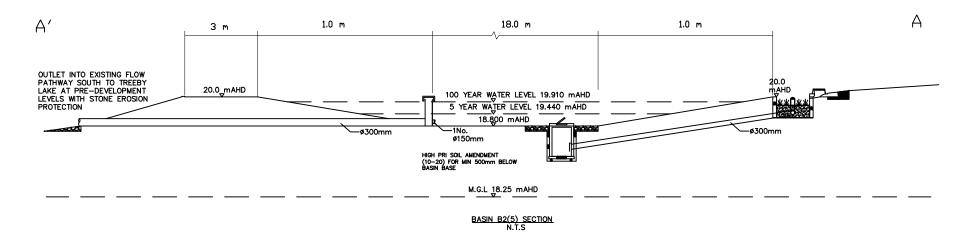
Appendix D: Basins and Rain Gardens AA' Cross Section Lines



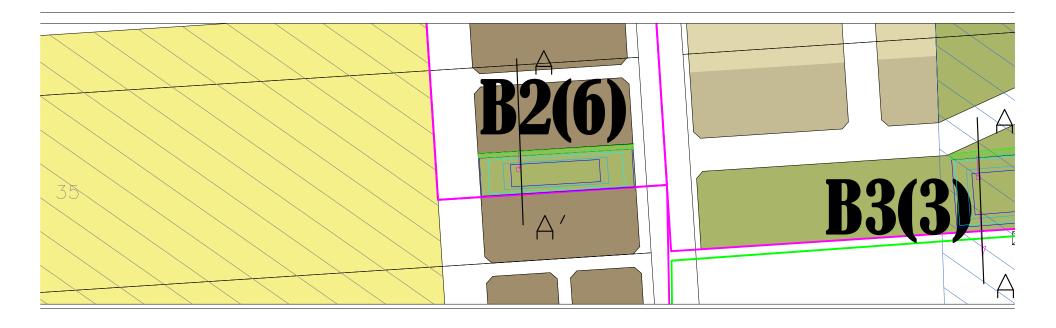


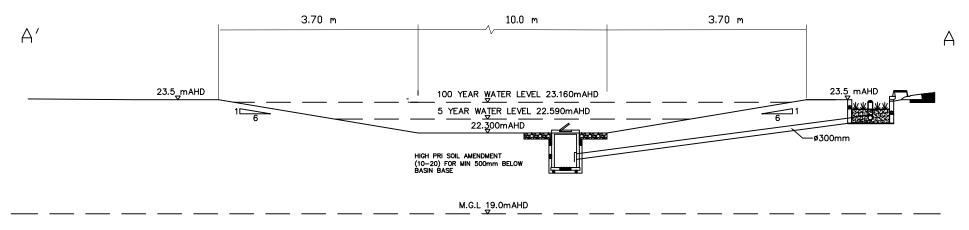






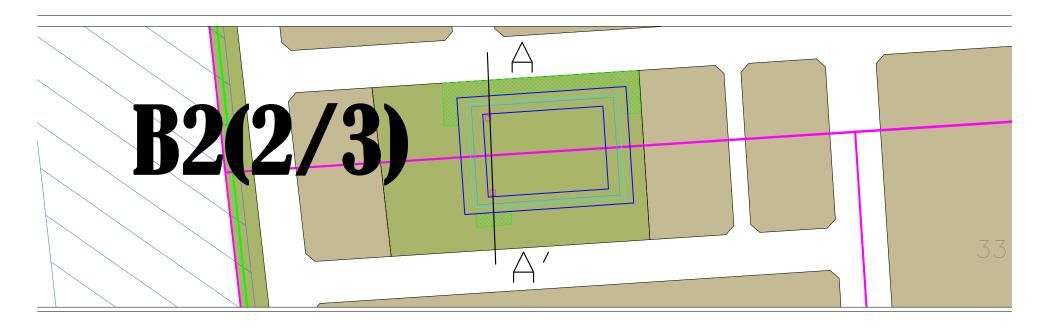


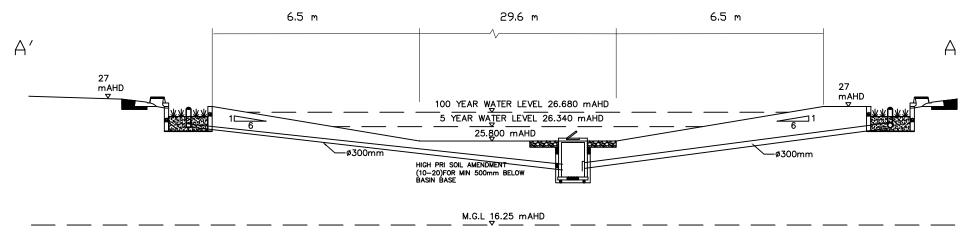




BASIN B2(6) SECTION N.T.S

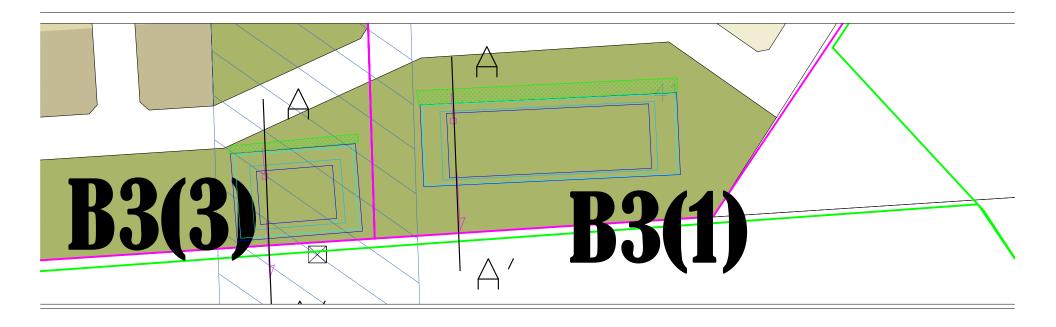


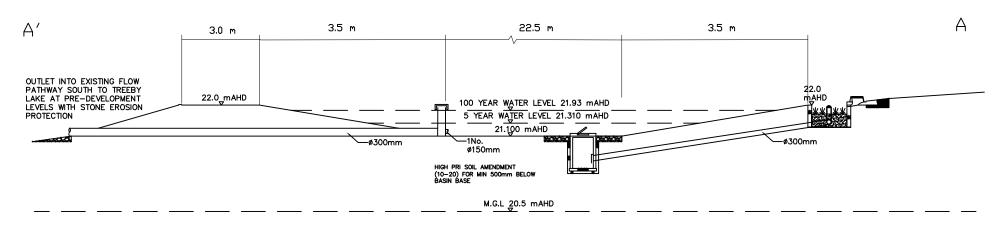




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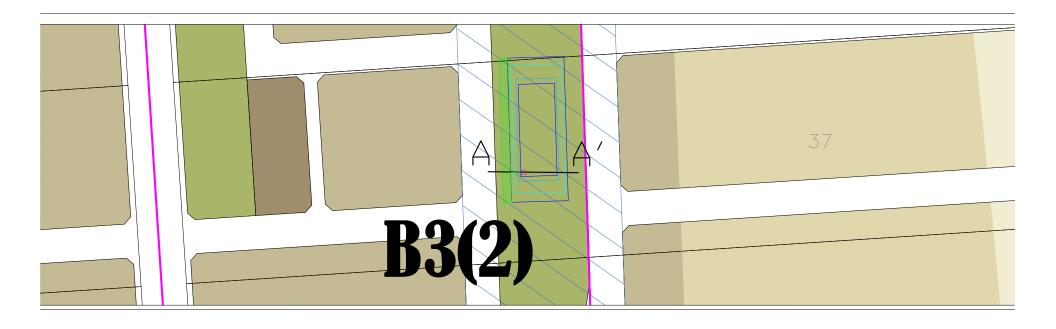
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488 NICHOLSON ROAD FORRESTDALE WA 6112 PO BOX 5466 CANNINGVALE SOUTH WA 6155	A	23/05/2019	FOR COMMENT	DA	PK PK		DWG NO.: ANKOO1
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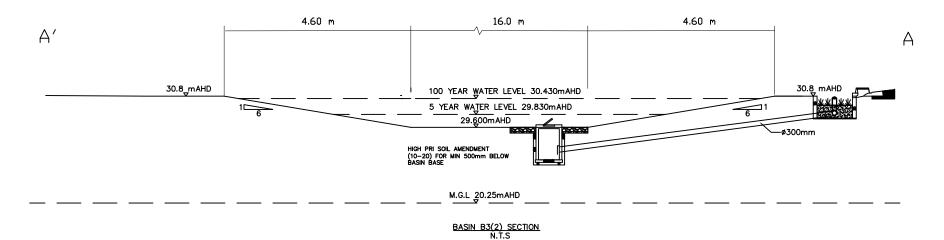




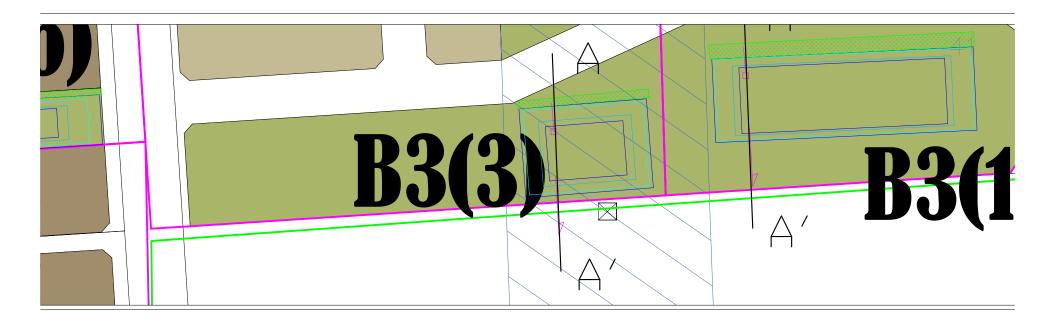
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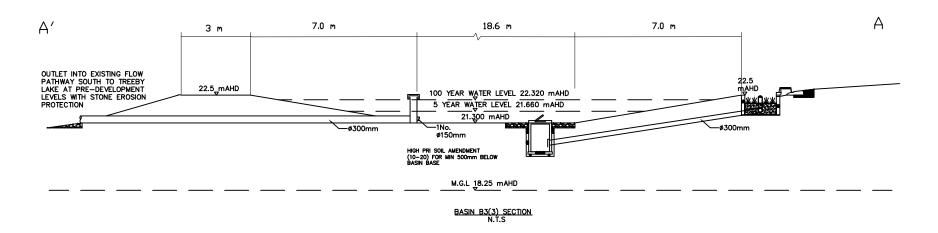
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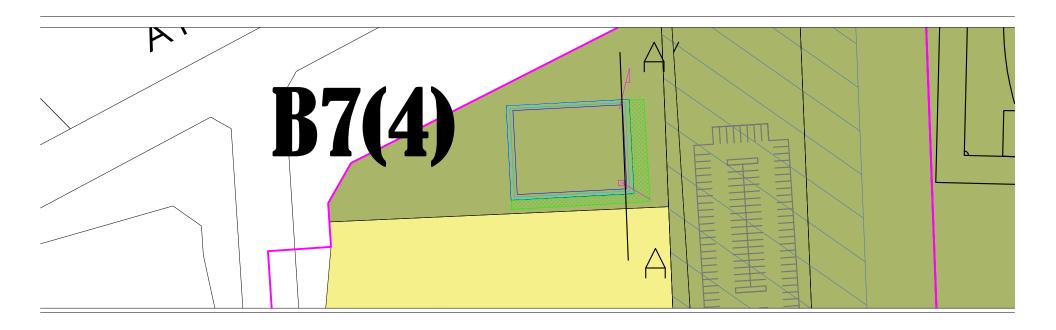


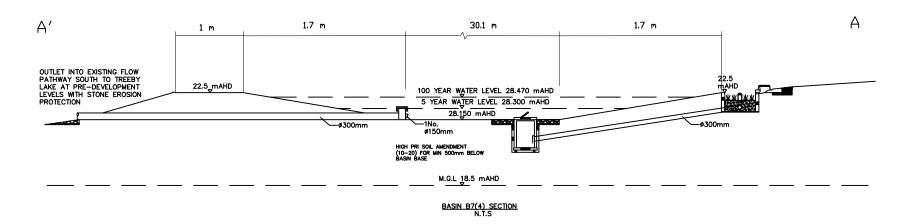




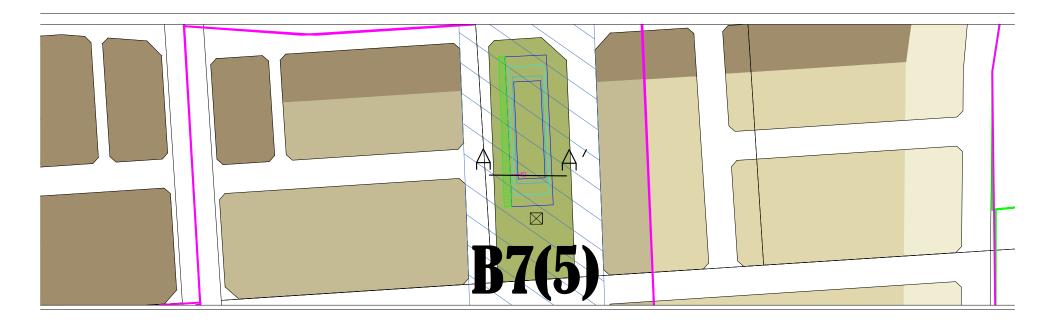


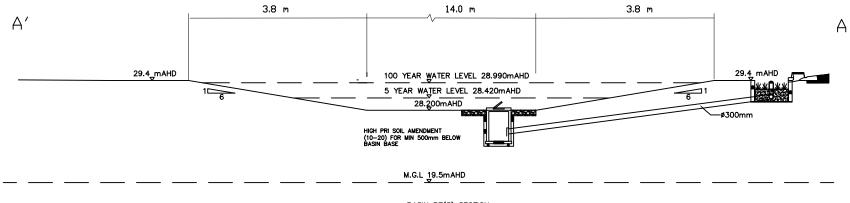
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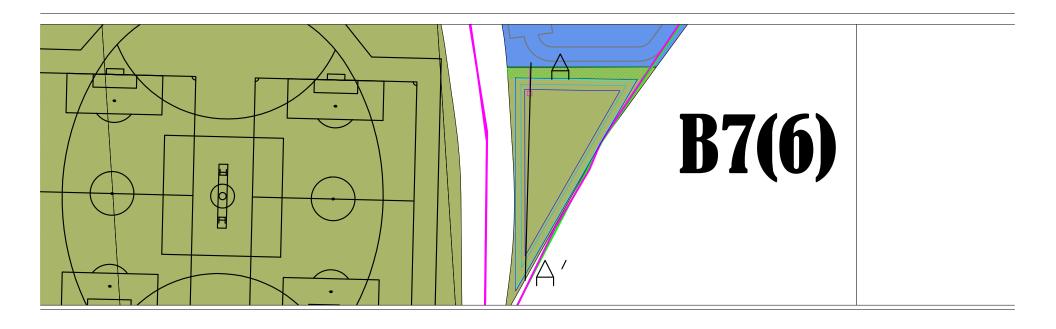
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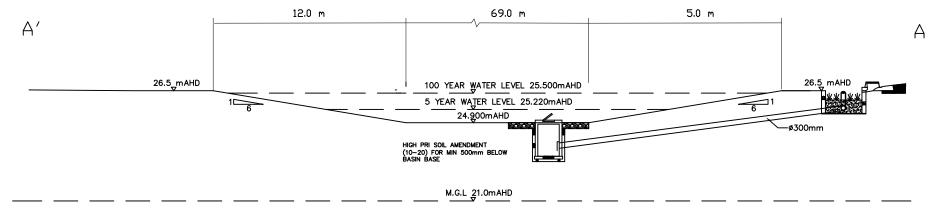




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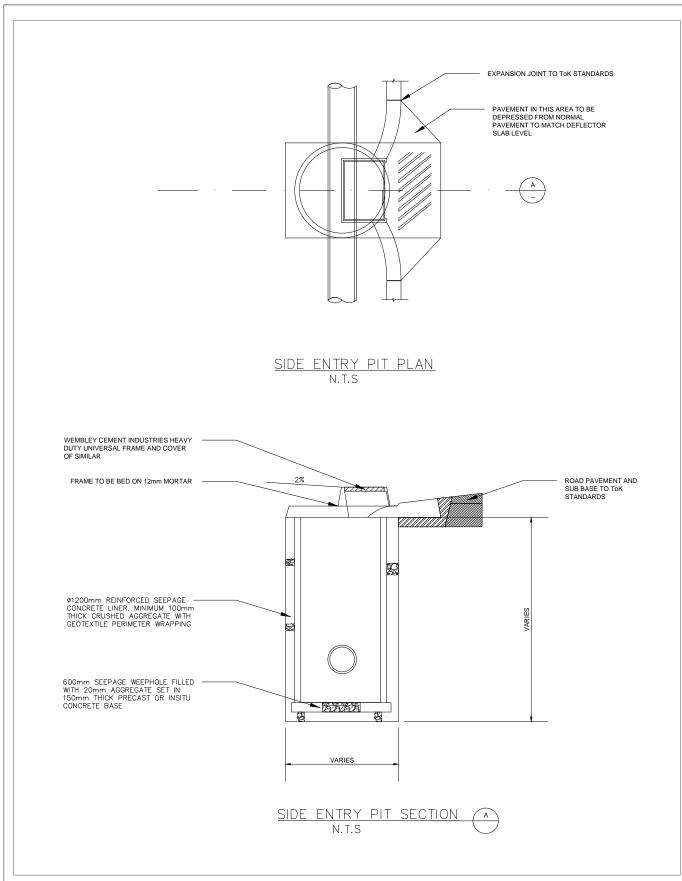
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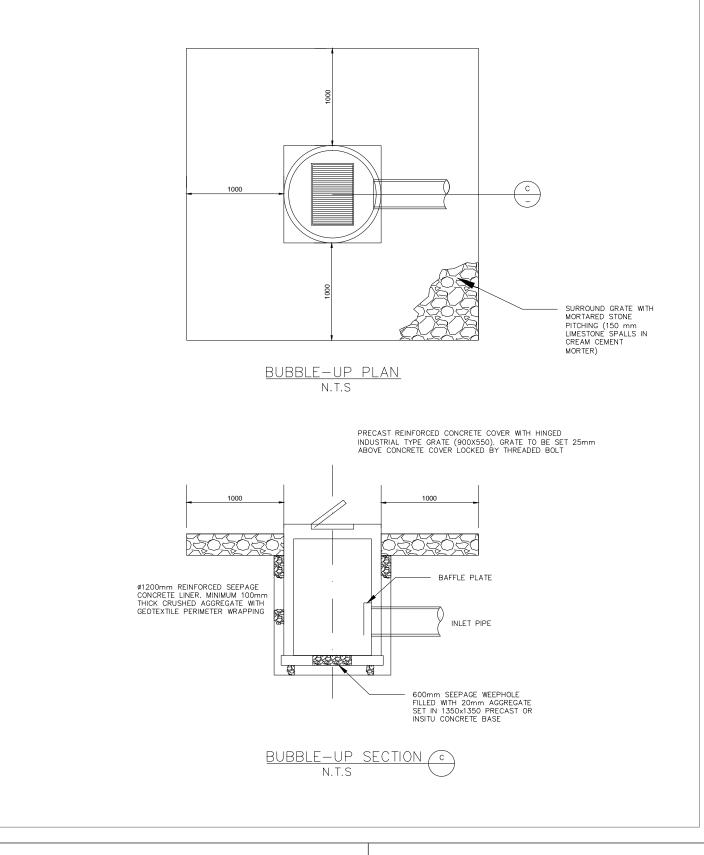




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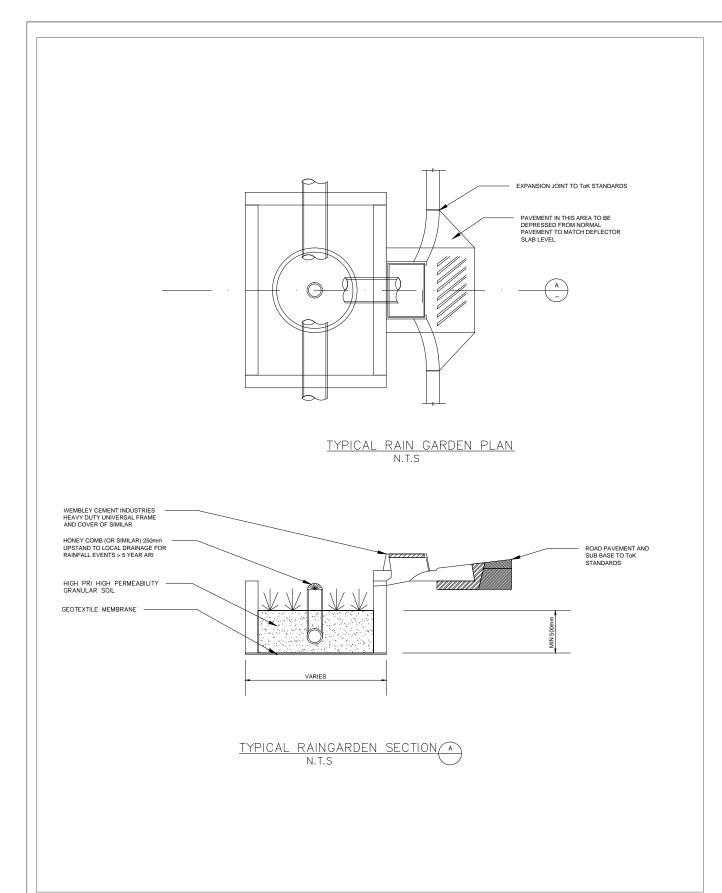
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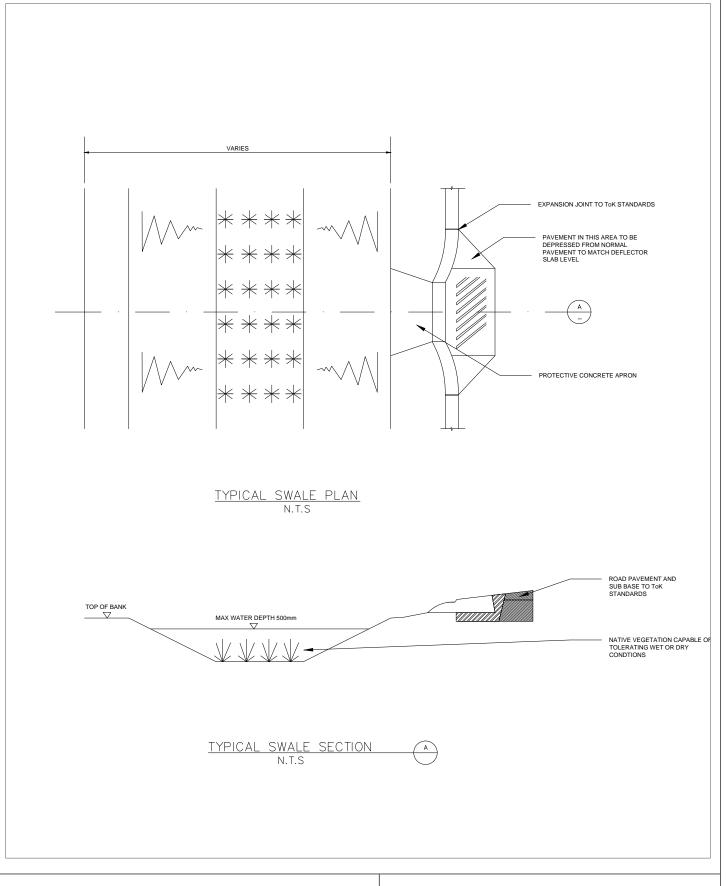
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DATE: 20/11/2013

DWG NO.: BIO 001

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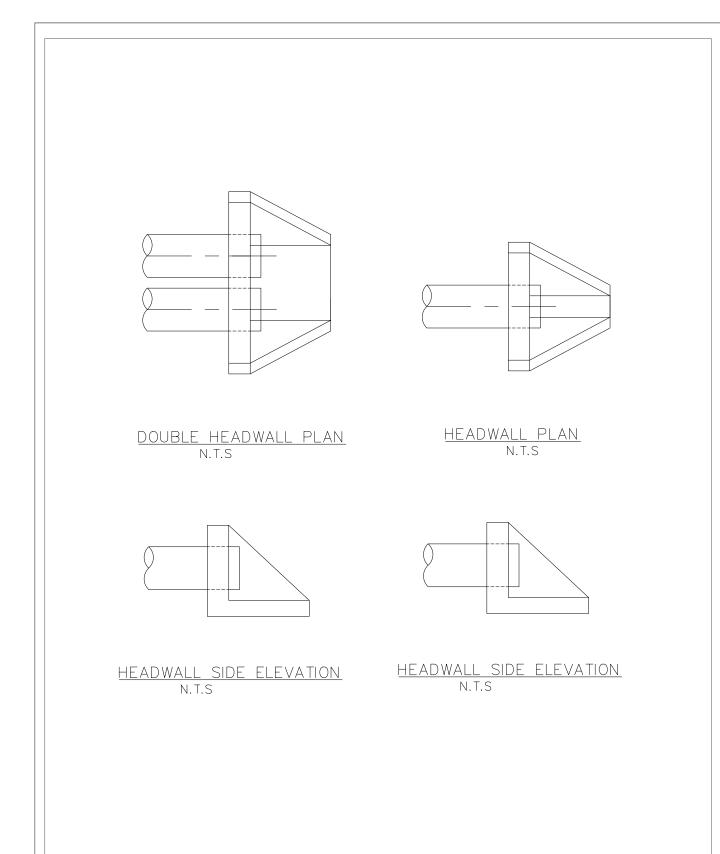
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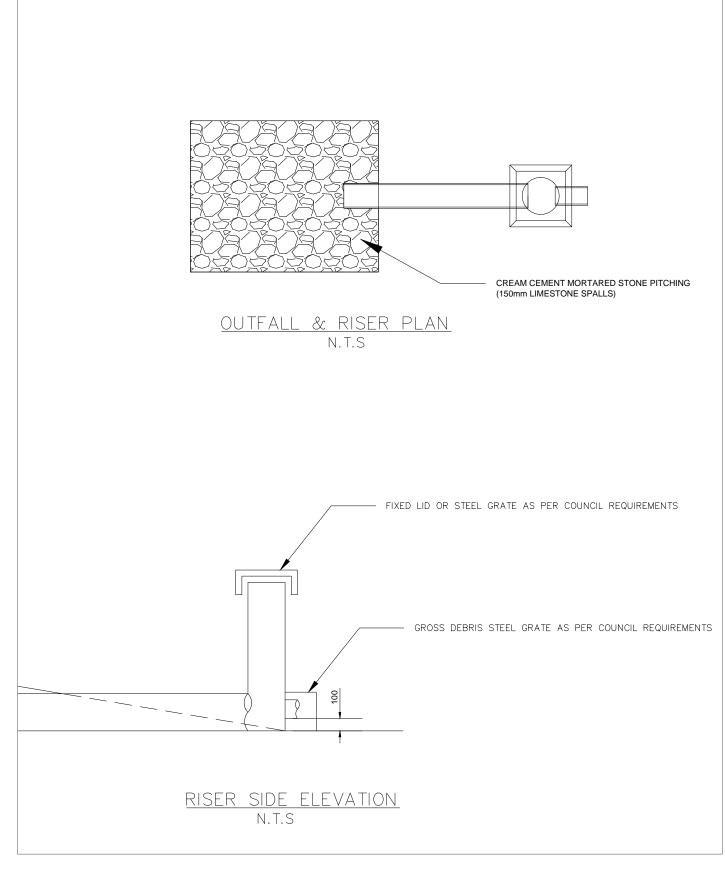
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DATE: 20/11/2013

DWG NO.: BIO 001B

REV.: A







488 NICHOLSON ROAD FORRESTDALE WA 6112 PO BOX 5466 CANNINGVALE SOUTH WA 6155 PHONE: (08) 9397 2446 FAX: (80) 9397 2447 EMAIL: bioscience@biosciencewa.com WEBSITE: www.biosciencewa.com

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Rev.	Date	Rev.	Drawn by	Approved

SCALE: N.T.S

NOTE: ALL INFRASTRUCTURE SHALL BE TO COUNCIL

SPECIFICATIONS

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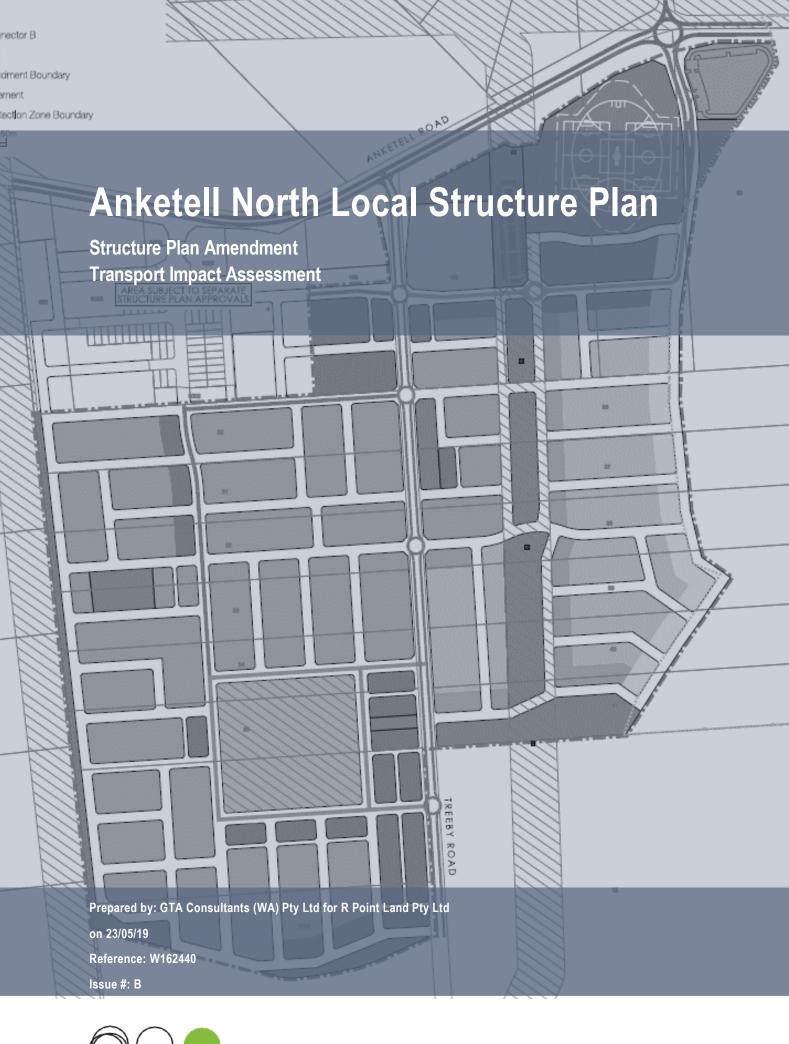
TITLE: ANKETELL NORTH URBAN CELL — HEADWALL & RISER DETAILS

DATE: 20/11/2013

DWG NO.: BIO 002

REV.: A

APPENDIX G TRANSPORT IMPACT ASSESSMENT





Anketell North Local Structure Plan

Structure Plan Amendment Transport Impact Assessment

Client: R Point Land Pty Ltd

on 23/05/19

Reference: W162440

Issue #: B

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
Α	04/12/18	Final – A	AZ / AQ	AQ / TM	TM	TM
В	23/05/19	-Revised Yields - reduced service commercial	AZ	TM	TM	Fefre.



SUMMARY



SUMMARY

An amendment to the Anketell North Local Structure Plan (ANLSP) is currently being proposed. The structure plan (SP) amendment proposes to slightly amend the internal road network, as well as altering the lot yield and residential density code. A roundabout has also been planned for and designed at the Anketell Road / Lyon Road intersection by Main Roads WA which was not previously included in the existing SP and is further discussed in this report.

Overall, the lot yields are proposed to slightly increase from 1,066 to 1,397 dwellings in the amendment area and there are some 6,000m² of service commercial development area proposed to the south of the Anketell Road / Lyon Road intersection. The traffic volumes expected to be generated by the amendment area is approximately 15,150 vehicle trips per day (vpd). Most of these vehicle trips are expected to access the SP via the Anketell Road / Treeby Road future signalised intersection, followed by the Anketell Road / Lyon Road future roundabout.

An internal footpath network will be provided as part of this development and will connect to a future 2.5m wide dual use path along Anketell Road, as per the *City of Kwinana Development Contribution Plan Report 4 – Anketell (DCA4)*.

Cycling links will also be provided across the SP area, linking the proposed primary school in the west of the structure plan, to the proposed district playing fields in the north-east, via the land that is available over the SP's north-south easement.

Anketell Road is currently classified as a District Distributor A road and is constructed to a rural standard at present. It is proposed to be upgraded to a four-lane divided carriageway and function as a Primary Distributor Freight Route as part of the State Government led Westport project. Anketell Road will be upgraded, not as part of this proposed structure plan, but as part of the development contribution plan. This key future freight route will connect the SP area to Naval Base and Kwinana Beach Industrial Areas.

Assessment of the proposed traffic and transport network for the SP amendment has shown that the proposed connectivity will function adequately when the area is fully developed, assumed and estimated to be by 2031.

Further to the details provided in the Conclusion Section 7 of this Transport Impact Assessment (TIA) prepared by GTA Consultants, the high-level determination is that the SP amendment, under the assumed traffic generation and distributions noted does not critically compromise the external transport network. The location of future intersections and network of links are adequate to support the overall amendment.

It can be concluded from the information presented in this TIA that the proposed amendments to the SP can be supported by the future traffic network. Accordingly, the transport characteristics of the proposed SP amendment are considered acceptable.



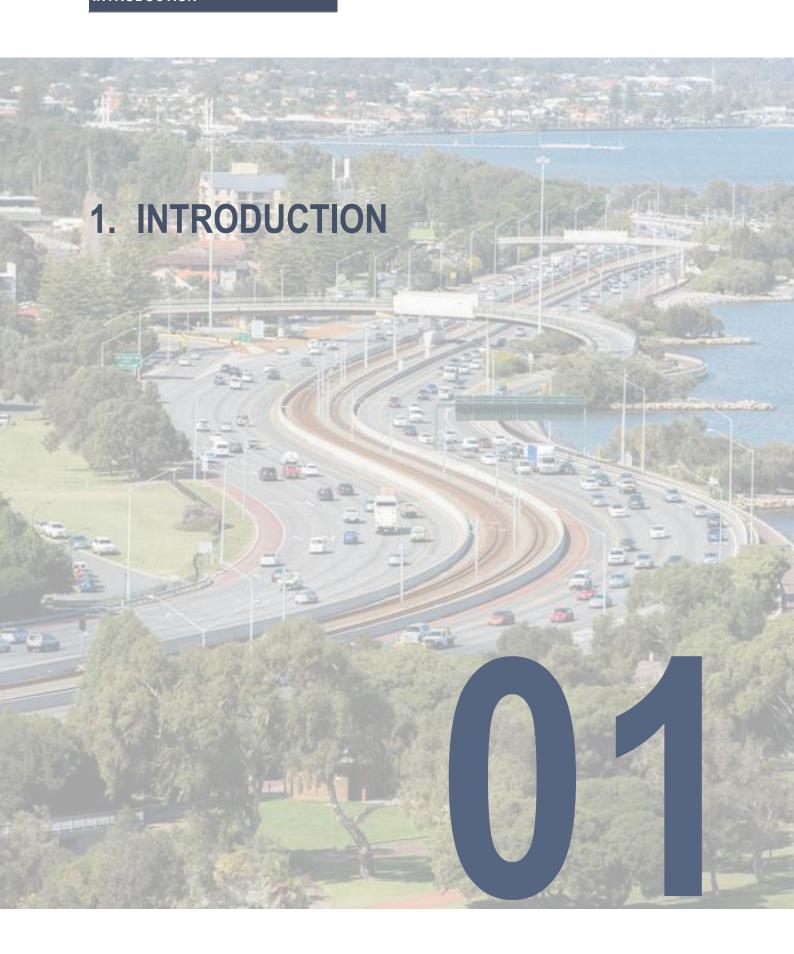
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1.1. Background & Proposal

The Anketell North Local Structure Plan (ANLSP) was previously approved in December 2015. Amendment No. 1 to ANLSP was recently endorsed by the Western Australian Planning Commission (WAPC) in April 2019. It is understood that two other smaller Structure Plan (SP) amendments are also current (as of 29 October 2018) and with the City for their assessment.

Amendment No. 1 (October 2017) proposed to reconfigure the westernmost left in / left out entry into the SP to include a right turn in from Anketell Road. Advice received from the City in October 2018 was that this additional right turn movement was not supported by the City, and the recently endorsed Amendment No. 1 confirms this access remains as a left-in/left-out.

The two other SP amendments mentioned above relate to the predominantly Service Commercial zoned area in the north of the SP and just south of Anketell Road. These amendments are understood to reconfigure the land use types slightly.

A subsequent amendment, and the subject of this report, is now being proposed to the ANLSP area, which proposes to:

- move the large Public Open Space (POS) (District Playing Fields) previously located in the centre of the ANLSP to the north-east corner of the new SP
- include an additional development area in the north-east corner of the new SP
- recode of several residential lots
- introduce a Service Commercial area.

GTA Consultants (GTA) has been engaged by Acumen Development Solutions on behalf of the landowner RPoint Land Pty Ltd, in October 2018 to undertake a transport impact assessment of the proposed Amendment. The Structure Plan has been slightly revised in May 2019, which removes a significant portion of the Service Commercial area, shifts the POS further north adjacent Anketell Road and introduces a small additional residential area

1.2. Purpose of this Report

Volume 2 of the Western Australian Planning Commission Transport Assessment Guidelines (WAPC Guidelines) provide direction on the preparation of a Transport Impact Assessment (TIA) for Planning Schemes and Structure Plans. The WAPC Guidelines identify that a TIA for a Structure Plan is to provide a broad-brush assessment.

The current WAPC policy identifies the need to prepare a transport assessment for a structure plan amendment to be discussed with the assessing authority. GTA contacted the City and discussed the key preliminary transport issues of the ANLSP area.

In accordance with the WAPC Guidelines, this TIA outlines only the proposed amendments.

1.3. Previous Studies

The following studies were previously prepared and are relevant to the subject sites due to their proximity:

- Lots 2 & 3 Anketell Road, Anketell North LSP Amendment (Transcore, February 2017)
- Anketell North Local Structure Plan Transport Impact Assessment Report (Transcore, October 2015).

1.4. References

In preparing this report, reference has been made to the following:

- City of Kwinana's Town Planning Scheme No.2 (TPS 2)
- Liveable Neighbourhoods Guidelines

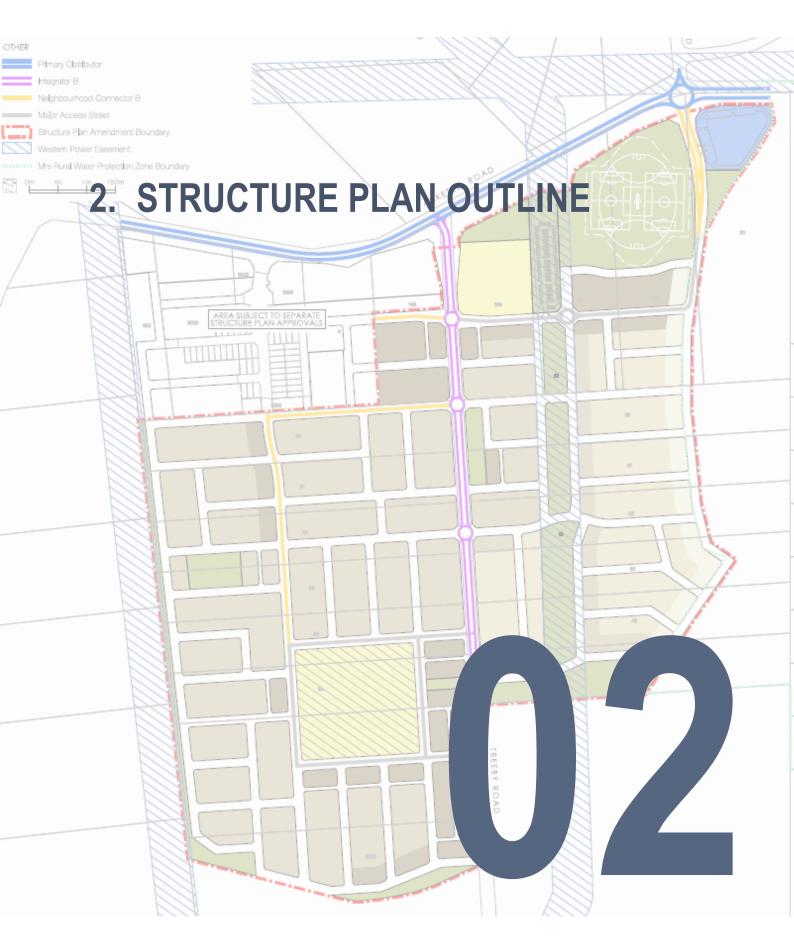


INTRODUCTION

- WAPC Transport Assessment Guidelines for Development
- plans for the proposed structure plan provided on 14 May 2019 prepared by Taylor Burrell Barnett Town Planning and Design (TBB)
- consultation undertaken with the City regarding status of the various SP Amendments and their consultation with Main Roads WA on access to Anketell Road
- various technical data as referenced in this report
- other documents as nominated.



STRUCTURE PLAN OUTLINE

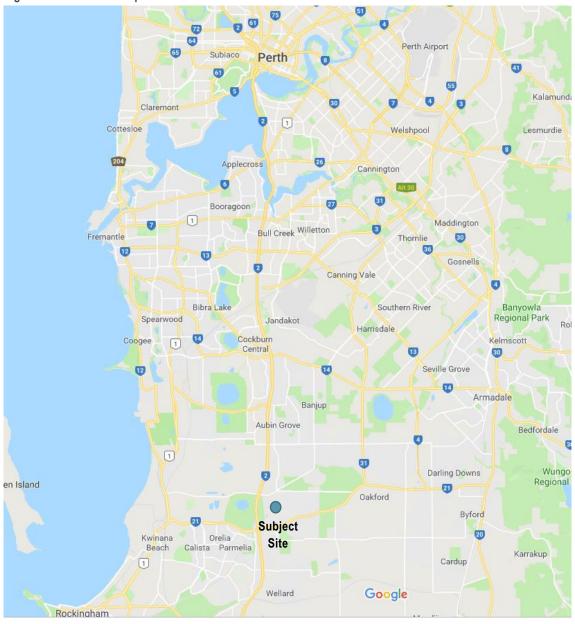




2.1. Regional Context

The subject site is in the suburb of Anketell, within the City of Kwinana. The site is approximately 31km south of the Perth CBD, approximately 200m east of the Kwinana Freeway and approximately 11km north-east of the Kwinana Town Centre.

Figure 2.1: Location Map



(PhotoMap courtesy of GoogleMaps)



2.2. Proposed Land Uses

The Amendment to ANLSP proposes a slight increase in density, modified road layout and an additional Service Commercial zoned area. The change in land uses relevant to the amendment area is summarised in Table 2.1.

Table 2.1: Land Uses - SP amendment area only

Lord Hos	Previously Approved	Proposed Amendment
Land Use	Yield	Yield
Residential R10	21 lots	N/A
Residential R20	N/A	33 lots
Residential R25	164 lots	209 lots
Residential R30	607 lots	837 lots
Residential R40	202 lots	318 lots
Residential R60	72 lots	N/A
Community Facility	1.67ha	1.65ha
Primary School	4ha	4ha
Service Commercial	N/A	6,072m ² NDA
Parks and Recreation / Drainage	12.4ha	13.4ha
Total	1,066 lots	1,397 lots

It is important to note that the Transport Assessment for the current ANLSP outlines a greater number of residential (1,544 lots), as this includes the SP area outside of the amendment.

For clarity, the ANLSP area outside of the amendment outlines a Mixed Use Residential of 34 lots, Retail use of 2,431sq.m. and Commercial use of 15,624sq.m which is presumed to be within the northern located lots, just south of Anketell Road.

The Service Commercial net developable area (NDA) proposed as part of the new SP is based on 50% of the estimated GFA, as advised by Taylor Burrell Barnett.

2.3. Attractors or Generators of Traffic (non-residential)

There are numerous supporting facilities within the structure plan areas which would be attractors or generators of traffic, such as:

- Primary School (already approved)
- Service Commercial (newly proposed as part of this amendment)
- Community Facility (already approved)
- Public Open Space and wetlands.

2.4. Specific Access Considerations

Since the approval of the original SP in December 2015, a subsequent Amendment No. 1 proposed a right turn into the SP area from the westernmost access road which was previously a left-in left-out intersection. This Amendment has since been determined, and the endorsed Amendment No. 1 retains a left-in left-out intersection. This has been acknowledged as part of the traffic modelling undertaken for this report.

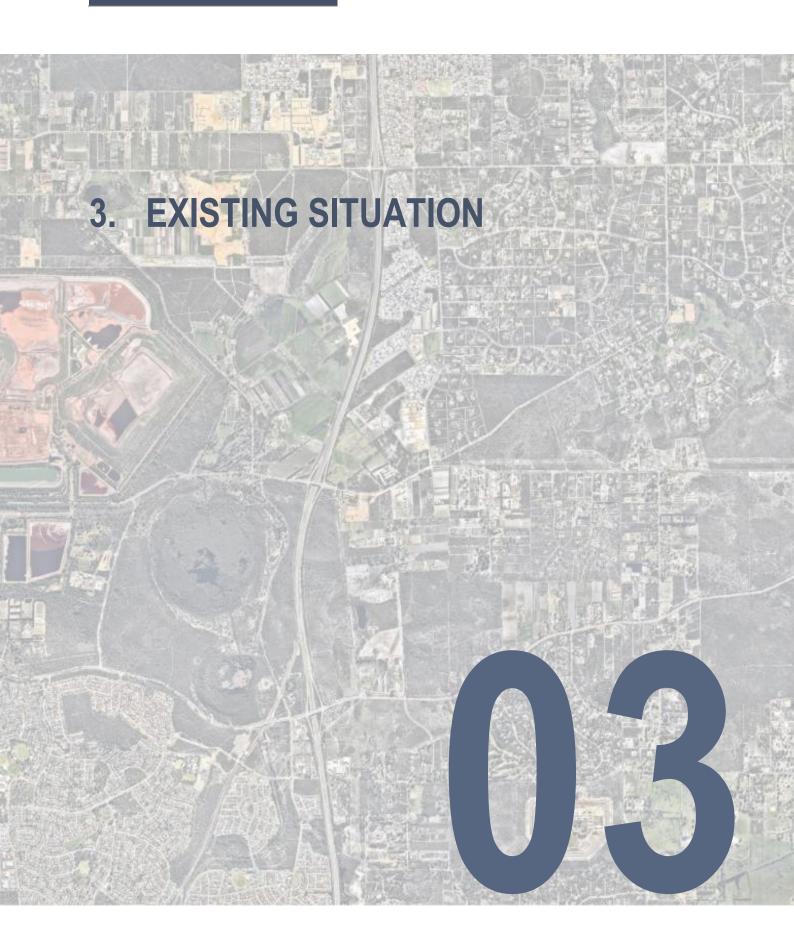


STRUCTURE PLAN OUTLINE

It is also noted that a roundabout is now being proposed at the intersection of Lyon Road and Anketell Road by Main Roads WA. This replaces the previously proposed left-in left-out intersection just east of the Treeby Road / Anketell Road future signalised intersection.

Whilst these are not specific transport issues, these new traffic conditions will impact the distribution of the generated trips and is therefore considered in this assessment.







3.1. Subject Site

The subject site comprises of numerous lots to the south of Anketell Road, Anketell. The ANLSP area has changed slightly to include additional land adjacent to the Lyon Road / Anketell Road intersection. The site area is bound by Anketell Road to the north, the Kwinana Freeway and Park/Recreation/Drainage to the west, and other land currently zoned Development under the City's TPS 2.

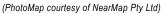
TPS 2 states that the Development Zone requires a structure plan to further guide development, and as such the ANLSP was prepared.

The surrounding properties include a mix of zones including the Rural Water Resource, Parks and Recreation and Rural A Zones

The location of the subject site and the surrounding environs is shown in Figure 3.1, and the land zoning is shown in Figure 3.2.









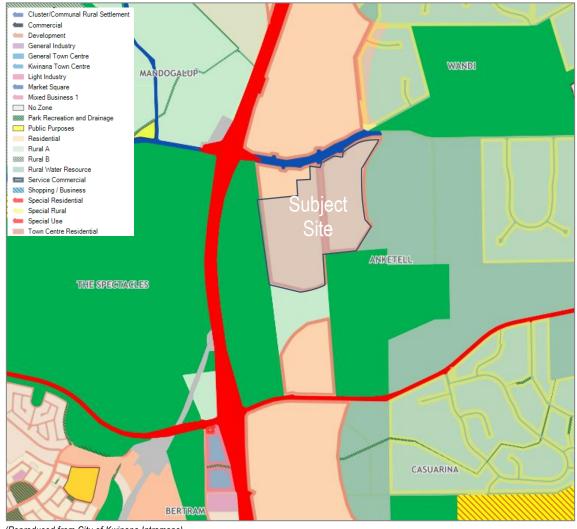


Figure 3.2: Land Zoning Map

(Reproduced from City of Kwinana Intramaps)

3.2. Existing Movement Network

3.2.1. Roads (including RAV Networks)

The urban development of the Anketell area is limited, and the land is currently largely of rural nature. The site is bound by Anketell Road to the north, with the Kwinana Freeway within proximity on the western boundary and Treeby Road through the centre.

Anketell Road

Anketell runs north of the subject area and is identified as an "Other Regional Road" under the Metropolitan Region Scheme (MRS). It is identified as a District Distributor A Road with a posted speed limit of 80km/h west of Tuart Road and 90km/h east of Tuart Road as per the Main Roads Western Australia (MRWA) Functional Road Hierarchy and Road Information Mapping System. It is carrying 6,155 vpd (M-F avg) with 14.2% truck traffic in the site's vicinity (2017/18 data).

Anketell Road has been identified as an alternative freight route to the Naval Base and Kwinana Beach industrial areas and will ultimately be a dual divided carriageway.



Treeby Road

Treeby Road runs north-south through the centre of the ANLSP area and is identified as a local road with a posted speed limit of 50km/h by the MRWA Road Information Mapping System. The northernmost point of Treeby Road currently intersects Anketell Road at a priority-controlled T-Junction. The southern portion is not constructed yet, and as such does not connect to Thomas Road, however is planned to connect to Thomas Road in the future.

3.2.2. Pedestrian and Cyclist Network

Access to the structure plan area is currently quite limited or incomplete as the surrounding area is still currently being developed. There are currently no footpaths or cycle lanes or paths along Anketell Road.

3.2.3. Public Transport

The bus services in the area are currently limited given the rural nature of the land. There are no bus routes servicing the subject site currently. The closest existing bus stop is approximately 1.5km north of the site, within the developments north of Anketell Road and terminates at Honeywood Avenue/Darling Chase.

In addition to road based public transport, the Kwinana Train Station on the Mandurah railway line is located approximately 2km from the site (measured in a straight-line distance).



3.3. Existing Road Network (Within 2km)

In addition to Anketell Road and Treeby Road discussed above, there are a few other roads within a 2km radius of the subject site including Kwinana Freeway and Lyon Street.

Kwinana Freeway runs north-south near the westernmost part of the site. It is classified as a Primary Distributor and reserved as a Primary Regional Road under the MRS. It has a posted speed limit of 100km/h and is constructed as a four -lane divided carriageway. The closest Kwinana Freeway interchange to the ANLSP area is at Anketell Road.

Lyon Street is a Local Distributor road with which runs north-south between Anketell Road, north of the subject site, to Rowley Road and beyond to Atwell. It has a posted speed limit of 80km/h to Rowley Road, then 60km/h through Aubin Grove and 50km/h in Atwell.



3.4. Traffic Counts (within 2km)

Figure 3.3: Location of Counters

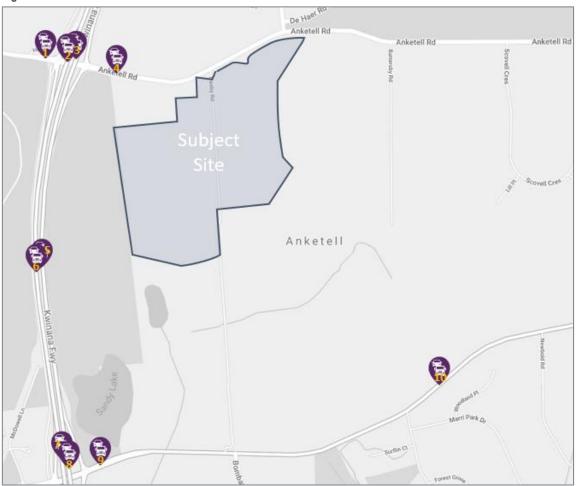
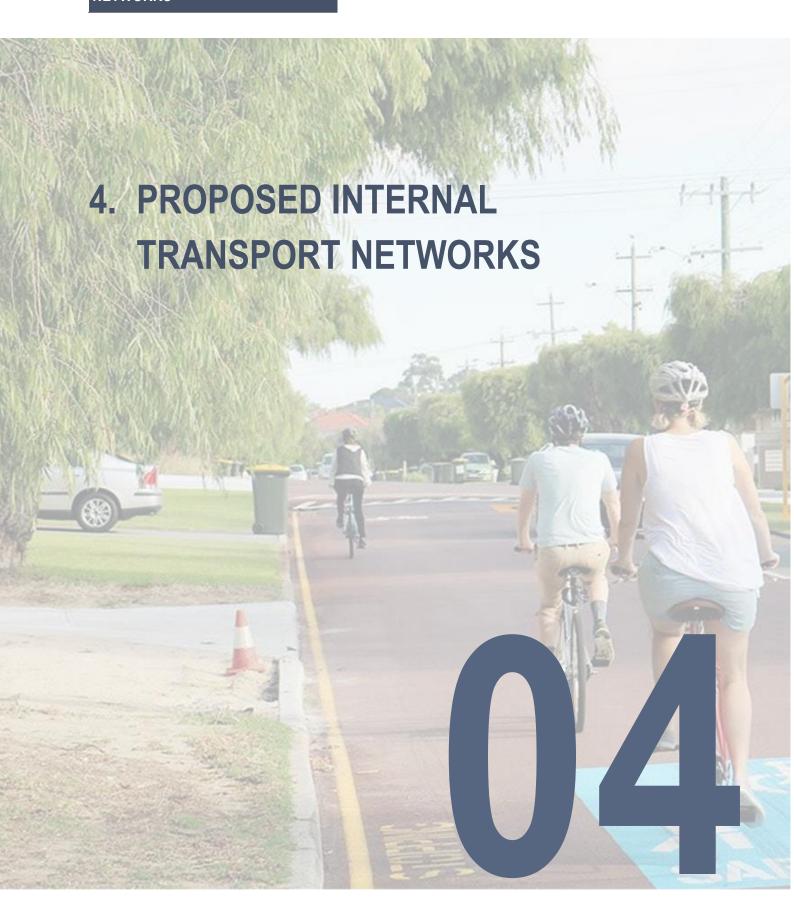


Table 3.1: Traffic Count Information

	Location	2017/18 Monday to Friday Average	% Cars	% Trucks
1	Anketell Road (West of Kwinana Freeway)	14,324	80.2%	19.8%
2	Kwinana Freeway (NB at Anketell Road)	37,107	91.5%	8.5%
3	Kwinana Freeway (SB at Anketell Road)	39,028	92.5%	7.5%
4	Anketell Road (East of Kwinana Freeway)	6,155	85.8%	14.2%
5	Kwinana Freeway (SB N of Thomas Road)	42,575	90.3%	9.7%
6	Kwinana Freeway (NB N of Thomas Road)	40,068	86.3%	13.7%
7	Kwinana Freeway (NB at Thomas Road)	32,843	90.3%	9.7%
8	Kwinana Freeway (SB at Thomas Road)	34,139	92.1%	7.9%
9	Thomas Road (East of Kwinana Freeway)	13,622	88.2%	11.8%
10	Thomas Road (West of Newbold Road)	16,116	88.7%	11.3%







4.1. Changes to Existing Road Network

A number of changes to the existing road network are planned. Anketell Road is to be upgraded from two to four lanes divided.

Anketell Road is currently approved for a left in / left out intersection at Road 1 (the westernmost intersection to the ANLSP area between Kwinana Freeway and Treeby Road). An amendment to introduce a right turn into Road 1 from Anketell Road was submitted, however the City has indicated that it did not support this access, although the outcome will be determined by the WAPC. The City has requested GTA to assume that it will remain as a left in / left out intersection.

Based on information provided at officer level from a Development Engineer from the City of Kwinana via email on 19 November 2018, Anketell Road is proposed to be upgraded to a Primary Distributor Freight Route road as part of the Westport project, led by the State Government. As part of this, MRWA have prepared a design for a roundabout at the Lyon Road / Anketell Road intersection. It was noted that the only full movement intersections would be Lyon Road / Anketell Road and Treeby Road / Anketell Road. All other access points would remain as left-in / left-out, unless otherwise approved. However, it was noted by the officer that it would be unlikely for MRWA to support any changes to this network described above.

4.2. Proposed Road Hierarchy, Road Reserve Widths and Speed Limits

The road hierarchy for the ANLSP area was established in the original structure plan document, as per Figure 4.1.

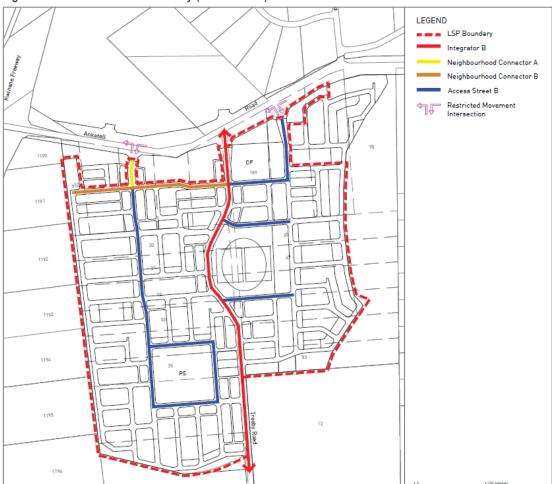


Figure 4.1: Current Road Hierarchy (ANLSP 2015)



PROPOSED INTERNAL TRANSPORT NETWORKS

The lot layout has now changed, and the updated road hierarchy is shown in Figure 4.2, and has been determined based on the modelling undertaken by GTA for this amendment.

Legend Primary Distributor Integrator B Neighbourhood Connector B Access Street AREA SUBJECTURE PL

Figure 4.2: Proposed Road Hierarchy - Amendment

(Base map sourced from Taylor Burrell Barnett, May 2019)

Further discussion on the proposed road hierarchy, including internal cycle links is provided in Chapter 6 – Analysis of Internal Transport Networks.







INTEGRATION WITH SURROUNDING AREA

5.1. **Surrounding Attractors**

Most of the land surrounding the subject area is currently still rural and has not been developed. Given this, there are limited attractors surrounding the structure plan area. The surrounding attractors could include The Spectacles and Wandi Nature Reserve.

5.2. Trip Attractors/Generators within 800m

The area within 800m is predominantly rural, including Special Rural and Rural Water Resource, as well as urban residential land to the north of Anketell Road and therefore predominantly urban residential. Within the Wandi South Structure Plan area, which lies to the north of the ANLSP area, there will be a future high school and public open space to complement the SP amendment's residential area.

The Anketell South Structure Plan, which lies south of the ANLSP, identifies land zoned as commercial, service commercial and public purpose / community facility, in addition to the residential land and associated public open space.

More locally, the ANLSP is predominantly residential with a future primary school, public open space and community facility.

5.3. Proposed Changes to Land Uses within 800m

The Anketell South Local Structure Plan and the Local Development Plan is within 800m of the SP amendment, on the southern end of Treeby Road. The Local Development Plan was endorsed by the City of Kwinana on 10 August 2017. A small neighbourhood centre has been allocated to the Anketell South SP area despite the area ultimately accommodating only 1,200 residents. This planned centre will ultimately trade to the community to the south of Thomas Road.

Wandi District Centre is planned to be the predominant retail centre in the area immediately to the north of Anketell Road.

5.4. Travel Desire Lines from Structure Plan to these Attractors/Generators

Travel desire lines to local attractors such as the school, community facility and commercial areas will be well catered for when developed as they all lie on direct road routes which will cater for motor vehicles, pedestrians and cyclists. There are no other trip attractors/generators within 800m of the structure plan areas as the surrounding land is predominantly Rural and/or Residential.

5.5. Adequacy and Deficiencies in External Transport Networks

It is understood that Anketell Road will be upgraded to a dual carriageway in the future which is expected to accommodate up to 20,000vpd, consistent with an Integrator B.

Treeby Road between Anketell Road and Thomas Road is either not constructed or constructed to a rural standard. Therefore, Treeby Road will also need to be upgraded or constructed to an urban standard, as per the road hierarchy discussed in Chapter 6.

The construction and upgrading of these roads are required to support the development in the structure plan area and are identified in DCA4. Footpaths and cycling facilities are required to connect the development areas with the wider network, which include the 2.5m dual use path identified in DCA4.



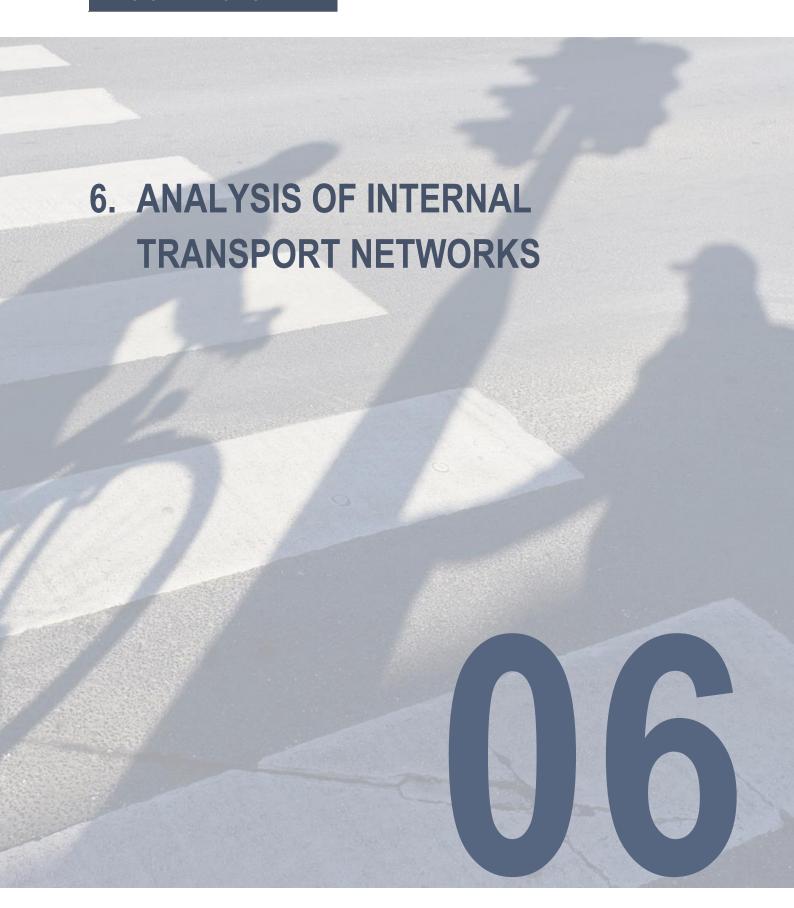
INTEGRATION WITH SURROUNDING AREA

5.6. Remedial Measures to Address Deficiencies

Most of the internal roads will be developed as part of the ANLSP area. The subject area is also subject to DCA4. This includes provisions for contributions to support the upgrading of intersections along Anketell Road, as well as the upgrading of Anketell Road to a single carriageway urban standard westwards of Treeby Road (including reconstruction and alignment, treatment of intersections, kerbing, undergrounding of power, lighting, construction of a 2.5m wide dual use path, drainage and lighting).

Treeby Road is required to be upgraded to a Neighbourhood Connector standard, as per DCA4, and most of the upgrades will be captured by the subdivision of adjacent land. The portion of Treeby Road between Anketell North LSP and Anketell South LSP will be subject to developer contribution fees for the upgrading and construction which is not captured by the land subject to DCA4.







ANALYSIS OF INTERNAL TRANSPORT NETWORKS

6.1. Assessment Year(s) and Time Period(s)

The development has been assumed to be fully developed by 2031, or approximately in 12 years.

6.2. Access Strategy

The access arrangements to/from the SP amendment includes:

- Access 1 a Left in/Left out (LILO) on Anketell Road to the north-west of the site (already approved).
- Access 2 a full movement signalised intersection at Anketell Road / Treeby Road to the north of the site (already approved). This intersection is currently configured as a priority-controlled T-intersection and will connect to the City's planned extension of Cordata Avenue to Anketell Road in the future.
- Access 3 a 4-way roundabout access at the Lyon Road Anketell Road intersection to the north-east of the SP.
 Consultation for the southern leg to connect into the Main Roads WA roundabout has been through the City to date.
- Access 4 a full movement T-intersection at Treeby Road / Thomas Road further south of the site. The City's
 online Intramaps website map as shown in Figure 6.2 confirms that Treeby Road will ultimately be extended to
 form a T-intersection with Thomas Road.

The locations of the proposed access intersections and road connections are shown in Figure 6.1.



Figure 6.1: Proposed Access Points



(Base map sourced from Taylor Burrell Barnett, May 2019)



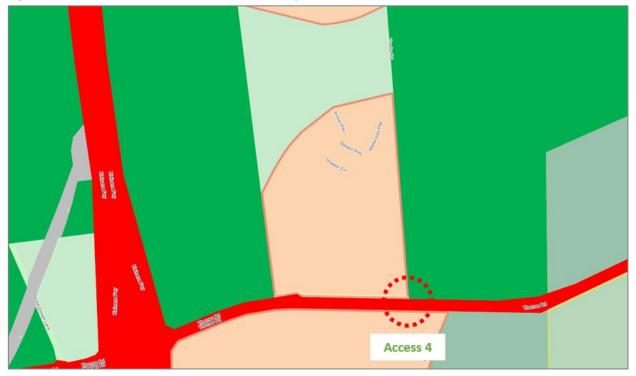


Figure 6.2: SP Amendment Access 4 – Ultimate Treeby Road / Thomas Road T-intersection

(Reproduced from City of Kwinana Intramaps)

6.3. **Future Year Baseline Traffic**

Reference has been made to the most up-to-date¹ strategic modelling outputs from the Main Roads WA Regional Operations Model (ROM 24) to establish the level of background growth to be applied to existing traffic volumes on Anketell Road and Treeby Road.

According to the information sourced from the Main Roads WA ROM model, the projected two-way daily flows on Anketell Road in the vicinity of the ANLSP area is about 18,000vpd in 2031 (including ANLSP traffic as shown in Figure 6.3). It is noted however that the ROM 24 model does not include flows along Treeby Road.

ROM 24 as a strategic model normally incorporates the local links for connection purposes only, in which the turning estimates are either unavailable or they don't represent the true network alignment. As such, reference has been made to Figure 7 in the approved ANLSP Transport Assessment report produced (October 2015) which indicates that the projected background traffic in 2031 (excluding ANLSP traffic) along Treeby Road is expected to be in the order of 1,500 (north of Thomas Road) to 2,500 (South of Anketell Road).

¹ Confirmed by Main Roads WA in an email on 12 November 2018.





Figure 6.3: ROM 24 Link Volume Diagram in the vicinity of ANLSP (x100)

(Source: Main Roads WA ROM 24 model in 2031)

6.4. Structure Plan Generated Traffic

6.4.1. Vehicle Trip Generation

In order to establish an estimate of the potential maximum vehicle trip generation for the SP amendment, reference was made to the proposed land uses and expected activity profiles. GTA also referred to the previous outcomes derived from the approved ANLSP Transport Assessment report produced by Transcore in October 2015. GTA estimated traffic generation impacts using conventional methods and standard trip generation rates extracted primarily from the WAPC Guidelines. Reference has also been made to the *Trip Generation 7th edition, 2003 - Institute of Transportation Engineers (ITE)* and the *RMS NWS Guide to Traffic Generating Developments*.

It is noted that the proposed SP amendment falls within neighbouring SP areas to the north and south which are expected to mainly facilitate residential and commercial development near the proposed ANLSP development. In this



respect, it is important to consider the impact of any traffic travelling through the SP amendment from these external generators. These include:

- External Zone 1 (EZ1); "Anketell South" development to the south of the SP area and it includes Lots 1, 2, 3 & 17
 Thomas Road and Portion of lot 100 Treeby Road, Anketell. This area is expected to include a mixture of low to
 medium residential codes in addition to a commercial use.
- External Zone 2 (EZ2); "Wandi South" development to the north of ANLSP, which accommodates a mixture of low to high residential codes, primary and secondary school sites.

GTA's trip generation methodology is discussed in further detail below.

6.4.2. Structure Plan Generated Traffic

Assessed traffic generation is shown in Table 6.1. Please note the assumed areas relate to the whole of the ANLSP, not just the amendment area, as the trips for the land to the south of Anketell Road also impacts the traffic impact assessment.

Table 6.1: Adopted Trip Generation Rates

Zone	Proposed Land Use	Assumed Area/Number of Lots/Students	Daily Trip Generation Rate	Daily Trips (VPD)
ANLSP amendment	Residential	1,397 (lots)	8 trips per lot per day	11,176
	School	4ha = 600 (students)	2 trips per student (c)	1,200
	Service Commercial*	21,696 (m2)	12 trips per 100 sqm of GFA	2,604
	Community Facility**	12.68ha = 16,514 (m2)	0.58 trips per patron (assuming 300 patrons)	174
Total				15,154

^{*} Trip generation rate for "Office" has been sourced from the NSW RTA Guidelines and was assumed for the service commercial lots.

ANLSP will include around 1,397 residential dwellings, with an assumed average trip generation of 8 trips per dwelling per day, resulting in a total of around 11,176 vehicle trips per day.

The 'Primary School' is assumed to cater for up to 600 students, and the modelling assumes 2 trips per student per day (assuming all car mode which is a very conservative estimate) resulting in 1,200 vehicle trips per day.

For the purpose of the modelling, the 'Service Commercial' lots has been assumed as offices with a trip generation rate of 12 trips per 100 sqm of GFA. This is considered as a moderate trip rate for the various types of service commercial uses that could later be developed under the City's permitted uses and therefore a reasonable assumption. This assumption is also consistent with the approved ANLSP. As advised by Taylor Burrell Barnett, a 30% reduction has been applied to the total area indicated in Table 6.1 for GFA conversion which results in 2,604 trips per day.

The 'Community Facility' has been assumed in the modelling as a function centre with a maximum capacity of 300 patrons. The community facility lot is expected to generate in the order of 174 vehicles per day.

In total, the entire ANLSP is expected to generate some 15,150 trips per day.



[&]quot;Trip generation rate for "Function Centre" has been sourced from the ITE Guidelines and was assumed for community facility lot.

6.4.3. Vehicle Trip Distribution and Assignment

The trips calculated in the trip generation exercise above were distributed onto the road network using the following method and assumptions:

- The assessment year that has been adopted is 2031, with full development of ANLSP amendment, Anketell South, and Wandi South assumed.
- ANLSP was broken down into smaller internal sub-zones in addition to two External Zones (EZ1 and EZ2) to
 capture the through traffic demand from/to Anketell South, and Wandi South. This zone structure divided the
 project area into key traffic sub-areas within the development and by land-use to provide an appropriate traffic
 model. The modelled network is shown in Figure 6.4.
- The major attraction patterns surrounding the ANLSP were analysed in accordance with various traffic counts sourced from the Main Road WA online traffic database. These external distribution percentages are outlined in Table 6.2.

Table 6.2: Adopted External Traffic Distributions

To/From	Distribution Percentage (%)	
10/F10111	Inbound	Outbound
Kwinana Freeway (North), Anketell Road (West)	46.7%	44.3%
Kwinana Freeway (South), Thomas Road (West, East)	52.4%	54.3%
Anketell Road (East)	1.0%	1.4%
Total	100%	100%

- The inbound/outbound distribution percentage assumed to/from Anketell Road East (1.0 1.4%) has been further validated by reviewing future planning to the east of Anketell Road. Reference has been made to the Jandakot Structure Plan Report (DoPLH, August 2007), which identifies a large portion of this land as Rural (see Figure 6.5). It is also noted that a significant portion of land to the east of the ANLSP area is zoned as Rural Water Protection under the Metropolitan Region Scheme (See State Planning Policy 2.3: Jandakot Groundwater Protection also applies to this area and identifies that the minimum lot size for subdivision is 2ha. and it shows that areas to the east of Anketell Road are identified predominantly as rural. An extract from the Final Jandakot Structure Plan is provided in Figure 6.5.
- As outlined in Table 6.3 below, the majority (75%) of the ANLSP's 'Primary School' trips were apportioned internally to the residential lots within the SP area. Given that Anketell South development (EZ1) to the south of ANLSP does not propose a school, the remaining 25% has been allocated to Anketell South (EZ1) to the south of ANLSP given the proximity to the school site. It is noted that Wandi South (EZ2) has access to other primary and secondary school choices within its vicinity.

Table 6.3: Assumed "Primary School" Trip Distribution

Zone	School Trip Proportions	Daily School Trips (VPD)
ANLSP	75%	900
Anketell South (EZ1)	25%	300
Total	100%	1,200

For the "Service Commercial" and "Community facility" lots, the percentages outlined in Table 6.4 have been
applied for the traffic distribution these lots. It is noted that the inbound/outbound external trips for these uses
have been assigned to the external network using the same percentages highlighted in Table 6.2.

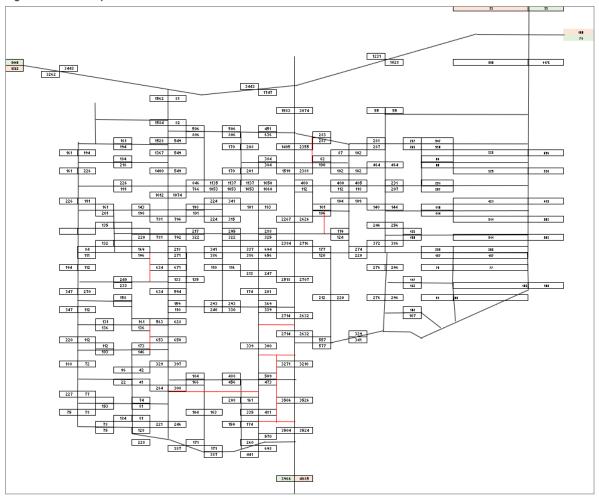


Table 6.4: Assumed "Service Commercial" and "Community Facility" Trip Distribution

	Trip Proportions	Service Commercial Trips (VPD)		
	Service Commercial Lots			
ANLSP (internal)	15%	552		
External	85%	3,128		
Total	100%	3,680		
Community Facility Lot				
ANLSP (internal)	40%	70		
External	60%	104		
Total	100%	174		

- Apart from primary school, service commercial, and community facility related trips, zero internal trips are assumed for the internal residential zones travelling within ANLSP.
- For each internal zone within ANLSP travelling to/from another zone, it was assumed that the vehicle making the trip would be following the shortest path to get to their destination.

Figure 6.4: Excerpt of ANLSP Amendment Traffic Demand Model





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Figure 6.5: Final Jandakot Structure Plan Map

(Source: Extract of Jandakot Structure Plan, Department of Planning, Lands and Heritage Online Website - reviewed in November 2018)

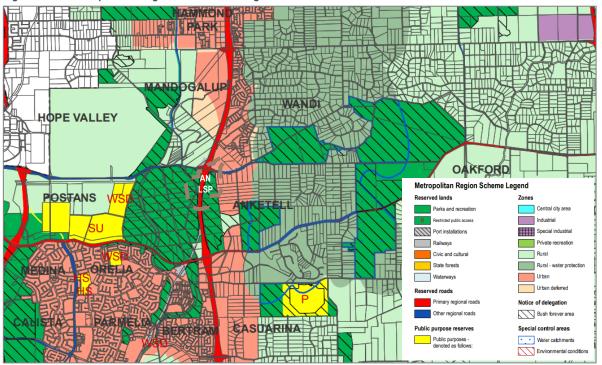


Figure 6.6: Metropolitan Region Scheme Zoning

(Source: MRS Maps, Department of Planning, Lands and Heritage - reviewed in November 2018)



6.4.4. Traffic Flows and Road Hierarchy

The traffic generated within the study area was assigned onto the road network using the methods and assumptions noted above. Future demands for each internal and external zone in addition to background traffic on Anketell Road and Treeby Road were then added together resulting in the daily demands set out in Figure 6.7.

7,600 18,000 950 1,400 800 2,350 1,750 1,350 1,450 8,800 990

Figure 6.7: Estimated Daily Vehicle Demands in 2031 (Total traffic)

(Base map sourced from Taylor Burrell Barnett, May 2019)



On this basis, the proposed internal road hierarchy for the SP amendment was developed, as shown in Figure 6.9. This road hierarchy has been developed using the guidelines and indicative daily traffic volume limits set out in *Liveable Neighbourhoods*, together with the overall design principles and aims for the ANLSP amendment.

Of note is that Treeby Road is proposed as an Integrator B. The existing width of Treeby Road is 20m - 22m (varies along sections). This key north-south road is being proposed as a boulevard design within the already approved 25.2m indicative road reservation width. To avoid the unnecessary CAP roads previously identified along Treeby Road, a road cross section similar to that of Honeywood Avenue, Honeywood (north of Anketell Road in the City of Kwinana) is appropriate with 4m wide carriageway widths, 6m wide median island restricting driveway movements to left-in / left out, shared use pathways on both sides of verge and roundabouts supplemented by occasional median breaks designed for u-tuns where roundabouts are distanced apart. This is an excellent design outcome for Treeby Road in lieu of undesirable CAP roads. Drainage swale in the central median will be limited to areas where the Treeby Road grades are flatter; however, this does not prohibit this boulevard concept being used.

Figure 6.8: Honeywood Avenue cross-section example in Honeywood



(Photomap courtesy of Google Maps)



Legend Primary Distributor Integrator B Neighbourhood Connector B Access Street Laneway

Figure 6.9: Proposed Road Hierarchy

(Base map sourced from Taylor Burrell Barnett, May 2019)

The road reserve widths proposed for each class of road are in line with the *Liveable Neighbourhoods* guidance (indicative), as set out below:

- Integrator B = 29.2m, 2x7.5m including on-street parking, plus an off-street shared path.
- Neighbourhood Connector B = 19.4m. Additionally, streets abutting the western service commercial lots (outside
 of the amendment area) where the westernmost left in / left out to Anketell Road is located, are recommended to
 be constructed to this standard to allow for on-street parking plus shared path on one verge. The verge width for



Neighbourhood Connector B streets can be reduced from 6.2m to 5.5m to reduce the overall reserve width from 19.4m to 18.0m which represents the minimum.

The remainder of the local road network is classified as Access Street A, B, C, and D or laneways with 16.5m – 14.2m road reserve width as follows:

- Access Street A = 20m 24m. The portion of the north-south connection which provides access to the eastern Service Commercial lots and Public Open Space (District Playing Fields) is recommended to be constructed to this standard.
- Access Street B = 16.5m 18m. Streets surrounding the Public Open Space (District Playing Fields) are
 recommended to be constructed to this standard. The access streets adjoining the primary school are also
 recommended to be configured as Access Street B standard in order to allow for on-street parking on both sides
 of the street.
- Access Street C = 15.4m 16m.
- Access Street D = 14.2m (narrower access streets (5.5 to 6m pavement width) may be appropriate in locations
 further away from centres and activity where traffic flows are less than 1,000vpd and a low on-street parking
 demand exists).

6.5. Intersection Types

Given the predominantly residential land use within the ANLSP amendment area, and their weighted one-directional peak hour flows within the internal road network, it is not expected any capacity issues will occur at junctions and that uncontrolled priority and roundabout intersections will be sufficient to accommodate the expected demand.

Roundabouts are suggested along the now 'straighter' north-south alignment of Treeby Road to maintain safe speeds and facilitate traffic movements. This also applies to the intersections adjacent to the community facility and the commercial areas to provide effective circulation for traffic accessing these lots.

A few of the intersections adjacent to the primary school are suggested to operate as roundabouts to assist school peak traffic movements, with priority-controlled intersections for the remaining. These should be further confirmed at the time that the school is planned in detail to ensure appropriate treatments are provided at convenient locations for safe pedestrian, cyclists movement and school drop of pick-up / set down.

A full movement signalised intersection at Anketell Road / Treeby Road to the north of the SP amendment is approved and will remain so. Other intersections on Anketell Road are proposed to operate as a left in / left out and a roundabout. Assessing the expected traffic volumes in the Structure Plan area, intersection controls were reviewed against Table 2.4 from the Austroads publication, *Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings* which provides advice as to intersection performance in peak flow conditions with regards to possible further analysis. This is summarised in Table 6.5.

Table 6.5: Austroads Guidelines

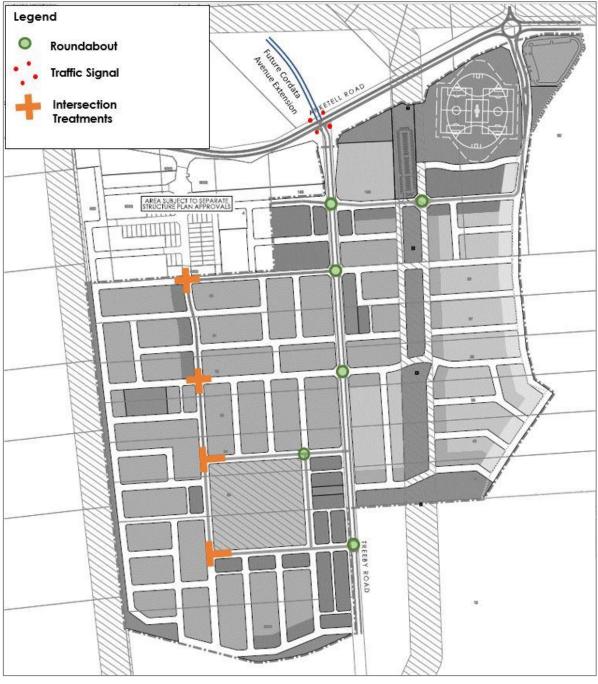
Major Road Type	Major Road Flow (two-way, vph)	Minor Road Flow (two-way, vph)
	400	250
Two-lane	500	200
	650	100
	1,000	100
Four-lane	1,500	50
	2,000	25



The peak volume per hour (vph) would be approximately 10% in the PM peak. The traffic volumes are low enough on the internal network of Access Street so as not to warrant further assessment for the structure plan internal roads. It is expected that all internal intersections should operate at a high level of service (LOS) with minimal delays and queues.

The proposed SP amendment internal traffic management for the control of local intersections is shown in Figure 6.10.

Figure 6.10: Internal Traffic Management



(Base map sourced from Taylor Burrell Barnett, May 2019)



6.6. Future Public Transport and Pedestrian and Cycle Infrastructure

As noted previously in Section 3.2.3, there are no bus routes servicing the subject site currently. The closest bus service to the site is route 537 which runs 1.5km north of the site. The SP area is also well outside of the 800m walkable catchment to/from the nearest train station.

According to information sourced from the approved ANLSP Transport Assessment, bus route 537 will run along the Treeby Road north-south connection and serve Wandi and Anketell cells and provide a good connection between Aubin Grove station and Kwinana station. Another service (Bus Route 545) is planned in the future to service the SP areas to the south of Thomas Road, and provide connection to the Kwinana train station and bus interchange facility.

The SP amendment has been designed in accordance with *Liveable Neighbourhoods* and is cognisant of achieving walkable catchments and a high pedestrian amenity. All streets are recommended to be provided with a footpath on at least one side and a wider footpath is appropriate adjacent to the primary school to enhance the safety of the access to the school. The recommended cycle network is shown in Figure 6.11. Shared paths are recommended along the Integrator B and Neighbourhood Connector roads, as well as along the Western Power Easement on the eastern side of the ANLSP area, providing a cycling connection between the Primary School and the District Playing Fields.

Local access streets with daily traffic flows lower than 3,000 vehicles per day will provide ample opportunity for pedestrians to cross without experiencing delay. The Neighbourhood Connectors which are designed as boulevards also provide greater opportunity for pedestrians to cross safely.

The Neighbourhood Connector roads are suited to on-street cycling as per the (physically separated from cars/trucks), and/or with a shared path on the verge. On April 27 2016, WA's laws were changed to allow cyclists of all ages to use footpaths, unless otherwise signed. The amendment to the *Road Traffic Code 2000* brought WA's bicycle laws into line with the rest of Australia, making it legal for parents to cycle alongside their children on footpaths, improving safety.



Legend Shared Path and On-Road Cycle Lane **Shared Path**

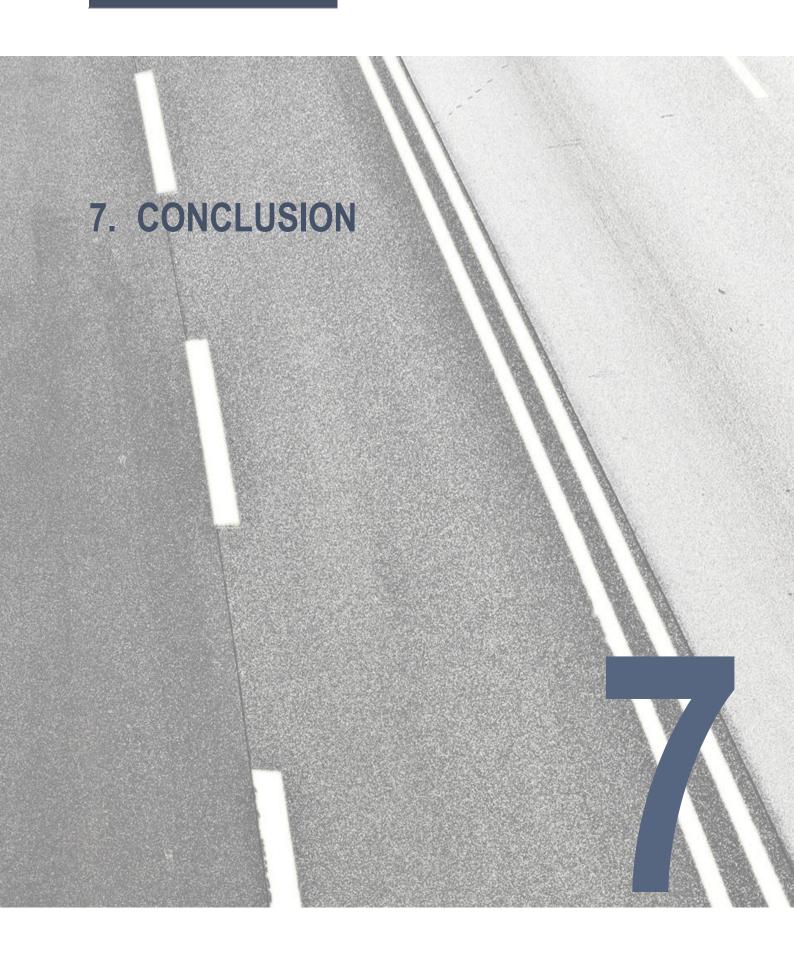
Figure 6.11: Proposed Cycle Network

(Base map sourced from Taylor Burrell Barnett, May 2019)

6.7. Traffic Impact of Development on Local Area

Based on the above assessment it is concluded that the development will have an acceptable impact on the surrounding roads and intersections with no major network changes required to the external transport network over and above what is proposed as part of the amendment.







This Transport Impact Assessment Report has been prepared in support of the amendment to the Anketell North Local Structure Plan ANLSP (The 'SP amendment'). The SP amendment proposes to:

- Relocate the Public Open Space (District Playing Fields) from the centre of the SP to the north-east corner, adjacent to a new roundabout proposed by Main Roads WA at the Lyon Road / Anketell Road intersection, which also results in the realignment of Treeby Road;
- Extend the SP amendment boundary to include the land in the north east corner and designate this land as 'Service Commercial'; and
- Amend the residential density codes slightly which results a change from the approved 1,066 dwellings to 1,397 dwellings.

The ANLSP entire site area covers approximately 86ha identified as 'development zone' immediately east of the Kwinana Freeway reserve. Based on the analysis and discussions presented within this report, the following conclusions are made:

- This site has an approved SP layout for which the future transport networks have been largely mapped out. The
 site layout for the amendment has been developed in this regard and intends to enhance the movement networks
 in the area.
- The relocation of the Public Open Space (District Playing Fields) from the centre of the SP to the north-east corner, effectively enables Treeby Road to remain in its 'straighter' alignment with traffic calming measures via roundabouts and landscaped median in an aesthetically pleasing boulevard style that removes the previously proposed undesirable CAP roads.
- It is proposed to provide footpaths alongside all Neighbourhood Connectors and a minimum of one side of all roads (with key access roads provided with a footpath on both sides).
- Shared use paths and/or on-road cycle lanes are to be provided on key links, including integrator and
 neighbourhood connectors, as well as roads adjacent to the primary school and district open space. A connection
 is also recommended along the Western Power Easement, connecting the primary school to the district playing
 fields.
- Vehicular access to/from the SP amendment has regard to the adjacent structure plan layouts. In total four access points are provided, with three of these expected to be key on Anketell Road.
- The ANLSP in its entirety, including the amendment proposed, is expected to generate some 15,150 vehicle trips
 per day. Most of the vehicle trips accessing the site are expected to do so via the future Anketell Road / Treeby
 Road signalised intersection, followed by the future Lyon Road / Anketell Road roundabout.
- The road network within the SP amendment has been determined based on daily flows and in accordance with Liveable Neighbourhoods.
- The extension of the SP to include additional Service Commercial area will not compromise the traffic network as the daily traffic volumes are supported by an additional Lyon Road / Anketell Road roundabout in addition to the Treeby Road / Anketell Road signalised intersection that was previously assessed for the potential traffic generation. As such, no daily adverse traffic impacts on external roads is expected in terms of overall traffic volume when compared with the current ANLSP.
- It is expected the external traffic generation associated with the SP amendment can be accommodated on the future planned external road network.

The high-level determination of this TIA is that the SP amendment, under the assumed traffic generation and distributions noted in this TIA does not critically compromise the transport network. The location of future intersections and network of links are adequate to support the overall amendment.



CONCLUSION

It can be concluded from the information presented in this TIA that the proposed modifications to the SP can be supported by the future traffic network. Accordingly, the transport characteristics of the SP amendment are considered acceptable.

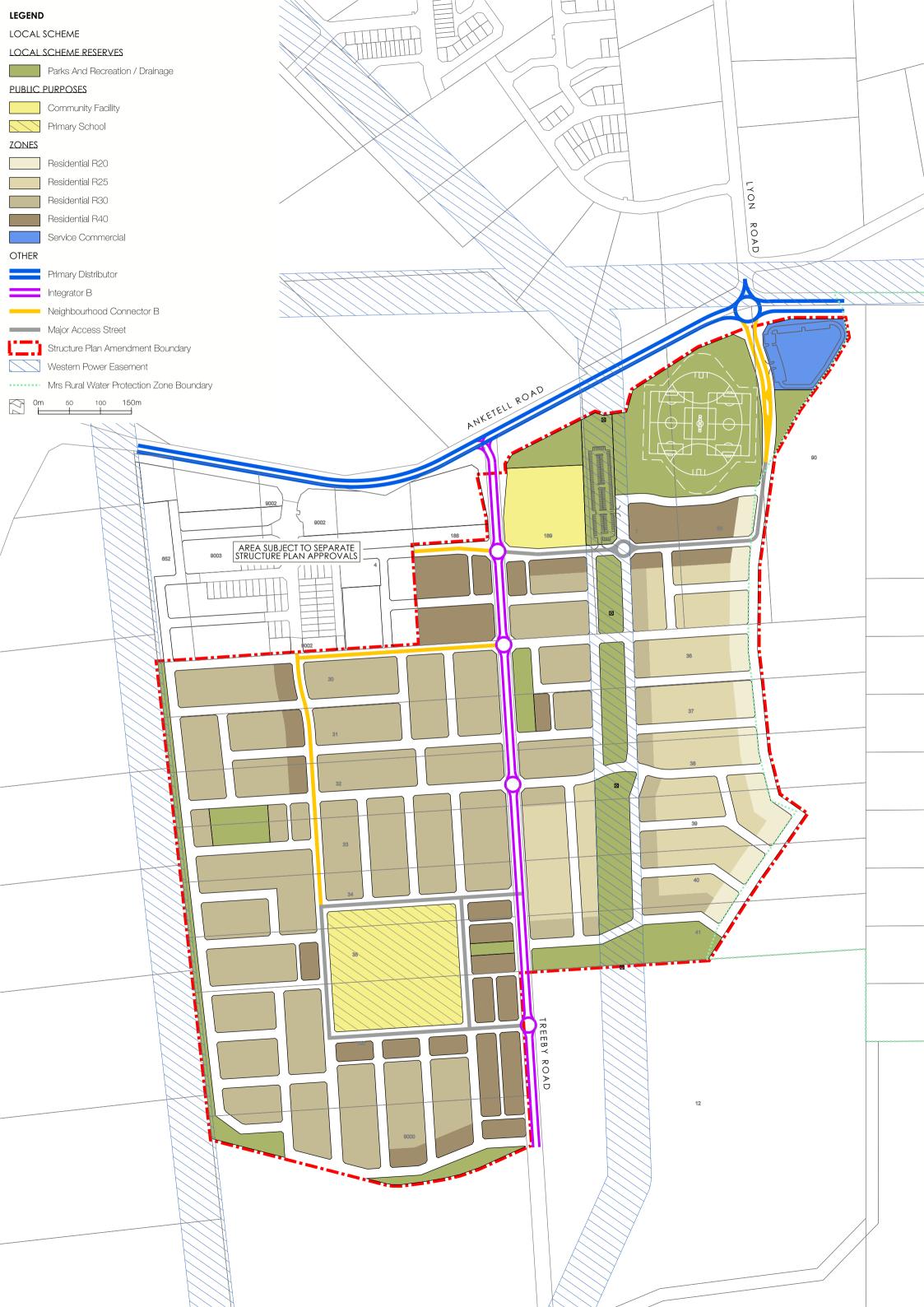
The WAPC checklist is included at Appendix B.



A. PROPOSED STRUCTURE PLAN







B. WAPC GUIDELINES CHECKLIST





APPENDIX: WAPC GUIDELINES CHECKLIST

Item	Provided	Comments/Proposals
Summary	Yes	Provided on page (ii)
Introduction/Background	Yes	Provided as Chapter 1
Structure plan proposal		
regional context	Yes	Provided as Chapter 2.1
proposed land uses	Yes	Provided as Chapter 2.2
table of land uses and quantities	Yes	Provided in Chapter 2.2
major attractors/generators	Yes	Provided as Chapter 2.3
specific issues	Yes	Provided as Chapter 2.4
Existing situation		
existing land uses within structure plan	Yes	Provided as Chapter 3.1
existing land uses within 800 metres of structure plan area	Yes	Provided as Chapter 3.1
existing road network within structure plan area	Yes	Provided as Chapter 3.2
existing pedestrian/cycle networks within structure plan area	Yes	Provided as Chapter 3.2
existing public transport services within structure plan area	Yes	Provided as Chapter 3.2
existing road network within 2 (or 5) km of structure plan area	Yes	Provided as Chapter 3.3
traffic flows on roads within structure plan area (PM and/or AM peak hours)	N/A	No existing traffic flows
traffic flows on roads within 2 (or 5) km of structure plan area (AM and/ or PM peak hours)	Yes	Provided as Chapter 3.4
existing pedestrian/cycle networks within 800m of structure plan area	Yes	Provided as Chapter 3.2
existing public transport services within 800m of structure plan area	Yes	Provided as Chapter 3.2
Proposed internal transport networks		
changes/additions to existing road network or proposed new road network	Yes	Provided as Chapter 4.1
road reservation widths	Yes	Provided as Chapter 4.2
road cross-sections & speed limits	Yes	Provided as Chapter 4.2
intersection controls	Yes	Provided in Chapter 6
pedestrian/cycle networks and crossing facilities	Yes	Provided in Chapter 6
public transport routes	N/A	Current proposal will not change the public transport network
Changes to external transport networks		
road network	Yes	Provided as Chapter 6.4
road network intersection controls	Yes Yes	Provided as Chapter 6.4 Provided as Chapter 6.5



APPENDIX: WAPC GUIDELINES CHECKLIST

Item	Provided	Comments/Proposals
ntegration with surrounding area		
trip attractors/generators within 800 metres	Yes	Provided as Chapter 5.2
proposed changes to land uses within 800 metres	Yes	Provided as Chapter 5.3
travel desire lines from structure plan to these attractors/generators	Yes	Provided as Chapter 5.4
adequacy of external transport networks	Yes	Provided as Chapter 5.5
deficiencies in external transport networks	Yes	Provided as Chapter 5.5
remedial measures to address deficiencies	Yes	Provided as Chapter 5.6
Analysis of internal transport networks		
assessment year(s) and time period(s)	Yes	Provided as Chapter 6.1
structure plan generated traffic	Yes	Provided as Chapter 6.4
extraneous (through) traffic	Yes	Provided as Chapter 6.4
design traffic flows (that is, total traffic)	Yes	Provided as Chapter 6.4
road cross-sections	Yes	Provided as Chapter 6.4
intersection controls	Yes	Provided as Chapter 6.5
access strategy	Yes	Provided as Chapter 6.2
pedestrian/cycle networks	Yes	Provided as Chapter 6.6
safe routes to schools	Yes	Provided as Chapter 6.6
pedestrian permeability & efficiency	Yes	Provided as Chapter 6.6
access to public transport	Yes	Provided as Chapter 6.6
Analysis of external transport networks		
extent of analysis	Yes	Provided as Chapter 6.4
base flows for assessment year(s)	Yes	Provided as Chapter 6.4
total traffic flows	Yes	Provided as Chapter 6.4
road cross-sections	Yes	Provided as Chapter 6.5
intersection layouts & controls	Yes	Provided as Chapter 6.5
pedestrian/cycle networks	Yes	Provided as Chapter 6.6
Conclusions		

Transport Assessor's Name: Tanya Moran / Ahmad Qader / Angela Zhang

Company: GTA Consultants Date: 23/05/19







APPENDIX H ENGINEERING SERVICING REPORT





TABEC Pty Ltd

May 2019 (Revised)



CLIENT: Rpoint Properties Pty Ltd

PROJECT: Anketell North Local Structure Plan Amendment

TITLE: Engineering Infrastructure Report

DOCUMENT REVIEW				
Revision	Date Issued	Written By	Reviewed By	Approved By
1 (DRAFT)	28/10/2018	CBITMEAD		
2	3/12/2018	C BITMEAD		
3	15/5/2019	C BITMEAD		

Note:

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1 INTRODUCTION

TABEC Pty Ltd has prepared this report to support a proposed amendment to the Anketell North Local Structure Plan (ANLSP). Engineering matters were discussed in the Anketell North Local Structure Plan Report prepared by Rowe Group in 2015, therefore this report will focus on engineering related items that have changed in the period from January 2015 until October 2018 and the impact of the changes contemplated by the subject amendment.

It is understood that the proposed amendment to ANLSP has arisen out of a review of the requirement to realign a section of Treeby Road in order to accommodate a district open space (DOS) in an area constrained by the alignment of Western Power overhead transmission lines. Although the DOS is located within the central portion of ANLSP, the topography at the location and the requirement to realign an existing road are considered to be less than ideal. In light of this R-Point Property engaged a consultant team to investigate alternative options for the location of the DOS, the result of which is the subject of this submission.

The investigation and preparation of the report is based on a review of the existing approved Local Structure Plan, preliminary advice from the various service authorities, desktop reviews and site investigations where appropriate. The information is current as of May 2019 and is subject to changes and timing as development proceeds around the subject land. Figure 1 illustrates the proposed amendment area with an aerial image.

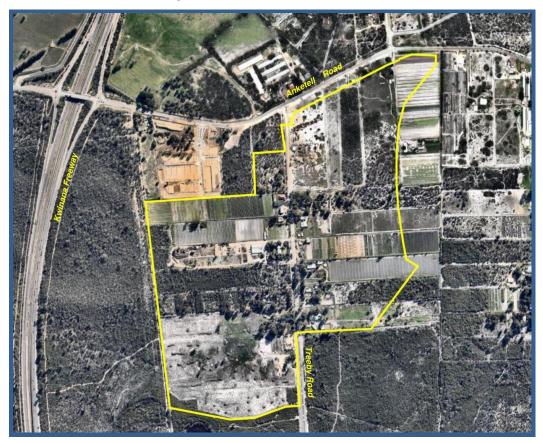


Figure 1 – Site location and aerial image (Nearmap)



The footprint of the proposed amendment area sits within the 2015 ANLSP area, with the significant changes to the plan being the section east of Treeby Road associated with the re-located DOS to a location adjacent to Anketell Road in an area that was partly excluded from the 2015 ANLSP. Within the context of servicing, overall dwelling yield within the amendment area is therefore similar to the 2015 ANLSP. Lots 35, 100 and 9000 Treeby road, occupying the south-west portion of the ANLSP area has an existing conditional subdivision approval issued by Western Australian Planning Commission. As part of this amendment, there are no changes proposed within lots 35, 100 and 9000.

1.1 Landform / Topography

The ANLSP area has undulating topography with site gradients as steep as around 8% (1 in 12). Levels across the site range from a low of around 19.0mAHD up to 41.0mAHD, a difference of over 22 metres.

The central area of the site where the DOS is shown in the current ANLSP has gradients of up to 6% (1 in 16) and a level difference across the proposed DOS site of 12m which would require significant recontouring across a number of existing properties in order to provide viable gradients for the DOS playing fields.

The proposed relocated DOS is in an area where the natural surface level difference is in the order of 3m, requiring comparatively little earthworks to create a useable space for recreational playing fields.

Within the broader ANLSP area, existing landform gradients above about 5.5% would need to be recontoured to ensure that proposed retaining walls constructed as part of subdivision development works are less than 3m high for rear of lot retaining or about 0.75m high for side boundary retaining. Due to the fragmented land ownership across the LSP area, the most optimal development outcomes in terms of landform are often not achieved due to differences in development timing across various landowners requiring tie-ins to existing boundary levels, retention of existing structures and the like. For this reason, the proposed development landform is likely to follow to a degree, the existing landform. Notwithstanding, the most desirable development outcome would minimize site gradients and therefore also minimize the occurrence of high retaining walls which would otherwise need to be contemplated through following the existing site gradients.

To achieve the most optimal development landform across the LSP area adjacent landowners / developers should be encouraged to work together to co-ordinate boundary levels for the benefit of both. This benefit would include a more desirable development landform along with an associated reduction in siteworks and retaining costs.

Given the earthworks required to achieve reasonable development grades, the opportunities to retain vegetation will be somewhat constrained across the LSP area. However an initial review of earthworks across the LSP area indicates an ability to retain some vegetation within some of the POS areas, notwithstanding the requirement to also accommodate stormwater drainage within POS.

1.2 Ground Conditions

Geology mapping for the area indicates the entire area consists of Bassendean (quartz) sands. Although this has not been tested with any specific on ground investigations recent subdivision works undertaken at the northern end of the structure plan area highlight that the site geology is consistent with the mapping.



Typically, Bassendean Sands provide for good permeability of water into the soil profile, provided that there is sufficient freeboard above groundwater level.

Some of the properties within the area have historically or are currently operating as market gardens. As part of any future development, appropriate testing would need to be undertaken to ensure there are no residual contaminants resulting from the pre-development land uses.

Acid sulfate soil (ASS) mapping published by Department of Water shows the majority of the LSP area as having no risk of ASS, with only the eastern and southern margins as having moderate to low risk of ASS. The areas shown as having low risk will require future site investigations to ascertain whether or not potential ASS exists within the area. Despite the moderate to low risk, if potential ASS is found, appropriate management plans to deal with soils disturbed during development construction works will need to be implemented.

2 STORMWATER DRAINAGE

Together with the preliminary earthworks plan, drainage catchments have been determined which has been utilised in the preparation of the amended Local Water Management Strategy (LWMS) by hydrology consultant Bioscience. The report details the stormwater management strategy and how the key design elements in the proposed urban environment include the maintenance of predevelopment flow paths and catchments. While there will be some modification to the natural surface gradients, generally, the post development landform with follow the pre-development landform in relation to high and low points therefore the current drainage catchment will remain, notwithstanding the urban development form.

West of Treeby Road, drainage infiltration basins remain the same as the 2015 Structure Plan. East of Treeby Road, the drainage catchment areas remain similar to the 2015 plan however some of the basins have changed size due to different land use within some of the sub-catchments. In order to optimise land use, there will be a focus to utilise the power transmission line easement for infiltration of stormwater within shallow depth, unfenced basins that would minimise length of time of standing water as far as practical.

Conveyance from source to the swales / basins would be via a pit and pipe system constructed to the requirements of City of Kwinana. Future lots within the LSP area will be responsible for containing stormwater on-site for events up to 18% Annual Exceedance Probability (AEP).

In preparation of this LSP amendment, modelling of the stormwater system has been undertaken by Bioscience within the framework of Better Urban Water Management Guideline (WAPC, 2008a). This modelling will be assessed in further detail during the future detailed subdivision design phase of the developments which will provide full details of water levels, basin volumes for critical storm events and also the details of the underground detention facilities and piped network. This information will be detailed in the Urban Water Management Plans (UWMP), which will be a Western Australian Planning Commission (WAPC) condition of subdivision as stages are developed.

3 WASTEWATER

The proposed LSP amendment area sits within two Water Corporation catchments that have somewhat of an overlap, therefore providing some flexibility with respect to wastewater planning.



The existing lots that front Anketell Road all fall within a catchment for which there is a gravity outfall consisting of a 225mm diameter PVC pipe in Anketell Road that discharges to Thompsons Lake Pump Station 902-63 located east of Kwinana Freeway about 700m north of Anketell Road. The initial stage of development within the Anketell North Local Structure Plan area has dictated the requirement for the sewer in Anketell Road which is shown red in figure 2 below. Water Corporation have advised that this sewer catchment can be extended to the south as far as practical and based on our review, this could encompass areas up to around 500m south of Anketell Road with an elevation generally above about 28.0mAHD at the southern extremity of the catchment.

The balance of the LSP amendment area has a planned gravity sewer discharge through to the recently completed sewer pumping station (Anketell PS174-04) located within the Anketell South Local Structure Plan area. However, proposed sewer servicing of the southern portion of the LSP area is dependent on an outfall sewer constructed between the southern end of ANLSP and PS174-04 adjacent to the wetland that separates Anketell North from Anketell South. This outfall is required to be funded by a developer, or developers within the catchment.

The 250mm diameter pressure main that transfers effluent from PS174-04 runs through ANLSP within Treeby Road reserve. If there are any changes in level and alignment of Treeby Road, the pressure main will need to be modified in some form to suit the Treeby Road changes.



Figure 2 – Existing gravity sewer infrastructure (source: Water Corporation November 2018)



4 WATER SUPPLY

The Structure plan amendment area is located within the Thompsons Lake Gravity Zone which is serviced from north of the site.

With the recent development of the northern portion of the structure plan area, water mains that will ultimately service the whole Anketell North Structure Plan area have already been built within Anketell Road and Albina Avenue. This comprises 250mm diameter mains in Lyon Road and Anketell Road.

Within the structure plan area, a 200mm diameter water main is proposed within Treeby Road. There are also two north-south directional 150mm diameter mains proposed, one either side of Treeby Road. There rest of the mains within the area will consist of 100mm diameter pipework.

All of the water supply network within the structure plan area will be developer funded.



Figure 3 – Existing water supply infrastructure (source: Water Corporation November 2018)

5 POWER SUPPLY

There is currently capacity within Western Power's network to service the development.

Although there are transmission lines that traverse the site parallel to and east of Treeby Road, there is no direct connection to these lines. Instead, power to the proposed area will be sourced from the existing High Voltage power lines in Treeby Road. These power lines in Treeby Road will be converted to underground supply as part of the roll out of development.

In accordance with normal development requirements, the power system will consist of high voltage cable and infrastructure including ground mounted cabinet transformers and switchgear, connected to a



network of low voltage cables connecting end users to the transformers. All HV cabinet infrastructure needs to be installed a level that achieves clearance above proposed stormwater levels.

Other than accommodating the power transmission line easements and physical clearance to towers etc. power supply does not represent an impediment to development within the area.

All roads constructed within the structure plan area will need to have lighting installed to the satisfaction of City of Kwinana, Western Power and relevant Australian Standards. This can include Western Power standard lighting or decorative lighting from Western Powers Streetvision range. Recently introduced by Western Power is an option for LED street lighting.

6 GAS SUPPLY

Recent subdivision works at Albina Avenue, off Anketell Road has bought a gas supply pipe network to the immediate area. It is therefore expected that developers within the LSP area will work with Atco to allow for the gas network to be extended into proposed development areas.

Under current arrangements, the developer will provide a trench in which Atco will install their pipe network. This is considered to be standard practice for subdivision works.

7 COMMUNICATIONS

Recent subdivision works at Albina Avenue, off Anketell Road is included in the NBNCo rollout map therefore expansion of the NBNCo rollout to the immediate surrounding area is considered to be a logical extension that would not require any extraordinary charges (other than the current \$600 per lot fee) to be levied on the developer. However, under this arrangement, the developer is responsible for the design and construction of a pipe and pit network in accordance with NBNCo requirements.

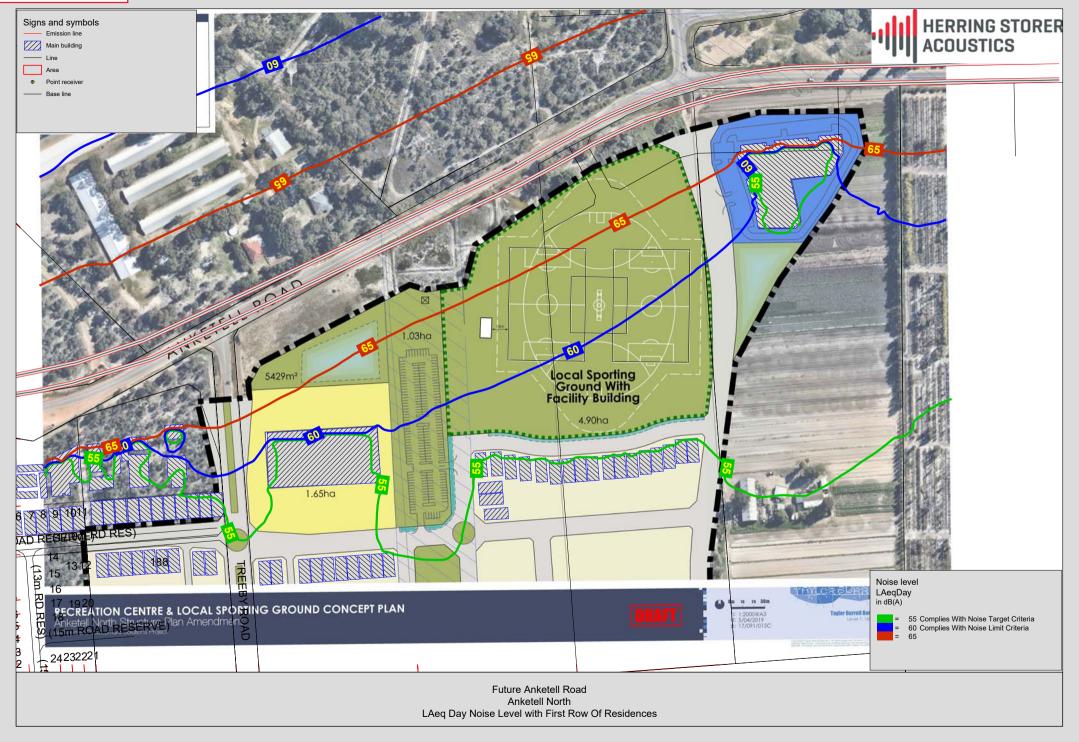
8 ROADWORKS

All roads within the LSP area are required to be constructed in accordance with City of Kwinana requirements. It is expected that all roads will have an asphalt wearing surface with concrete kerb edge restraints. Road reserve and carriageway widths will be in accordance with Liveable Neighbourhoods and City of Kwinana requirements.

Subject to developer discretion, roads and on-street parking areas may include feature such as brick paving or coloured asphalt.

Proposed intersection treatments within the LSP will be in accordance with traffic engineering requirements.

ATTACHMENT O



15.2 Amendment 5 to the Anketell North Local Structure Plan (Lots 7 and 89 Anketell Road) – Consideration of submissions and recommendation to the Western Australian Planning Commission

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

The City of Kwinana has received two proposals to amend the adopted Anketell North Local Structure Plan (ANLSP). These are Amendments 4 and Amendment 5 to the ANLSP which have both been submitted in accordance with Schedule 2, Clause 29(1) of the *Planning and Development Regulations* 2015 (P&D Regulations).

The proposed amendments are quite different in design and scale. Amendment 4 versions A and B affects most of the Anketell North urban area as per Attachments A and B whilst Amendment 5 applies to a small number of lots in the north-west part of the Anketell North urban area (Attachment C). However, the two proposed ANLSP amendments are not compatible and recommend different land uses and design approaches over a number of the same lots. Importantly, the incompatible land uses involve key open space and recreation areas.

As a result, City officers believe it is appropriate to assess both amendments in parallel, consider the issues, determine a preference and then make a recommendation to Council. Council can then inform the Western Australian Planning Commission (WAPC) of its recommendation on this matter so that the WAPC can consider this as part of its final determination on the proposed amendments. Officers of the Department of Planning Lands and Heritage (DPLH) have indicated that this approach to considering the two proposals is appropriate.

The assessment of Amendment 5 to the ANLSP is addressed in this Council Report. An assessment of the proposed merits of Amendment 4 has been undertaken in a separate Council report also presented at this Ordinary Council Meeting (Item 15.1).

In summary, City officers are recommending support for proposed Amendment 4B and are recommending that Amendment 5 be refused. The two key reasons for supporting Amendment 4B are as follows:

- a) The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4, whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre which is identified in the City's Community Infrastructure Plan at this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.
- b) The relocation of the Local Sporting Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. For example, it allows the current Treeby Road reserve to be retained rather than it be closed and relocated and is considered to assist noise management from Anketell Road.

15.2 AMENDMENT 5 TO THE ANKETELL NORTH LOCAL STRUCTURE PLAN (LOTS 7 AND 89 ANKETELL ROAD) – CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

Further, City officers are of the view that proposed Amendment 5, even if considered in isolation to Amendment 4, should not be supported. It is not considered to be an appropriate amendment to the adopted ANLSP Amendment 5 seeks to introduce residential land use to within 50 metres of Anketell Road, a critical freight route. The land in question has previously been excised from the adopted ANLSP given uncertainties in relation to land use, freight and noise impacts associated with Anketell Road.

The adopted ANLSP shows residential land uses 250 metres south of Anketell Road. While the proponent has provided a noise mitigation strategy it has not adequately demonstrated to City officers that a residential land use is appropriate for locations shown in Amendment 5. City officers believe a precautionary approach is required to avoid conflicts between sensitive land uses and the impacts of freight and traffic noise. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP.

The City received 18 submissions on Amendment 5, including three from government agencies. Twelve of the submissions objected to Amendment 5 on the basis that the submitters preferred Amendment 4. The submissions on Amendment 5, and the City's comments on the submissions are summarised in the Schedule of Submissions (Attachment D). The key points raised in the submissions were:

- a) A preference for Amendment 4 because it maintains the existing constructed alignment of Treeby Road.
- b) Realigning Treeby Road will be unnecessarily expensive and complicated.
- c) Preference for Amendment 4 because it relocates the Local Sporting Ground to a flatter area.
- d) Preference for Amendment 4 because it co-locates the Local Sporting Ground with the Recreation Centre.

OFFICER RECOMMENDATION:

That Council makes the following recommendation to the Western Australian Planning Commission (WAPC) in respect to the proposed Amendment 5 to the Anketell North Local Structure Plan (ANLSP);

- 1. Advises the WAPC that it recommends refusal of proposed Amendment 5 for the following reasons;
 - i. A fundamental component of Amendment 5 is to introduce residential land uses to within 50 metres of Anketell Road, a critical and long planned freight route. The land in question has previously been excised from the adopted ANLSP given freight and noise impacts associated with Anketell Road.

The adopted ANLSP does not identify residential land uses on the subject site until approximately 250 metres south of Anketell Road, well south of that proposed on Amendment 5. While the proponent has provided an approach to noise mitigation for the residential uses, City officers believe a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP.

15.2 AMENDMENT 5 TO THE ANKETELL NORTH LOCAL STRUCTURE PLAN (LOTS 7 AND 89 ANKETELL ROAD) – CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

The proponent has not adequately demonstrated to the City of Kwinana that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

- ii. The reduction in POS for Lots 7 and 89 Anketell Road proposed by Amendment 5 is not supported. The amount of POS should remain the same as that approved previously by Council and the WAPC.
- 2. Notwithstanding the above, in the event that the WAPC were to support Amendment 5 the following actions and modifications should apply:
 - a) Inclusion of the following requirements in Part 1 of Amendment 5 text to the City's satisfaction:
 - A Landscape Feature and Tree Retention Plan should be prepared in accordance with Local Planning Policy No 1, to ensure that the retention of significant trees is optimised as part of the subdivision design, civil design and earthworks.
 - The Landscape Feature and Tree Retention Plan should be developed in consultation with the City of Kwinana at the detailed design stage.
 - ii) A Local Water Management Strategy (LWMS) is to be prepared to the satisfaction of the Department of Water and Environmental Regulation and the City of Kwinana. The LWMS shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.
 - iii) Preparation of a Traffic Noise Assessment (TNA) assessing the impact of traffic noise from Anketell Road on residential areas including appropriate noise mitigation measures such as acoustic barriers and / or quiet house design requirements and the timing and stage of their application to the satisfaction of the City of Kwinana. The TNA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 5.
 - iv) A Transport Impact Assessment (TIA) is to be prepared to the satisfaction of Main Roads WA in consultation with the City of Kwinana and in accordance with the Department of Planning Lands and Heritage Transport Impact Assessment Guidelines. The TIA should include details about the design of the proposed left in / left out on Anketell Road and demonstrate the appropriateness of this intersection.

- v) Remove the northern 250 metres of Amendment 5 from the proposal so that the planning for this area defaults to that under the adopted ANLSP. The adopted ANLSP shows this area as being excluded from the operative local structure plan until matters of noise impacts from Anketell Road have been addressed to the satisfaction of the WAPC including addressing the requirements of the State Planning Policy (SPP) 5.4 Road and Rail Transport Noise and Freight Considerations.
- vi) Modify the description for POS Area 5 in the Anketell North Landscape Master Plan to require the Bushfire Management Plan show the position of the Conservation Category Wetland boundary and its 50 m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.
- vii) Modify the Anketell North Landscape Master Plan be to require that the 50 m wetland buffer be revegetated to ensure the area acts as an ecological buffer to the CCW.
- b) Requests that the concerns raised by the Department of Education (DoE) about the future size and configuration of the Primary School (which are yet to be fully articulated by the DoE) be the subject of further consideration and discussions by the Department of Planning, Lands and Heritage, DoE and the City of Kwinana prior to the final adoption of an amended ANLSP by the WAPC.
- c) Request that the WAPC impose a condition on future subdivision applications within the area of ANLSP requiring:
 - i. The provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis.

All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.

No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

- ii. The provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road advising prospective purchasers that the lot is situated in the vicinity of the Anketell Road and is currently affected and/or may in the future be affected by transport noise.
- iii. The preparation of an Urban Water Management Strategy for the area the subject of Amendment 5 to the ANLSP in consultation with the City of Kwinana and Department of Water and Environmental Regulation.
- 3) Note that the conceptual subdivision and lot design shown in Amendment 5 to the ANLSP is not considered appropriate nor supported by the City. A review of the design is required to be undertaken in consultation with City officers at the subdivision stage so that the interface between the residential lots and the POS and the power easement is appropriately treated.
- 4) Endorse the Schedule of Submissions (Attachment D) pursuant to Schedule 2, Part 4, Clause 20(2) of the *Planning and Development Regulations 2015*.
- 5) Advises the WAPC that Council has assessed current Amendment 4 (versions 4A and 4B) and Amendment 5 to the ANLSP in parallel so that it can consider the issues, determine a preference and make its recommendation to the WAPC. The amendments affect similar landholdings and are not compatible. In this respect, it strongly supports Amendment 4B in preference to proposed Amendment 5 to the adopted ANLSP.

The reasons for this are as follows:

- The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4 (version B), whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.
- The relocation of the Local Sports Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. It allows the current Treeby Road reserve alignment to be retained and for a land use to be situated adjacent to Anketell Road that is compatible with traffic noise emissions.
- It will facilitate the greater retention of significant trees within the ANLSP.
- Allows for good traffic access/egress to Anketell Road.

 Allows for the retention of the current alignment of Treeby Road within the ANLSP avoiding the closure and redevelopment of the north – south internal distributor road.

Further, as noted above, the City is of the view that proposed Amendment 5, even if considered in isolation to Amendment 4, should not be supported. The City believes a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise for the area of the proposed amendment. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP. The proponent has not adequately demonstrated to the City that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

6) Forward this Ordinary Council Meeting Report, Council's recommendations and the Schedule of Submissions for Amendment 5 to the WAPC pursuant to Schedule 2, Clause 20 of the *Planning and Development Regulations 2015*.

BACKGROUND:

The area the subject of Amendment 5 is zoned Urban under the *Metropolitan Region Scheme* (MRS) and Development under *Local Planning Scheme No. 2* (LPS2).

Original approved ANLSP

The WAPC granted approval to the original ANLSP on 17 December 2015 (Attachment F). The approved ANLSP excludes the land immediately south of Anketell Road.

When the WAPC granted approval to the ANLSP, it advised (letter dated 18 December 2015) that the following information would be required before the area on the south side of Anketell Road could be considered for inclusion in the ANSLP:

- a) The requirements of State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning would need to be met inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan;
- b) The required type, extent and form of Commercial land uses that will provide for and support the needs of the ANLSP and complement the land uses and development envisaged for the Wandi District Centre; and
- c) Options to provide for safe pedestrian/cycle connectivity between the ANLSP area and the Wandi District Centre.

These requirements have been considered by the City in its assessment of Amendment 5, which includes land excluded from the original ANLSP.

Description of Amendments 1, 2 and 3

Council has considered three previous amendments to the ANLSP (Amendments 1, 2 and 3) which were concerned with various landholdings abutting Anketell Road, to the west of Treeby Road. The areas the subject of the amendments are shown in Attachment G.

Proposed Amendment 4 (Versions A and B)

Amendment 4 covers approximately 87 hectares (ha) of land consisting of multiple landholdings under separate ownership. The location of the proposed amendment is shown in Attachment H. The proposed amendment was advertised twice due to modifications that were made to the amendment following the first period of advertising. Both versions of Amendment 4 (versions A and B) have redesigned large parts of the adopted ANLSP with a key part being the relocation of the Local Sporting Ground from the site shown in the adopted ANLSP to a site closer to Anketell Road in the north-west part of the structure plan. These can be seen on the figures below. Amendment 4A is shown in Attachment A and Amendment 4B is shown in Attachment B.

Another key change proposed is the introduction of Service Commercial land along Anketell Road with the extent of this land use reduced in Version B and the Local Sporting Ground moved north into the area vacated by Service Commercial and the area south of the local sporting ground has been identified as Residential in Amendment 4B

Amendment 4A



Amendment 4B



Proposed Amendment 5

Amendment 5 covers approximately 5.96ha of land. The location of the proposed amendment is shown in Attachment H.

Amendment 5 provides for modifications and updates to provide for the addition of residential lots within the 'Investigation Area 1' affecting the northern portion of Lot 4 Anketell Road. These modifications can be seen by comparing Attachment C to Attachment F. The area the subject of Amendment 5 has the potential to accommodate approximately 56 residential lots.

Amendment 5 also provides for modifications to the residential density (R-Coding), Public Open Space allocation and the internal road layout.

SUMMARY AND RESPONSE TO ISSUES RAISED IN THE SUBMISSIONS

Eighteen submissions were received during the advertising period for Amendment 5, including three from State Government agencies/service providers and 15 from the affected landowners. The issues raised in the submissions on Amendment 5 and the City responses are outlined in the Schedule of Submissions. The main issues are summarised in Table 1 below which largely object to Amendment 5:

 Table 1:
 City officers response to the main issues raised in the submissions

Mai	n Issues Raised In Submissions	City Officers Comments
1.	Local Sporting Ground	
	Prefer Amendment 4 because it relocates the	Noted
	Local Sporting Ground to a flatter area.	
		City officers are recommending
		support for Amendment 4B.
	Prefer Amendment 4 because it co-locates the	Noted
	Local Sporting Ground with the Recreation	
	Centre.	City officers are recommending
		support for Amendment 4B.
2.	Treeby Road alignment	
	Prefer Amendment 4 because it maintains the	Noted
	existing alignment of Treeby Road.	
	Realigning Treeby Road will be unnecessarily	Noted
	expensive and complicated.	
3.	Department of Education	
	The Department of Education's (DoE) has	The concerns raised by the
	significant concern that the allocated size of	Department of Education (DoE) about
	the public primary school site will be	the future size and configuration of
	inadequate to support the increased dwelling	the Primary School (which are yet to
	yield anticipated within the school catchment	be fully articulated by the DoE) be the
	area.	subject of further consideration and
	DoE's support for the draft Amendment will be	discussions by the Department of
	subject to the review of the approved Anketell	Planning, Lands and Heritage, DoE
	North LSP in its entirety to secure a public	and the City prior to the final adoption
	primary school site larger than the standard	of any amended ANLSP by the
	four hectare site required by the DC Policy 2.4.	WAPC.

CITY OFFICERS ASSESSMENT OF AMENDMENT 5

To ensure that the area the subject of the amendment is developed in an orderly and proper manner and achieves the best possible long term planning outcome, City officers considered the following matters for proposed Amendment 5:

Land use compatibility with traffic noise from Anketell Road

Anketell Road is identified as a Strategic Freight Route in the Perth Freight Transport Network Plan for Transport @ 3.5 million (Department of Transport, 2016). As a Strategic Freight Route to the future Outer Harbour, Anketell Road will provide operations for heavy vehicles up to 36.5m in length; and vehicles carrying Over-Size Over-Mass and Heavy Wide Cargos.

In September 2017, the State Government established the Westport Taskforce to investigate a total supply chain solution to Western Australia's growing freight volumes recognising the importance of providing high standard freight corridors to the future Outer Harbour. The provision of freight corridors to connect the future Outer Harbour to the broader metropolitan transport network requires a number of east - west links across the south-west metropolitan sub-region to be upgraded, including Anketell Road.

The future Outer Harbour will need to be capable of operating on a 24/7 basis, and heavy vehicles travelling along Anketell Road may cause night time noise and vibration exposure to properties in the vicinity of Anketell Road.

City officers are of the view that orderly and proper planning and the long term optimal use of the lots adjacent to Anketell Road should take into consideration the potential impact of noise emissions from heavy vehicles travelling along Anketell Road.

State Planning Policy - 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4) (WAPC, 2009) aims to minimise the adverse impact of transport noise on noise sensitive residential development by achieving:

- acceptable indoor noise levels in noise sensitive areas [L_{Aeq(Day)} 40dB(A) in living areas and L_{Aeq(Night)}35dB(A) in bedrooms]; and
- a reasonable degree of acoustic amenity in at least one outdoor living area $[L_{Aeq(Day)} 55dB(A)]$ and $L_{Aeq(Night)} 50dB(A)]$.

The current adopted ANLSP shows a significant setback for residential development from Anketell Road. Portions of the setback are shown as POS, community facility site and an area that is subject to 'Further Investigation'. The 'Further Investigation' area has been excluded until a number of matters have been addressed to the satisfaction of the WAPC, including consideration of noise emissions in accordance SPP5.4.

Residential development is not proposed at present within about 250 metres of the current Anketell road reserve.

Amendment 5 proposes residential development to within about 20 to 30 metres of the future Anketell Road. To support the amendment, the proponent has lodged a noise assessment (Herring Storer Acoustics, January 2019) (Amendment H) which concludes that noise received from future Anketell Road traffic at the ground floor level of the residential lots could exceed acceptable noise levels. However, the noise assessment advises that noise levels would be below the noise limit provided that a barrier (noise wall or like 1.8m high) is constructed at the southern side of the POS, before the first row of houses.

While City officers appreciate that there are engineering and design measures that can be implemented to ameliorate the impact of noise on residential development, consideration must also be given to the local amenity of future communities and the critical significance of Anketell Road as a long term freight route. It is recommended that a precautionary approach to planning be taken for surrounding land uses to avoid any future conflicts between noise and sensitive land uses.

In this respect, the question of suitable alternative land use to a residential use emerges. In this regard, and as noted in the Council Report assessing proposed Amendment 4, the City engaged Macroplan to provide independent advice on the viability of Service Commercial fronting Anketell Road for this part of the ANLSP. In summary, Macroplan has advised that Service Commercial floorspace in this locality is likely to have a significant impact on the viability of the 'Other Retail' floorspace in the City which in turn could affect the timing, staging and total developable area of the designated activity centres in the City. The report supports the provision of up to 5,000m² (equates to 1.35ha of Service Commercial land) of Service Commercial floorspace, particularly for transport-related uses at this location. This recommended limitation of Service Commercial land for this locality means that while the use is appropriate, the extent is limited.

An alternative land use may be POS. The adopted ANLSP already identifies a portion of POS adjoining Anketell Road which may be used partly for drainage purposes. Amendment 4B expands the POS further south to include the Local Sporting Ground and provides further separation of land uses from Anketell Road.

Retention of Significant Trees

The ANLSP was adopted by the WAPC in December 2015 and the Local Planning Policy 1: Landscape Feature and Tree Retention (LPP1) was adopted by the City in September 2016. LPP1 is not intended to be applied retrospectively, therefore, it is the City's view that LPP1 can only apply to any material changes proposed by Amendment 5.

Amendment 5 is generally consistent with the material impact of ANLSP and is does not significantly change the overall developable area.

The proponent has conducted a significant tree survey which identified 6 significant trees within the area the subject of Amendment 5. However, the proponent has not indicated where these trees are situated or how they will be impacted by the proposed development.

City officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring the preparation of a Landscape Feature and Tree Retention Plan in accordance with LPP1, to ensure that the retention of significant trees is optimised as part of the civil design and earthworks. It is recommended that the Landscape Feature and Tree Retention Plan is developed in consultation with the City at the detailed design stage.

Bushfire Management

State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP3.7) (WAPC, 2015) outlines how development and/or land uses should address bushfire risk in Western Australia and it applies to all land which has been designated as a Bushfire Prone Area. The area the subject of Amendment 5 is partially situated within a designated Bushfire Prone Area in the Map of Bushfire Prone Areas (2015).

A Bushfire Management Plan (BMP) has been prepared for Amendment 5 by an accredited assessor (Smith Consulting Bushfire Consultants, January 2019) in accordance with Clause 6.5 of SPP3.7.

Western Power easement

Western Power has advised that Amendments 4 and 5 facilitate the proliferation of development and land use which affect the easement and may result in potential network reliability and public safety risks that would require further assessment by Western Power prior to subdivision or development.

The structure plan, future subdivision and development processes must protect the transmission line corridor and associated assets from encroachment, mitigating public safety or network reliability risks and ensuring there is no impediment to routine and emergency land access to the network.

For this reason, City officers are supportive of additional requirements on the proponent prior to the adoption of Amendment 5 to the ANLSP and at subdivision stage. These are as follows:-

- Prior to subdivision, Western Power will need to review, assess and provide prior written consent to any proposals below within the registered easement, in accordance with standard easement conditions:
 - Landscaping plans (including mature heights and location of species);
 - Ground level changes;
 - Permanent structures;
 - Drainage plans;
 - Conservation controls.
- 2. The additional provisions to be included on the Structure Plan for consideration at the subdivision and development stages:
 - Provision of Section 70A Notifications on all proposed lots adjoining the
 existing Western Power registered easement prior to subdivision clearance
 advising prospective purchasers that they are in close proximity to power
 infrastructure which will be maintained, upgraded and expanded on a
 regular basis.
 - All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.
 - No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

LIVEABLE NEIGHBOURHOODS ASSESSMENT

The WAPC requires LSPs to be prepared in accordance with objectives and requirements of Liveable Neighbourhoods (WAPC, 2009). Amendment 5 has been assessed by City officers against the following elements of Liveable Neighbourhoods:

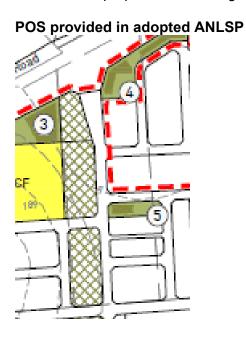
Lot Layout

Amendment 5 will provide approximately 56 residential lots at an R30 density resulting in 16 dwellings per gross urban hectare zoned land and 28 dwellings per residential hectare zoned land. These densities are consistent with the minimum requirements of 15 dwellings per gross urban hectare and 26 dwellings per residential site hectare, set out in Liveable Neighbourhoods.

It should be noted that the conceptual subdivision and lot design shown in Amendment 5 to the ANLSP is not considered appropriate nor supported by the City. A review of the design is required to be undertaken in consultation with City officers at the subdivision stage so that the interface between the residential lots and the POS and the power easement is appropriately treated.

Public Parkland

Amendment 5 proposes to reconfigure the provision of POS as shown in the plans below.





The adopted ANLSP included two areas of POS (Areas 4 and 5) in the Amendment 5 area totalling 5,519m².

Amendment 5 proposes to provide one area of POS totalling approximately 2,769m² in area. There will be a 2,750m² shortfall in POS between the adopted ANLSP and Amendment 5.

Table 2: Summary of POS requirements

	POS Required	POS Provided
10% POS (Gross subdivisible area approx. 50,960m²)	Approx. 5,096m ²	-
Max restricted permitted (80%)	-	-
Min unrestricted permitted (20%)	-	-
Non credited	-	-
Total credited POS (80% restricted & 20% unrestricted)		Approx. 2,789m ²

The proponent suggests that the POS surplus provided in the adopted ANLSP be utilised by Amendment 5 to offset the reduced area of POS being provided by Amendment 5. City officers do not support the reduction in the amount or the relocation of POS in Amendment 5.

The POS shown in Amendment 5 is likely to function as a small informal 'kick about' area for local children and its proposed location adjacent to Anketell Road is not considered appropriate for this type of use. It is also likely that the dwellings nearest Anketell Road will require a sound barrier which may isolate the POS from the residential area.

Urban Water Management

The following water management plans and strategies have been prepared for the area the subject of Amendment 5. These strategies include:

- Jandakot Drainage and Water Management Plan Peel Main Drain Catchment (Department of Water, 2009); and
- Anketell North Urban Cell Local Water Management Strategy (Bioscience November, 2014).
- Lot 7 Anketell Road, Anketell Local Water Management Strategy (Development Consulting Engineers, March 2019).

These plans address water management within the area the subject of Amendment 5 providing a greater level of detail at each successive stage of the planning process. The system of stormwater management proposed for the area the subject of Amendment 5 in the LWMS (March, 2019) is consistent with the Better Urban Water Management guidelines and the Local Water Management Strategy (Bioscience March, 2014) that was approved as part of the adopted ANLSP.

Utilities

The Engineering Infrastructure Report (Development Consulting Engineer, March 2019) prepared to support Amendment 5 does not identify any major constraints to the provision of water, sewer, electricity, gas and telecommunications services. It is normal practice for the Western Australian Planning Commission to impose subdivision conditions requiring that these services are provided to an urban standard.

The servicing agencies have not raised concerns with respect to Amendments 5.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering a financial or impartiality interest only, the proponent for Amendment 5 is Anketell Property Investments Pty Ltd.

Acts and Regulations

- Environmental Protection Act 1986
- Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)
- Planning and Development Act 2005
- Planning and Development (Local Planning Schemes) Regulations 2015

Schemes

- Metropolitan Region Scheme
- City of Kwinana Local Planning Scheme No. 2

State Government Policies

- Jandakot Drainage and Water Management Plan Peel Main Drain Catchment
- Liveable Neighbourhoods 2009
- Perth Freight Transport Network Plan for Transport @ 3.5 million (DoT, 2016)
- State Planning Policy 3.7 Planning in Bushfire Prone Areas
- State Planning Policy 4.2 Activity Centres for Perth and Peel
- State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning

Local Planning Policies

- Local Planning Policy No. 1 Landscape Feature and Tree Retention
- Local Commercial and Activity Centres Strategy (LCACS)
- Local Planning Policy No. 8 Designing out Crime
- Local Planning Policy No. 7 Uniform Fencing

FINANCIAL / BUDGET IMPLICATIONS:

The cost of preparing Amendment 5 to the ANLSP and advertising has been borne by the applicant.

ASSET MANAGEMENT IMPLICATIONS:

The City will be financially responsible for maintaining POS, roads, verge trees and footpaths within the ANLSP once the area has been developed.

ENVIRONMENTAL IMPLICATIONS:

Metropolitan Region Scheme Amendment 1116/33 to rezone Anketell Cell 3 from Rural to Urban Deferred was assessed by the Environmental Protection Authority (EPA) on 13 March 2006 under the *Environmental Protection Act 1986* (WA). The EPA advised that Amendment 1116/33 did not require formal assessment under the EP Act 1986 and provided advice and recommendations. In particular, the EPA advised that it had not assessed the following issues in its assessment of Amendment 1116/33:

- Drainage
- Wetlands
- Remnant vegetation
- Fauna

- Peel Harvey catchment
- Contamination
- Air emissions
- Noise & Vibration

The EPA's decision to not formally assess Amendment 1116/33 was on the basis that the environmental issues listed above can be resolved during subsequent stages of the planning process.

The area of land affected by the material changes proposed in Amendment 5 represents a small proportion of the overall area the subject of the ANLSP. Similarly the changes to the overall environmental impact of the proposed amendment as assessed by the EPA, are minimal.

The proponent has advised that potential significant impacts to 2.7ha of Threatened Ecological Communities (TEC), will be referred to the Commonwealth Department of Environment and Energy.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objective detailed in the Strategic Community Plan.

Plan	Outcome	Objective
Strategic Community Plan	A well planned City	4.4 Create diverse places and spaces where people can enjoy a variety of lifestyles with high levels of amenity.

COMMUNITY ENGAGEMENT:

The City advertised Amendment 5 to the ANLSP from 17 May 2019 and 7 June 2019 in accordance with Schedule 2, Clause 18 of the P&D Regulations.

Public advertising was conducted in the following manner:

- Nearby land owners and State government agencies were notified of the proposal in writing and invited to comment;
- The proponent erected two signs within the area the subject of the amendment:
- A notice was placed in a local newspaper once over the course of the advertising period; and
- Copies of the Amendment 5 to the ANLSP and relevant documents were made available for inspection at the City's Administration Office and placed on the City's website.

The following State government agencies were notified of the proposal in writing and invited to comment:

- Department of Fire and Emergency Services
- Department of Biodiversity, Conservation and Attractions
- Department of Water and Environmental Regulation
- Western Power
- Water Corporation
- Main Roads WA

A total of 18 submissions were received during the advertising period. The majority of the submissions were from landowners within the amendment area; and from the State Government agencies listed above. The submissions, and City Officer comments on the submissions are summarised in the Schedule of Submissions.

PUBLIC HEALTH IMPLICATIONS:

The City will require that future development applications within the ANLSP area are accompanied by noise studies to demonstrate that the sensitive land uses will not be exposed to unacceptable noise emissions, to the satisfaction of the City.

The City will only support land uses in locations where it can be confident there will not be long-term noise conflicts.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	Future development of the Anketell North area does not meet Council's policies and expectations for quality urban form.
Risk Theme	Failure to fulfil statutory regulations or compliance requirements
Risk Effect/Impact	Compliance
Risk Assessment Context	Strategic
Consequence	Moderate
Likelihood	Possible
Rating (before treatment)	Moderate
Risk Treatment in place	The 60 day period in which the City is required to report to the WAPC, under Schedule 2 Clause 20 of the P&D Regulations, expires on 5 August 2019 (60 days from close of advertising).
	The City will be reporting to the WAPC following the Ordinary Council Meeting on the 10 July 2019.
Response to risk treatment required/in place	The City is to give due regard to the amended ANLSP when providing advice to the WAPC in relation to subdivision applications and making decisions in relation to development applications.
Rating (after treatment)	Moderate

COUNCIL DECISION

491

MOVED CR S MILLS

SECONDED CR D WOOD

That Council makes the following recommendation to the Western Australian Planning Commission (WAPC) in respect to the proposed Amendment 5 to the Anketell North Local Structure Plan (ANLSP);

- 1. Advises the WAPC that it recommends refusal of proposed Amendment 5 for the following reasons;
 - i. A fundamental component of Amendment 5 is to introduce residential land uses to within 50 metres of Anketell Road, a critical and long planned freight route. The land in question has previously been excised from the adopted ANLSP given freight and noise impacts associated with Anketell Road.

The adopted ANLSP does not identify residential land uses on the subject site until approximately 250 metres south of Anketell Road, well south of that proposed on Amendment 5. While the proponent has provided an approach to noise mitigation for the residential uses, City officers believe a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP.

The proponent has not adequately demonstrated to the City of Kwinana that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

- ii. The reduction in POS for Lots 7 and 89 Anketell Road proposed by Amendment 5 is not supported. The amount of POS should remain the same as that approved previously by Council and the WAPC.
- 2. Notwithstanding the above, in the event that the WAPC were to support Amendment 5 the following actions and modifications should apply:
 - a) Inclusion of the following requirements in Part 1 of Amendment 5 text to the City's satisfaction:
 - i) A Landscape Feature and Tree Retention Plan should be prepared in accordance with Local Planning Policy No 1, to ensure that the retention of significant trees is optimised as part of the subdivision design, civil design and earthworks.
 - The Landscape Feature and Tree Retention Plan should be developed in consultation with the City of Kwinana at the detailed design stage.
 - ii) A Local Water Management Strategy (LWMS) is to be prepared to the satisfaction of the Department of Water and Environmental Regulation and the City of Kwinana. The LWMS shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 4B.

- iii) Preparation of a Traffic Noise Assessment (TNA) assessing the impact of traffic noise from Anketell Road on residential areas including appropriate noise mitigation measures such as acoustic barriers and / or quiet house design requirements and the timing and stage of their application to the satisfaction of the City of Kwinana. The TNA shall be prepared and adopted so as to inform subdivision design and / or any development approvals for the area of Amendment 5.
 - iv) A Transport Impact Assessment (TIA) is to be prepared to the satisfaction of Main Roads WA in consultation with the City of Kwinana and in accordance with the Department of Planning Lands and Heritage Transport Impact Assessment Guidelines. The TIA should include details about the design of the proposed left in / left out on Anketell Road and demonstrate the appropriateness of this intersection.
 - v) Remove the northern 250 metres of Amendment 5 from the proposal so that the planning for this area defaults to that under the adopted ANLSP. The adopted ANLSP shows this area as being excluded from the operative local structure plan until matters of noise impacts from Anketell Road have been addressed to the satisfaction of the WAPC including addressing the requirements of the State Planning Policy (SPP) 5.4 Road and Rail Transport Noise and Freight Considerations.
 - vi) Modify the description for POS Area 5 in the Anketell North Landscape Master Plan to require the Bushfire Management Plan show the position of the Conservation Category Wetland boundary and its 50 m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.
 - vii) Modify the Anketell North Landscape Master Plan be to require that the 50 m wetland buffer be revegetated to ensure the area acts as an ecological buffer to the CCW.
- b) Requests that the concerns raised by the Department of Education (DoE) about the future size and configuration of the Primary School (which are yet to be fully articulated by the DoE) be the subject of further consideration and discussions by the Department of Planning, Lands and Heritage, DoE and the City of Kwinana prior to the final adoption of an amended ANLSP by the WAPC.

- Request that the WAPC impose a condition on future subdivision applications within the area of ANLSP requiring:
 - i. The provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis.

All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.

No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.

- ii. The provision of Section 70A Notifications on all proposed lots that may be subject to excessive noise levels from Anketell Road advising prospective purchasers that the lot is situated in the vicinity of the Anketell Road and is currently affected and/or may in the future be affected by transport noise.
- iii. The preparation of an Urban Water Management Strategy for the area the subject of Amendment 5 to the ANLSP in consultation with the City of Kwinana and Department of Water and Environmental Regulation.
- 3) Note that the conceptual subdivision and lot design shown in Amendment 5 to the ANLSP is not considered appropriate nor supported by the City. A review of the design is required to be undertaken in consultation with City officers at the subdivision stage so that the interface between the residential lots and the POS and the power easement is appropriately treated.
- 4) Endorse the Schedule of Submissions (Attachment D) pursuant to Schedule 2, Part 4, Clause 20(2) of the *Planning and Development Regulations 2015*.
- 5) Advises the WAPC that Council has assessed current Amendment 4 (versions 4A and 4B) and Amendment 5 to the ANLSP in parallel so that it can consider the issues, determine a preference and make its recommendation to the WAPC. The amendments affect similar landholdings and are not compatible. In this respect, it strongly supports Amendment 4B in preference to proposed Amendment 5 to the adopted ANLSP.

The reasons for this are as follows:

- The location of the active playing fields (Local Sporting Ground) in proposed Amendment 4 (version B), whilst different from the adopted ANLSP, is considered the best long-term location for this use. In part, this is because the location of the playing fields allows for an integration with the proposed Dry Recreation Centre identified as part of the City's Community Infrastructure Plan for this location. The integrated recreation facilities will front Anketell Road creating a strong presence and visual impact in the urban landscape. Further, the landform at the site reduces the need for significant earthwork to create the appropriate grades for the playing fields.
- The relocation of the Local Sports Ground away from its previous location affords marginally more flexibility to the design and land use for the balance of the local structure plan area. It allows the current Treeby Road reserve alignment to be retained and for a land use to be situated adjacent to Anketell Road that is compatible with traffic noise emissions.
- It will facilitate the greater retention of significant trees within the ANLSP.
- Allows for good traffic access/egress to Anketell Road.
- Allows for the retention of the current alignment of Treeby Road within the ANLSP avoiding the closure and redevelopment of the north – south internal distributor road.

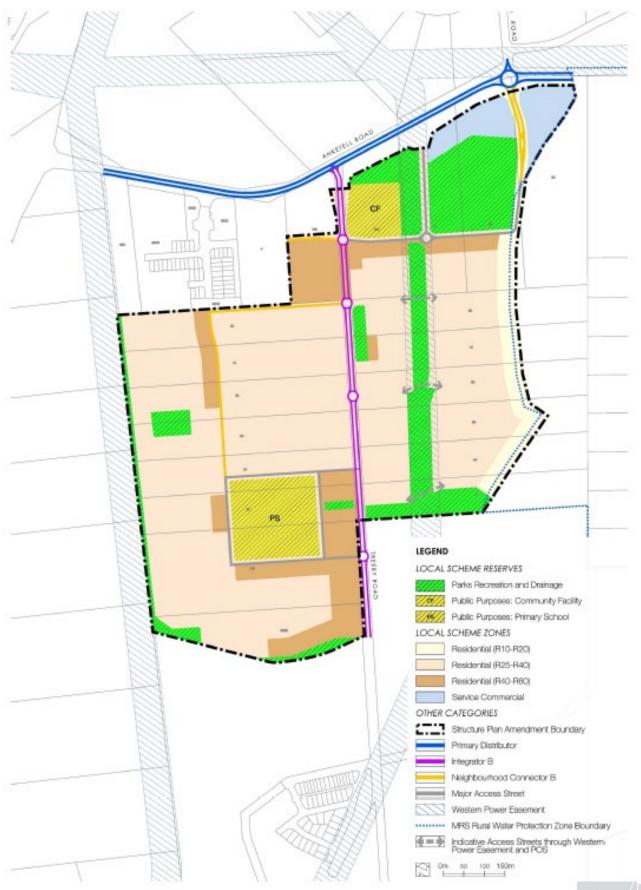
Further, as noted above, the City is of the view that proposed Amendment 5, even if considered in isolation to Amendment 4, should not be supported. The City believes a precautionary approach is required to avoid conflicts between sensitive land uses such as residential and the impacts of freight and traffic noise for the area of the proposed amendment. This is consistent with the position Council has taken in respect to other past amendments to the ANLSP. The proponent has not adequately demonstrated to the City that a residential land use is appropriate for the portion of the subject site previously excised from the ANLSP.

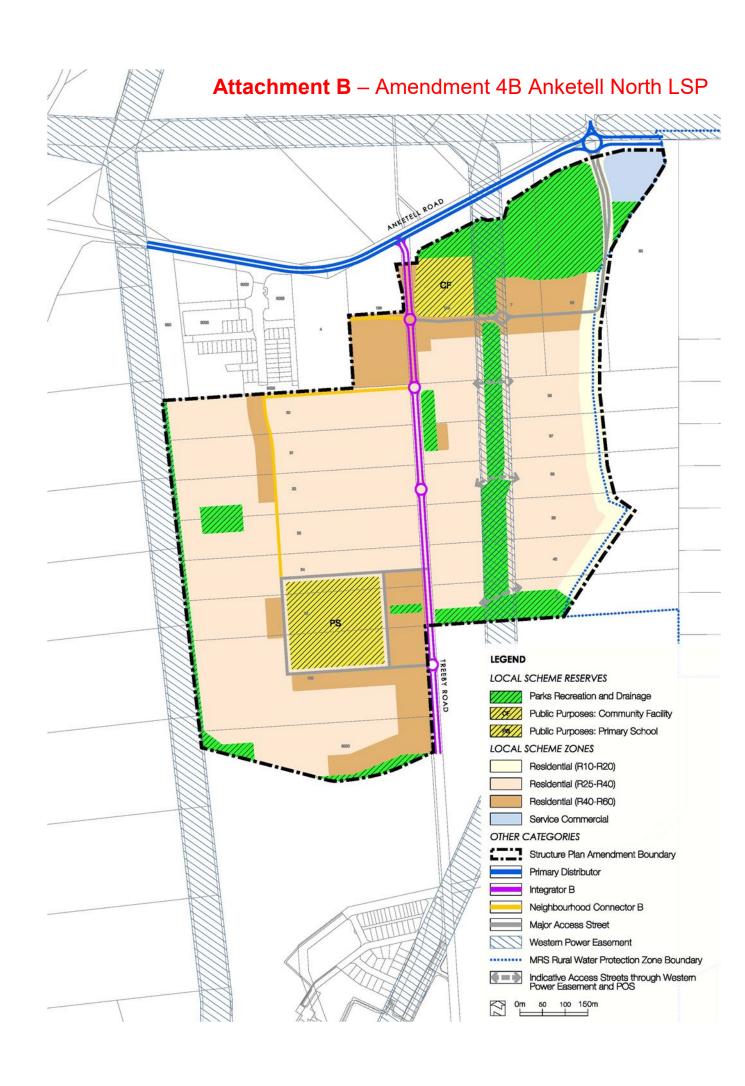
6) Forward this Ordinary Council Meeting Report, Council's recommendations and the Schedule of Submissions for Amendment 5 to the WAPC pursuant to Schedule 2, Clause 20 of the *Planning and Development Regulations 2015*.

CARRIED 8/0

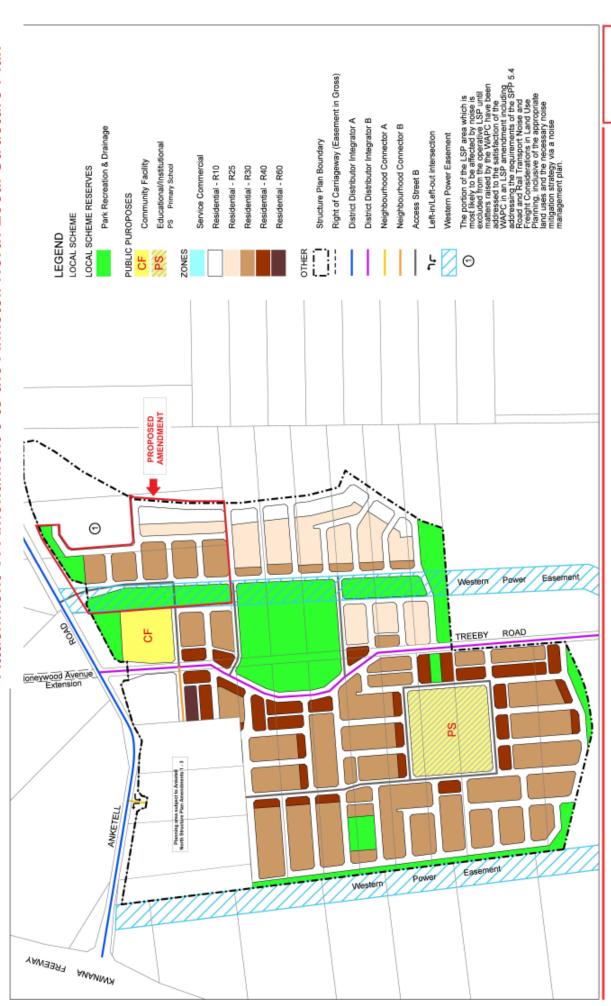
Attachment A

Amendment 4A - Anketell North LSP





Attachment C: Amendment 5 to the Anketell North Local Structure Plan



ANKETELL NORTH LOCAL STRUCTURE PLAN

Veris

PLAN 1

PLE 19223 Administrative VORTAN JAPA (S)

DREADSHIP CALRA DRINGS CALRA ORDIGING P. P.

Chapter of present agreement and the second agreement ag

Plan No.: 20932-7 Revision: REV.8 Scale ::1:6000@N3

Subi	mitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
1.	Department of Biodiversity Conservation and Attractions (same submission as Amendment 4)		Matters of National Environmental Significance The Environmental Assessment Report for the Anketell North Local Structure Plan (Amendment) prepared by Strategen (December 2018) states that development of the site would impact 27 trees considered to provide potential breeding habitat for black cockatoos. The trees are within 9.7 hectares of Black Cockatoo foraging habitat. Development of the site would also require clearing of 9.6 hectares of banksia woodlands which may be considered to be part of the recently been listed "Banksia Woodlands of the Swan Coastal Plain" Threatened Ecological Community (TEC). It would also impact 6.7 hectares of potential Banksia Woodland TEC across areas of the site that have not been surveyed. DBCA notes that within the LSP area, only the proposed development of Lot 7 Anketell Road has been referred to the Department of the Environment and Energy (DoEE) for assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (EPBC 2018/8281). Other developers within the LSP amendment area must also contact DoEE to determine what responsibilities they have under the EPBC Act.	Noted
			Conservation Category Wetland The Landscape Master Plan Anketell North presented as Appendix C (LD Total 5/12/18) shows a neighborhood park (Public Open Space (POS) area 5) within Lot 41 described as "areas of open turf, circulation pathways and drainage treatment basin, public amenity such as picnic facilities". Given that the majority of Lot 41 comprises the 50 metre buffer to a Conservation category wetland (CCW), identified as UFI 13506 in DBCA's Geomorphic Wetlands Swan Coastal Plain dataset, the proposed uses and facilities within the POS are not supported. DBCA recommends that any future planning approval to create the POS be subject to a relevant local government condition requiring revegetation of the 50 m wetland buffer to ensure the area acts as an ecological buffer to the CCW. The EPA's position in Guidance Statement No. 33 is to fully protect the wetland and buffer area and to rehabilitate disturbed areas and manage threatening processes.	Noted City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require that the 50 m wetland buffer be revegetated to ensure the area acts as an ecological buffer to the CCW.
			Fire Management All necessary fire management requirements should be provided for within the development area, in accordance with the provisions of State Planning Policy 3.7 Planning in Bushfire Prone Areas and any other relevant policies. DBCA reiterates that, in accordance with current government policy and guidance, where a 50 m wetland buffer is required for conservation purposes, the entire buffer should be restored and managed to maintain or enhance the adjoining wetland values and should not be used for bushfire protection requirements. The Bushfire Management Plan presented as Appendix B to support the structure plan (Strategen December 2018) should be reviewed and updated to show the position of the CCW boundary and its 50 m buffer and to reflect appropriate vegetation classifications (i.e. Woodland) based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.	City Officers recommend that the description for POS Area 5 in the Anketell North Landscape Master Plan be modified to require the Bushfire Management Plan show the position of the Conservation Category Wetland boundary and its 50 m buffer and to reflect appropriate vegetation classifications based on a fully revegetated wetland buffer in Lot 41. No bushfire management mitigation activities are to impact on or affect remnant vegetation or proposed rehabilitation species within the adjoining CCW or its buffers. Proposed Asset Protection Zones to residential dwellings are to be accommodated within the development area without the need for fuel reduction measures within the CCW or its agreed buffer.

Subr	nitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
	Department of Education	neutai	The Department of Education notes the proposed amendment to a portion of the Anketell North LSP which includes, in part, lifting the area known as 'Investigation Area 1' to provide for additional residential land use and modification to the residential density. Currently, there is a four hectare public primary school site within the Anketell North LSP which is expected to accommodate students in both the Anketell North LSP and Anketell South LSP. The Western Australia Planning Commission's Development Control Policy 2.4- School Sites (DC Policy 2.4) stipulates the requirement for a four hectare stand-alone public primary school site for every residential catchment of 1,500-1,800 dwellings. The current approved Anketell North LSP contemplates an estimated dwelling yield of 1, 180. However, in accordance with the Anketell North LSP Amendment Report, the proposed Amendment would result in an ultimate dwelling yield of 1,483 which equates to an increase of 303 dwellings. Coupled with the anticipated dwelling yield of 420 in the Anketell South LSP, this results in an overall dwelling yield of approximately 1,903 to be serviced by the primary school site in lieu of the maximum 1,800 dwellings permitted. In addition, the Department is aware that the revised density seems to be increasing at subdivisional stage. The Department has significant concern that the allocated size of the public primary school site will be inadequate to support the increased dwelling yield anticipated within the school catchment area. In view of the above, the Department's support for the draft Amendment will be subject to the review of the approved Anketell North LSP in its entirety to secure a public primary school site larger than the standard four hectare site required by the DC Policy 2.4. If additional surrounding land is released that results in more residential development it is likely the Department will require a further primary school site.	Noted It is recommended that City Officers liaise with the Department of Education and the Department of Planning Lands and Heritage concerning the provision of an adequate primary school site in the Anketell urban area.
2.	Department of Water and Environmental Regulation		The DWER has previously reviewed the supporting document Lot 7 Anketell Road Anketell - Local Water Management Strategy (Terranovis Pty Ltd, March 2019) in a separate referral and amendments are required. Please find attached DWER correspondence regarding the review of the LWMS. The DWER cannot support the local structure plan until the Department is satisfied with the LWMS. Accordingly, the proposed structure plan should not be finalised prior to the endorsement of a satisfactory LWMS by the DWER and the City of Kwinana in accordance with BUWM (WAPC, 2008).	City Officers recommend that Part 1 of Amendment 5 be modified to include a provision requiring the Local Water Management Strategy shall be revised to incorporate DWER's requested changes and approved prior to any future approval of the proposed Anketell North Local Structure Plan.
4.	Tina Bazzo Property affected by amendment: Lot 35 (82) Treeby Road, Anketell	Object	Object to Amendment 5 as it is inconsistent with the proposed Amendment 4 to the ANLSP. Amendment 4 is preferred and more desirable as it avoids the realignment of Treeby Road and relocates the playing fields from the top of the hill to more favourable flatter ground on Anketell Road.	Noted
5.	Comley Property affected by amendment: 83 Treeby Road, Anketell	Object	The proposed sporting ground is located on a steep hill and under power lines which requires Treeby Road to be shifted to make it fit. A sewer pump out point line has just been installed for Treeby Park. We oppose this amendment as it contradicts Amendment 4 which places the oval in the area of Lot 7 & 89 Anketell Road. The relocated oval would cost very little compared to the current structure plan.	Noted

SCHEDULE OF SUBMISSIONS Amendment 5 to Anketell North Local Structure Plan

(Advertising Period - 17 May 2019 to 7 June 2019)

Subi	mitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
6.	Dean Fiore Sanpoint Pty Ltd	Object	Strongly object for the following reasons: a. Amendment 5 is seeking a piecemeal change to the current Anketell North	Noted
	Property affected by amendment: 56 Treeby Road, Anketell		LSP, and has no consideration for the broader issues that actually require resolution in the current LSP. These key issues include:	
	,		 i. unnecessary and complicated process of realigning Treeby Road from its current alignment in an area of fragmented land ownership that will impact existing homes and make access difficult for current and future residents. ii. the proposed playing fields being located in a position that is physically 	
			unsuitable for the scale of the planned open space facility given the significant crossfall of the land and it being located on one of the highest points in immediate area. iii. Environmental and Tree retention considerations.	
			b. These first two issues alone add significant costs to the development of the area to both private landowners and developers in extra road and servicing costs, as well as to the DCP for the considerable earthworks and associated costs of creating the playing fields as a level surface.	
			c. The ad-hoc and opportunistic nature of Amendment 5 is highlighted by the fact that it only considers one landowners benefit to obtain some zoning and it has no consideration for the balance of the Urban zoned land that is excluded from the current LSP area in the north eastern portion of the Anketell North precinct – it just continues to ignore this land and doesn't resolve any of the land use studies that are necessary for proper consideration for a holistic planning framework in the area. This just reiterate the self-serving and reactive nature of the proposal, rather than a more comprehensive overall LSP Amendment.	
			d. Amendment 5 also proposes significant areas of residential land be located in proximity to the future freight route along Anketell Road, which will unnecessarily subject a number of home to major noise impacts requiring expensive building conditions to manage noise inside these homes, which is counter-intuitive to housing affordability and residents enjoyment of private outside spaces in their homes.	
			e. Given the land topography across the LSP area, achieving a balance across a number of good planning outcomes including efficient development layouts, retention of significant trees, etc it is a reality that areas such as large public open space areas for playing fields need to be located on the flattest parts of the precinct. This logically therefore positions the required playing fields across the land in the north eastern area of the Anketell North LSP precinct, and if Amendment No 5 is adopted, then the ability for this outcome to be achieved is highly compromised, along with other benefits such as co-location of the playing fields with the Community Facility site.	
			In summary, we believe a more comprehensive and considered Amendment that addresses and solves all of the major issues arising for the development under the current LSP, and takes a more holistic view of the overall precinct is a far better and more equitable outcomes for all landowners in the area. This will provide the best	

Subr	mitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
			chance for the delivery of an integrated community development, and we believe that the previously advertised Amendment 4 went a long way to providing those more holistic solutions for the area.	
7.	GHT Pty Ltd	Object	Object to Amendment 5 on the grounds that:	Noted
	Property affected by proposed amendment: Lot 30 (36) Treeby Road, Anketell		-it is contrary to Amendment 4 to the ANLSP – Amendment 4 is the better planning and community outcome and it fixes the problems associated with realigning Treeby Road into an existing residence and the excessive cost of building playing fields on the hilltop.	
			-This land is better suited to local sporting grounds, co-located next to the future community purpose site, due to topographic and traffic noise issues.	
8.	HPH Solutions On behalf of Bruna and Daniele Volpi Property affected by proposed amendment:	Object	Mr & Mrs Volpi sold Lot 30 Treeby Road under a sale agreement that detailed that they were to retain a lot of 4,000m2, which would include their residence. This property runs along Treeby Road. The purchaser was to subdivide this land to Mr & Mrs Volpi upon subdivision.	Noted
	Lot 30 Treeby Road		Our understanding is that the purchaser of this land assisted in the preparation of the Original Local structure Plan (LSP) that had a road going through the middle of Mr & Mrs Volpi's home, which was in conflict with original agreement.	
			After proposing legal action against the purchaser, we now have a legal agreement that confirms the original intent of the offer, with the block size now being 4,306m2. We have also been advised this subdivision has been lodged and awaiting approval.	
			We were aware of Amendment 4 to the above LSP that retains Treeby Road in present form and are comfortable is supporting this amendment as it allows Mr & Mrs Volpi to retain their residence.	
			We have just been made aware of Amendment 5 that proposes to relocate road through Mr & Mrs Volpi's family home and would like our objection noted to this amendment.	
			The reasons for our objection include:	
			 Mr & Mrs Volpi's family home would have to be demolished to build the new road, removing them from their residence of over 20 years. Our advice is that having public open space (POS) in this area would create significant engineering costs, increasing costs in developing POS. The area of LSP has minimal homes located in the area and therefore should be able to be created without having to demolish a family home. 	
9.	Kenneth Bruce Telfer	Object	The current park location is impeding the development of the property. The new LSP proposal with park and community hall is a better location.	Noted
	Property affected by proposed amendment: Lot 36 (35) Treeby Road, Anketell		The new LSP is an attractive subdivision for Treeby Road, Families will have easy access to functional facilities. The layout of Treeby Road is functional for motorists.	
10.	Kua Hao Su Property affected by proposed amendment:	Object	The process of realigning Treeby Road from its current alignment in an area of fragmented land ownership is both unnecessary and complicated. It would make access difficult for existing residents as well as any future residents.	Noted
	I reporty andotted by proposed amendment.		Laccood difficult for existing residents as well as any luture residents.	<u> </u>

Submitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
Lot 38 (55) Treeby Road, Anketell		 2. The location of the proposed playing field is also not ideal in terms of it being physically unsuitable for the scale of the planned open space facility given the significant crossfall of the land and it being located on one of the highest points in immediate area. These issues not only highlight the impact of significant development costs to private landowners like us, and also developers in terms of extra road and servicing costs but it also impacts the DCP in terms of the considerable earthworks and associated costs required in order to create the playing fields as a level surface. Amendment 5 demonstrates a scheme that is purely self-serving and opportunistic as it fails to consider the balance of the Urban zoned land that is excluded from the current LSP area in the north eastern portion of the Anketell North precinct. Rather than considering a more comprehensive overall LSP Amendment, this proposal choses to ignore issues associated and does not employ land use studies required for proper consideration for a holistic planning framework in the area. In addition, Amendment 5 proposal may also subject a vast number of homes to major noise impacts with its plan to relocate a significant proportion of residential land in proximity to the future freight route along Anketell Road. This would compromise not only resident's enjoyment of private outside spaces in their home and expensive building conditions will be required to manage noise inside these homes, and thus impacting greatly on housing affordability. To achieve a positive planning outcome across several areas, in terms of efficient development layouts, preservation of trees and so forth, the land typography across the LSP area should be carefully considered. With these considerations in mind it is more sensible and environmentally conscious for large public open space areas such as the playing fields to be located on the flattest parts of the precinct. Thus, the playing fields would be more ideally position	
11. Planning Horizons		On behalf of our clients, we reiterate that we support the proposed amendment. The proposal is very similar to the original version of the ANLSP, which our client prefers vastly to proposed Amendment 4. We also believe that Anketell will be far better served by Public Open Space located in the centre of the suburb.	Noted

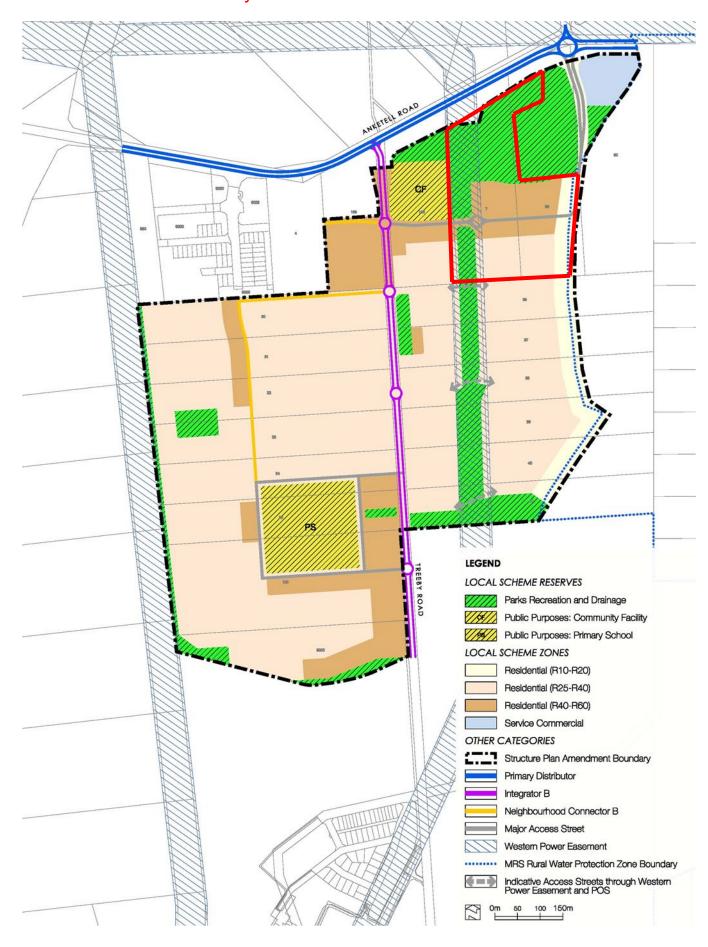
Subn	nitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
12.	Property affected by Amendment: Lot 48 Treeby Road, Anketell	Object	We are deeply passionate about the respective area and its potential for appropriate residential growth and activity and accordingly we must write in a clear objection to the currently Advertised LSP Amendment 5. We feel strongly that the 'reactive' & 'single lot' planning approach to an older LSP is not an appropriate nor holistic planning approach. We note the Amendment is a very isolated amendment to an LSP that is currently fraught with problems (problems that have proven time and time again to stunt the growth in this fantastic area which holds so much potential). An isolated style amendment to this LSP further embeds these issues (commercial, legal, planning, engineering, road alignment, land cross-falls) and limits the options for planning in the future. It clearly will only serve to further enhance the current issues by limiting the options available to unlock the potential of the area. Most specifically it limits playing field and community space options by forcing those items to remain in undesirable and/or unworkable locations. It also, from a planning perspective, indirectly reinforces the integrity of the current LSP which has a major flaw in the Treeby Rd alignment (and legal and commercial issues which flow from that). These issues with LSP Amendment 5 should be taken seriously by the City within the context of the State-wide Strategic Planning Framework, housing affordability requirements, and the dwelling & desnity directions outlined in Directions 2031 and the Perth and Peel @ 3.5 Million framework. Further, in our view it is truly against the principles of good and proper planning to support any such self serving, piecemeal amendment to the LSP which benefits only one landowner; replaces what is currently unzoned/undevelopable land under the current LSP with residential dwellings next to a main truck route; does not appear to have undertaken required depth in planning, environmental, community and noise assessment and considerations that should from the basis of a true LSP Amendment consi	
13.	TBB On behalf of Acumen Property affected by Amendment: Lots 31, 32, 33, 34, 36, 37 and 38 Treeby Road, Anketell	Object	We prepared a comprehensive amendment to ANLSP which extends beyond just our client's land landholdings in the structure plan area and which would ultimately replace the entire existing approved ANLSP. The primary purpose of our amendment is to provide for the District Open Space to be located further north to a more suitable location towards Anketell Road to enable the future local sporting ground and building to be constructed with minimal earthworks and co-located with the future district dry recreation centre, whilst also removing the need for Treeby Road to be realigned.	Noted

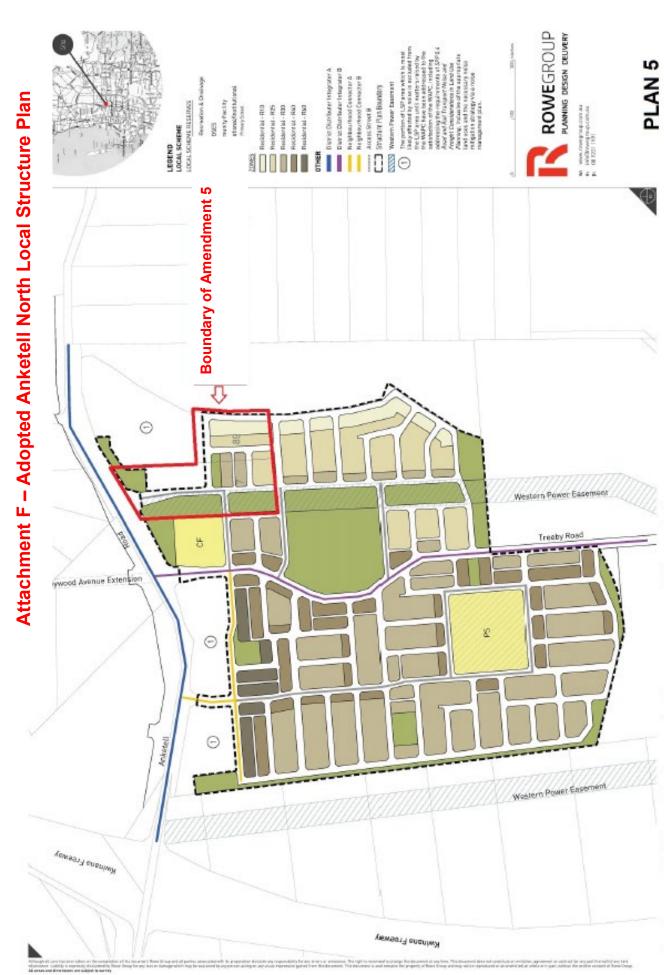
Submitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
		Our comprehensive Amendment addresses a fatal flaw in the preparation and approval of the ANLSP, being the ability to deliver local sporting fields in the location depicted in the ANLSP and realign Treeby Road, due to significant site constraints. These site constraints relate to the topography (slope) of the land, the extent of earthworks (cut and fill) required to deliver level playing fields (max 1% gradient across the playing surface) and the location of a dwelling which is required to be retained on Lot 30 Treeby Road by virtue of a legal agreement. Other landowners and developers in the ANLSP area have been undertaking subdivision of their own land and seeking to progress amendments to the ANLSP over their landholdings to further their own interests and, in doing so, have failed to address these fatal flaws. Amendment 5, and prior to that, Amendments 1, 2 & 3, are examples of recent proposed (and in some cases approved) amendments to ANLSP which have been progressed over landholdings under single ownership which have not attempted to address the fatal flaw to the delivery of local sporting facilities for the benefit of residents in this LSP area and a wider catchment to the north of Anketell Road.	
		We recommend that the City of Kwinana and the WAPC not support Amendment 5 as it represents an ad hoc proposal which is not consistent with orderly and proper planning for the urban development of this area. Approval of Amendment 5, and any further piecemeal amendments to ANLSP over single landholdings, would jeopardise the delivery of essential community facilities to support residential development, in particular the playing fields, and would also likely result in the approved ANLSP being unable to be implemented any further than the current subdivision approvals allow or beyond the lots fronting Anketell Road. This is by virtue of subdivision being able to take place over Lots 189 & 7 if the 'Investigation Area 1' boundary is lifted and a residential land use designation is applied, as proposed under Amendment 5, removing the only suitable option for the location of the local sporting ground.	
		Amendment 5 and proposes Residential R30 for the majority of that lot outside of the Western Power easement along with an unnecessary and costly road connection to Anketell Road in close proximity to the existing and future upgraded intersection of Treeby Road and Anketell Road.	
		In addition to the information we have provided in our Amendment and this submission on the suitability of Lot 7 and adjacent land for the construction of a local sporting ground to support the broader residential catchment in DCA 9 and at considerably reduced cost to all developers in the DCP area, we raise concerns with a residential land use designation on the northern portion of Lot 7 and the provision of a road (Access Street B) and intersection to Anketell Road as proposed in Amendment 5. Our concerns relate to the suitability of noise sensitive land uses so close to Anketell Road which is a major freight distributor road with significant volumes of traffic generating noise which we are not confident has been adequately addressed in the amendment documents.	
		There is no evidence of a noise management plan being prepared and the Acoustic Assessment undertaken by Herring Storer Acoustics (included in the amendment documents as Appendix 2) actually recommends that a "mutually beneficial noise management plan be developed and implemented" in the executive summary. Furthermore, the recommendations for a 1.8m high noise wall between the first row of residences and the POS is hardly a suitable response and no other options, including increasing separation distances to sensitive land uses and alternative land uses appear	

Subr	mitter and property affected by amendment (where applicable)	Overall object / support / neutral	Summary of Submission	City Response
15.	Teranovis Property affected by Amendment: Lot 2 and 3 Anketell Road, Anketell	Support	to have been considered. The provision of approximately 3000m² of POS adjacent to Anketell Road, between the road and the noise wall is also of little utility and no benefit to the community. It can also not be ascertained from the amendment documents what assumptions have been made about the adjoining land uses on Lots 89 & 198 and their role in mitigating or otherwise noise from Anketell Road, nor the extent of any future noise wall along Anketell Road and timeframes for construction of this, nor the assumptions made in regard to the construction of the road surface for the realigned Anketell Road. We support the local structure plan as advertised. We have previously objected to Amendment 4, and request that our objection to Amendment 4 be considered in the light of this submission in support of Amendment 5. The simplest way to solve the issues in this corridor would be an amendment to the DCA to allow Treeby Street to become an DCA item where it is adjacent to the playing fields and to allow the City to use its resumptive powers to purchase the houses and land in the way of the re aligned road and build the road on the alignment shown in the existing approved structure plan. This would be an equitable outcome for all concerned. Alternatively the open space should be moved to be on the eastern side of the power line reserve, on the same lots as to where it is currently located prior to Amendment 4. This would be much more central to the cell then moving it to the north of the cell on lot 7. The structure plan advertised for lot 7 is broadly in line with the existing approved LSP (prior to Amendment 4) and provides for a stable, considered evolution of the approved design. Amendment 4 is a radical departure and results in planning uncertainty for all parties. Structure plans are employed to provide certainty to guide development. Radical changes of structure plans erode confidence in the planning outcomes and act as a disincentive to investment.	City Officers recommend that the WAPC be requested to impose a condition on future subdivision applications requiring Provision of Section 70A Notifications on all proposed lots adjoining the existing Western Power registered easement prior to subdivision clearance advising prospective purchasers that they are in close proximity to power infrastructure which will be maintained, upgraded and expanded on a regular basis. All development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. No development (including fill, fencing, storage or parking) will be permitted within Western Power registered easements without the prior written approval of Western Power or the relevant power line operator.
16.	Massimo Valentino Property affected by Amendment: Lot 39-63 Treeby Road, Anketell	Object	I reject Amendment 5 to the Anketell North Local Structure Plan. I prefer the location of the oval as proposed in Amendment 4.	Noted
17.	Well Holdings Pty Ltd & Trevalley Investments Pty Ltd	Object	Object to Amendment 5 as it is inconsistent with and contrary to proposed Amendment 4.	Noted
	Property affected by Amendment: Lot 9000 & Lot 1000 Treeby Road, Anketell		Amendment 4 is preferred and supported as it avoids the unnecessary cost of realigning Treeby Road and building playing fields at the top of the Anketell Hill. The land the subject of Amendment 5 should be used as the local sporting ground due to better topography and co-location benefits with the future community purpose site.	

	Submitter and property affected by amendment (where applicable)		Overall object / support / neutral	Summary of Submission	City Response
,	8.	P&K White Property affected by Amendment: Lot 37 (49) Trebby Road, Anketell	Object	We feel the new plan is more for the community and City of Kwinana as a whole.	Noted

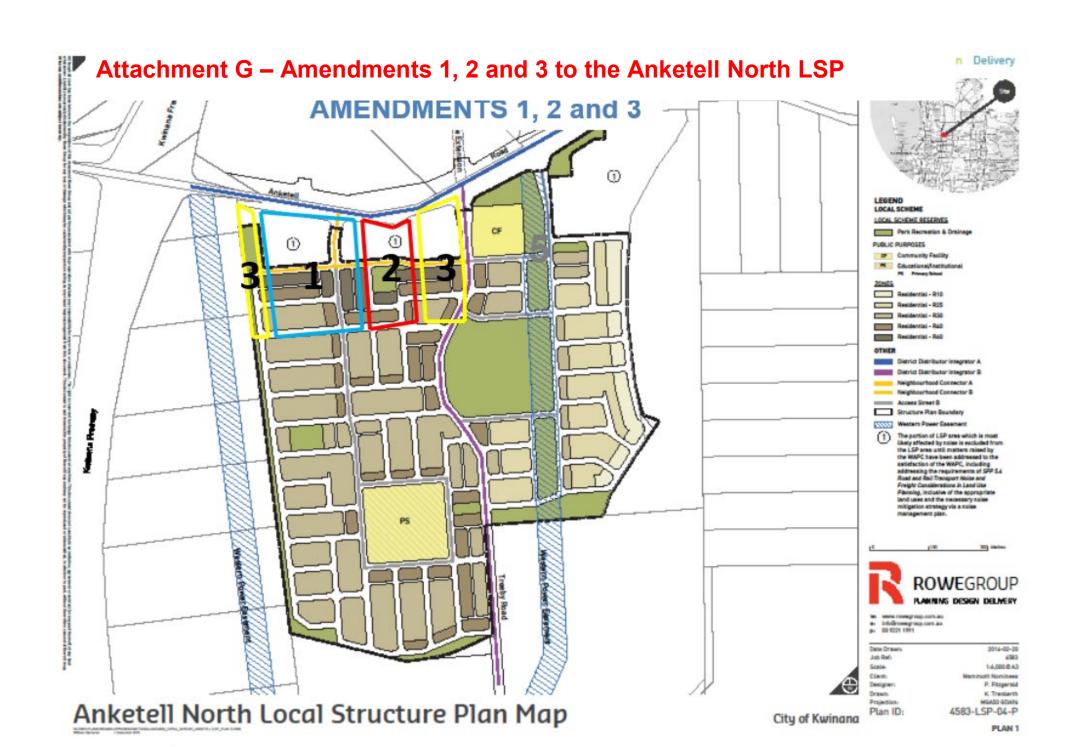
Attachment E - The boundary of Amendment 5 over Amendment 4B to ANLSP

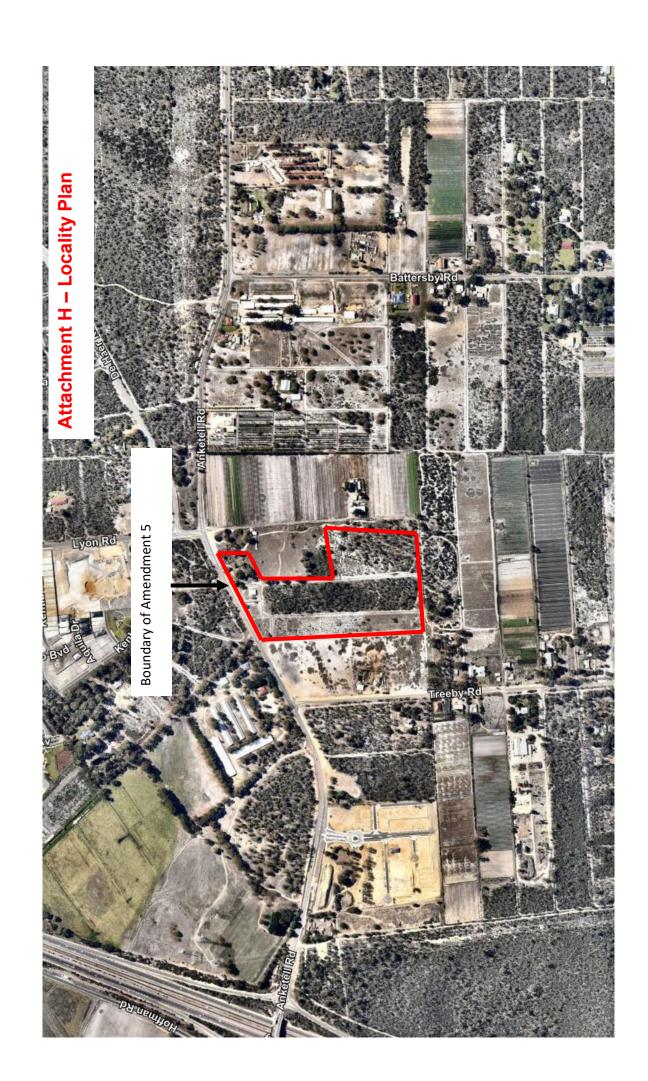




Anketell North Local Structure Plan Map

(Source: Rowe Group, 2019 - modified)







LOT 7 ANKETELL ROAD, ANKETELL

RESIDENTIAL SUBDIVISION ACOUSTIC ASSESSMENT

FOR

TERRANOVIS

JANUARY 2019

OUR REFERENCE: 23917-1-19008



DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT

LOT 7 ANKETELL ROAD, ANKETELL

Job No: 19008

Document Reference: 23917-1-19008

FOR

TERRANOVIS

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APPENDICIES

- A Figure A1 Site Layout Figure A2 – Receiver Location Map
- B Noise Contour Plot
- C Monitoring Results

EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Terranovis, on behalf of Anketell Developments Pty Ltd to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 7 Anketell Road, Anketell from road traffic noise associated with the future Anketell Road.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

 $L_{Aeq(Day)}$ of 60 dB(A); $L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

 $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Additional to the above, noise received at an outdoor area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

From information provided, we understand that Anketell Road may, in the future, undergo a re-alignment, which would affect noise levels onto the development. Therefore, this report considers noise level associated with the proposed future road alignment.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

The results of the acoustic assessment indicate that without any noise amelioration, noise received at the residences in the future would exceed the "Noise Limit" as outlined in the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning".

For residential developments, the possible noise amelioration options that are normally considered are:

- Noise bunds and / or barriers; and
- "Quiet House" design applied to the first row of residences.

A combination of Noise Wall (1.8m high) between the first row of houses and the POS, and Individual noise control in the form of "Quiet House" design has been developed for lots with the details contain within this report. Alternative construction would be possible if a suitably qualified acoustical consultant assessed the individual building requirements at the time of building licence approval.

Note: The residences effected by noise above 55 dB(A) require Notifications on Titles. These Lots have been detailed further in this report.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Terranovis, on behalf of Anketell Developments Pty Ltd to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 7 Anketell Road, Anketell from road traffic noise associated with the future Anketell Road.

This acoustic study has been undertaken to assess the suitability of residential premises in these lots and provide recommendations in regard to noise amelioration.

As part of the study, the following was carried out:

- Measure existing noise levels at the proposed development site, from noise associated with the current Anketell Road traffic.
- Determine by noise modelling the noise that would be received at proposed residences within this stage of the scheme amendment from vehicles travelling on the roadway (Anketell Road) for the future road alignment.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles.

2. CRITERIA

The WAPC released on 22 September 2009 State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations In Land Use Planning". Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to—

- proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and
- proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations —

- for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and
- for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.

Further information is provided in the guidelines.

Table 1: Outdoor Noise Criteria

Time of day	Noise Target	Noise Limit
Day (6 am–10 pm)	$L_{Aeq(Day)} = 55 \ dB(A)$	$L_{Aeq(Day)} = 60 \; dB(A)$
Night (10 pm–6 am)	$L_{Aeq(Night)} = 50 \ dB(A)$	$L_{Aeq(Night)} = 55 dB(A)$

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to the sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot¹.

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot¹. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance

¹ For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.

with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms². For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the quidelines."

The Policy, under Section 5.7, also provides the following information regarding "Notifications on Titles":

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- the potential for transport noise impacts; and
- the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the quidelines).

² For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the quidelines.

An example of a standard form of wording for notifications is presented in the quidelines."

3. NOISE MONITORING

Noise monitoring was undertaken at the boundary of the proposed LSP between the 27th June and the 4th July 2016. From these measurements, the noise received at the development from vehicles travelling along Anketell Road was determined.

The results of the noise data logging are summarised in Table 3.1 with the graphical data contained in Appendix D.

TABLE 3.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Boundary of Development (7 metres from the road edge)	71.0	69.2	62.2

Based on the noise monitoring, the calculated difference between the $L_{A10,18hour}$ and $L_{Aeq,8hour}$, and the $L_{Aeq,16\,hr}$ is -8.8 and -1.8 dB respectively. Also, as the difference between day and night L_{Aeq} noise levels is greater than 5 dB(A) (i.e. 7 dB(A)), the day period is the critical period for compliance.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows 20 years in the future.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Current Anketell Road	Future Anketell Road
Traffic flows	7,226 vpd	20,000 vpd
Heavy Vehicles (%)	19.6%	19.6%
Speed Limit (km/hr)	80/110	80/110
Road Surface	Chip Seal	Chip Seal
Façade Correction	+2.5 dB(A)	+2.5 dB(A)

Noise modelling was carried out for noise received within the development for current traffic volumes and road alignment to calibrate the noise model.

Advice has been provided by WAPC, MRWA and City of Kwinana that there is to be a major upgrade of Anketell Road in the future. This upgrade will likely align the road closer to the development boundary. Advice was also sought on the projected future traffic volumes, with the values shown in Table 4.1 above.

Based on the above information the following scenarios have been considered:

Scenario 1 – Future road alignment with future traffic volumes, no noise control (Appendix B Figure B1).

Scenario 2 – Future road alignment with future traffic volumes, with 1.8 metre noise wall located at the southern side of the POS, before the first row of houses (Appendix B Figure B2).

Design on the future alignment was provided by MRWA, hence has been used for the above scenarios.

5. TRAFFIC NOISE ASSESSMENT

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

 $\begin{array}{ll} \mbox{Living and Work Areas} & \mbox{$L_{Aeq(Day)}$ of 40 dB(A)} \\ \mbox{Bedrooms} & \mbox{$L_{Aeq(Night)}$ of 35 dB(A)} \\ \end{array}$

The results of the acoustic assessment indicate that noise received at the ground floor level of the residential lots located oat the development from future Anketell Road traffic, could exceed the above Target, however, would be below the noise Limit provided a barrier (noise wall or like 1.8m high) is constructed at the southern side of the POS, before the first row of houses.

Table 5.1 details the noise level at the building envelop for each proposed development Lot with Figure 1 in Appendix A showing the location map.

Herring Storer Acoustics

TABLE 5.1 – DEVELOPMENT NOISE LEVELS (GROUND FLOOR)

Scenario 2: Future Traffic Volumes – Future Road Alignment with Noise Wall and Future Residential Buildi		
Location / Lot Number	L _{AeqDay}	Requirements
S1	60	A
S2	59	А
S3	58	А
S4	57	N
S5	57	N
S6	54	Nil
S7	55	N
S8	55	N
S9	56	N
S10	57	N
1 to 45	42 - 54	Nil
46	55	N

Note: Nil No Requirements

N Notification on Title

A Package A Quiet House Design

B Package B Quiet House Design

C Package C Quiet House Design

Hence, to comply with the Policy, the following options have been provided:

- Strata Lots 1 to 3 require Package A Quiet House Design and Notification on Titles.
- Strata Lots 4 and 5 and 7 to 10 require Notification on Titles.
- All other Lots do not require any noise considerations.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

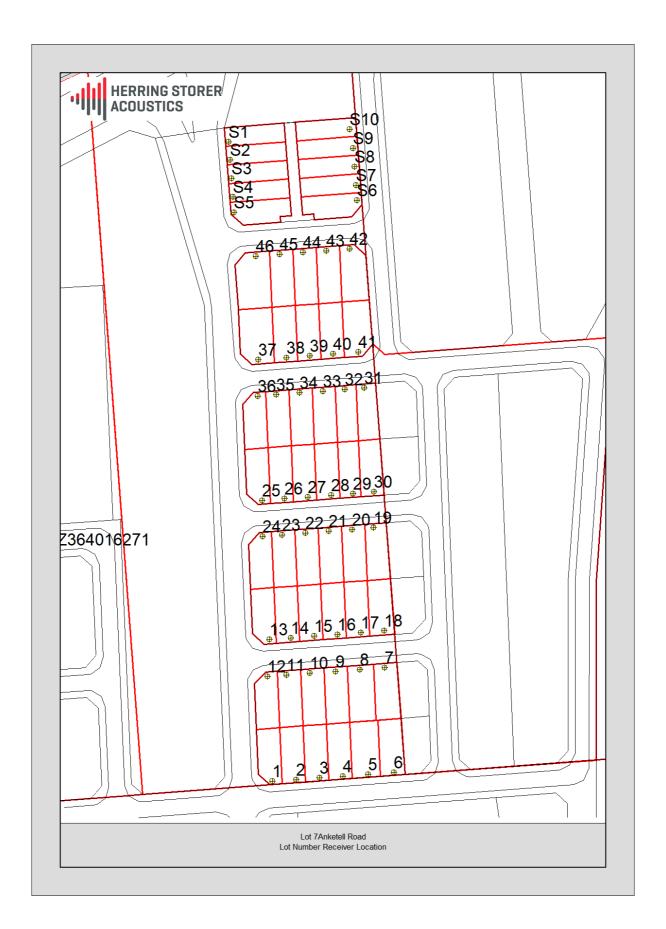
APPENDIX A

FIGURE A1 – SITE LAYOUT
FIGURE A2 – RECEIVER LOCATION MAP

FIGURE A1 – SITE LAYOUT

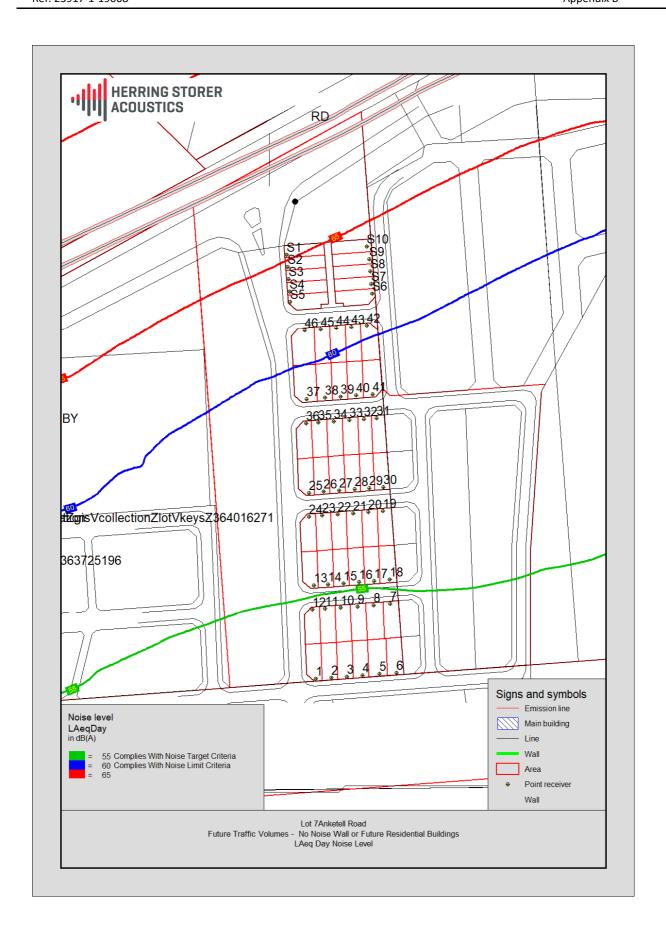


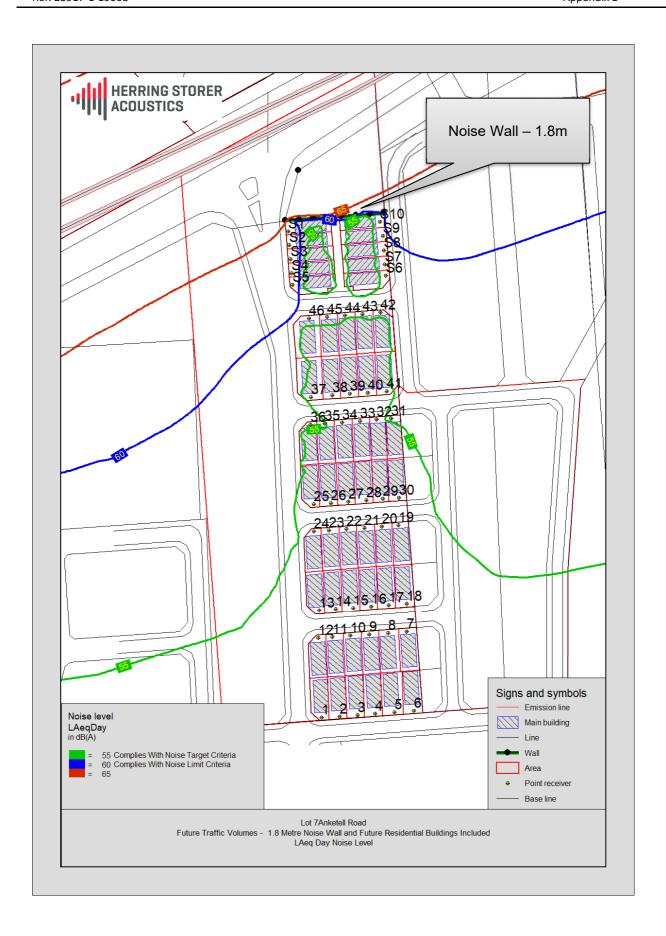
FIGURE A2 - RECEIVER LOCATION MAP



APPENDIX B

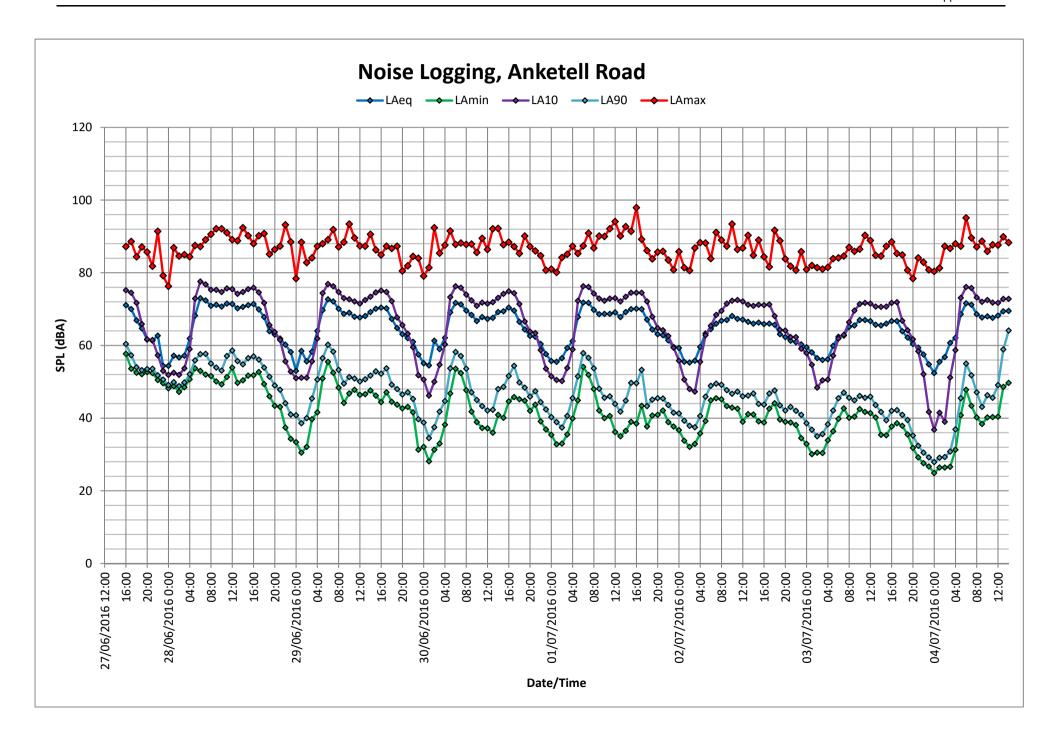
NOISE CONTOURS PLOT





APPENDIX C

NOISE MONITORING RESULTS





Anketell North Structure Plan

Amendment No. 5

Date: 8 March 2019

Version 1.0

A Veris Company Veris

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Prepared by Justin Page

Reviewed by Vernon Butterly

Date 8 March 2019

Document name Anketell North Structure Plan Amendment No. 5

Version 1.0

CERTIFICATION OF APPROVED STRUCTURE PLAN

This Structure Plan is prepared under the provisions of the City of Kwinana Town Planning Scheme No. 2 and in accordance with the *Planning and Development* (Local Planning Schemes) Regulations 2015

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

Date
Signed for and on behalf of the Western Australian Planning Commission
An officer of the Commission duly authorised by the Commission pursuant to section 16 of the Planning and Development Act 2005 for that purpose, in the presence of:
Witness
Date
Date of Expiry of this Structure Plan

TABLE OF AMENDMENTS TO STRUCTURE PLAN

Amendment No.	Summary of the Amendment	Amendment Type	Date approved by the WAPC
1	- Lifting of the 'Investigation Area 1' boundary over Lots 2 & 3 Anketell Road to provide for residential and commercial land uses; and - Minor modifications to residential density (R-Coding) and road layout within predominantly Lots 2 & 3 Anketell Road.		
2	Structure Plan modifications including: - Minor modifications to the road network and residential density (R-Coding) within Lot 652 Anketell Road and Lot 188 Treeby Road.		
3	- Lifting of the 'Investigation Area 1' boundary over Lot 4 Anketell Road to provide for residential and commercial land uses; and - Minor modifications to residential density (R-Coding) and road layout and public open space within Lot 4 Anketell Road.		
4	Currently Subject to Consideration – major amendments		
5	Currently Subject to Consideration Structure Plan modifications including: - Lifting of the 'Investigation Area 1' boundary over Lot 7 Anketell Road to provide for residential land uses; and - Minor modifications to residential density (R-Coding) and road layout within predominantly Lots 7 & 89 Anketell Road.		

Executive summary

This Structure Plan has been prepared to modify the *Anketell North Local Structure Plan* (as amended) originally endorsed by Western Australian Planning Commission (WAPC) on 18 December 2015 ("the approved Structure Plan").

This Structure Plan provides for modifications and updates ('Amendment No. 5') to provide for the addition of residential land uses within the 'Investigation Area 1' affecting the northern portion of Lot 4 Anketell Road.

The Structure Plan amendment also provides for minor modification to the residential density (R-Coding) and the internal road layout predominantly within Lots 4 & 89 Anketell Road. The report provides the rationale and planning framework to support the Structure Plan amendment.

The amendment will provide for a mix of medium density residential development whilst addressing planning matters relating to transport noise. The report demonstrates that the Structure Plan amendment will not have any adverse impact on existing and/or planned development in the immediate and surrounding land.

The proposed amendment is consistent with proper and orderly planning and the current planning framework. Amendment No. 5 will provide appropriate transport connections to the neighbouring land to the south and east to enable other landowners to subdivide in accordance with the approved Structure Plan as amended.

The following table is an updated summary comprising of the entire area of the approved Anketell North Structure Plan, which as a result of Amendment No. 5 now includes the whole of Lot 4 Anketell Road.

Item	Data	Section number referenced within the Structure Plan Report
Total area covered by the Structure Plan	99.63 hectares	2.0
Area of each land use proposed: Zones Service Commercial Residential	3.81 hectares 41.92 hectares	Appendix 9 and 6.2 at Table 1
Reserves Road Reserve Public Open Space & Drainage Public Purpose – Community Public Purpose – Primary School Power Easement	22.55 hectares 16.99 hectares 1.67 hectares 4.0 hectares 4.31 hectares	
Excluded Area ¹	8.69 hectares	6.2
Total estimated lot yield ²	1,483 lots	6.2
Estimated number of dwellings	1,483 dwellings	6.2
Estimated residential site density	39 dwellings per site hectare or 16 dwellings per gross urban hectare	6.2
Estimated Population (average 2.8 people/household)	4,152 people	6.3
Number of Primary Schools	1	Section 4.1 of original approved Structure Plan refer to Appendix 1
Estimated area and percentage of public open space given over to:		
Local Parks Neighbourhood Parks Anketell District Playing Fields Restricted Public Open Space Unrestricted Public Open Space Total Public Open Space	0.51 hectares (2 parks) 5.12 hectares (8 parks) 4.97 hectares (1 oval) 0.42 hectares (0.5%) 10.26 hectares (12.1%)	Appendix 9 and 6.4
	*Community Purpose Site included in total POS	

The balance portion of the original approved Structure Plan area is excluded from the Structure Plan area until matters raised by the WAPC have been addressed to the satisfaction of the WAPC, including addressing the requirements of SPP 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning, inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan.

² Estimates based on total Structure Plan area including the development potential of the 'Excluded Area' subject to Note 1.

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- Appendix 2 Acoustic Assessment
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- Figure 1 Aerial Cadastral Plan
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- Plan 1 Structure Plan Amendment Area
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Acronyms

Acronyms	Description
AHD	Australian Height Datum
ВМР	Bushfire Management Plan (Appendix 3)
EAR	Environmental Assessment Report (Appendix 1)
EPBC Act	Environmental Protection, Biodiversity and Conservation Act 1999 (Commonwealth)
FCT	Floristic Community Type
LN	WAPC Liveable Neighbourhoods (January, 2009 Update 02)
MRS	Metropolitan Region Scheme
MRWA	Main Roads Western Australian
SCP	Subdivision Concept Plan
TA	Transport Assessment (Transcore, March 2019)
TEC	Threatened Ecological Community
TPS 2	City of Kwinana Town Planning Scheme No. 2
WAPC	Western Australian Planning Commission

PART ONE (IMPLEMENTATION)

PART ONE (IMPLEMENTATION)

1.1 Structure Plan Area

The Structure Plan is identified as the *Anketell North Structure Plan* as amended (being Plan No. 20932-7 Rev 8). The Structure Plan shall apply to the land contained within the inner edge of the line denoting the structure plan boundary on the Structure Plan Map.

1.2 Operation

The date the Structure Plan comes into effect is the date the Structure Plan is approved by the Western Australian Planning Commission (WAPC) as set out in the Structure Plan - Certification Page.

1.3 Staging

Given the relatively small area of development, staging is likely to occur within a single stage as shown indicatively in **Plan 2**.

1.4 Subdivision & Development Requirements

1.4.1 Land Use & Permissibility

The Structure Plan Map outlines the Zones and Reserves applicable within the Structure Plan Area and these will guide future subdivision and development of the land. Land use permissibility within the Structure Plan Area shall generally be in accordance with the corresponding Zone under the City of Kwinana Town Planning Scheme No. 2 (TPS 2).

1.4.2 Residential Density

Residential densities for the structure plan area are the residential densities shown on the Structure Plan Map. The Structure Plan shall provide for a minimum 15 dwellings per gross hectare at the subdivision approval stage. A variation to the minimum 15 dwelling target yield may be considered given the substantial areas of non-developable land within the subject site.

1.4.3 Notifications on Title

In respect of applications for the subdivision of land a condition shall be imposed on the grant of subdivision approval for a notification to be placed on the Certificate(s) of Title(s) to advise of the following: -

- (i) Land or lots deemed to be affected by a Bush Fire Hazard.
- (ii) Building setbacks and construction standards required to achieve a Bushfire Attack Level 29 or lower in accordance with Australian Standards (AS3959-2009): Construction of buildings in bushfire prone areas.
- (iii) Lots affected by transport noise.

1.4.4 Local Development Plans

A Local Development Plan (LDP) is required to be prepared and implemented pursuant to the provisions of TPS 2 and the *Planning & Development (Local Planning Schemes)**Regulations 2015, for lots with the following site attributes, but not limited to:

- (i) Lots with direct boundary frontage to an area of Public Open Space; and
- (ii) Lots affected by transport noise under WAPC State Planning Policy 5.4 'Road and Rail Transport Noise and Freight Considerations in Land Use Planning'.

1.4.5 Public Open Space

Public open space is to be provided in accordance with the Structure Plan. Land within the power easement may be included and utilised as restricted public open space.

1.4.6 Bushfire Management

Any land falling within 100 metres of a bushfire hazard identified in the BMP is designated as a Bushfire Prone Area for the purpose of the Building Code of Australia. All subdivision and development of land within the Structure Plan is to be consistent with an approved Bushfire Management Plan.

1.4.7 Other Requirements

a) <u>Development Contribution Arrangements</u>

Under the City of Kwinana Town Planning Scheme No. 2, the following development contribution arrangements apply:

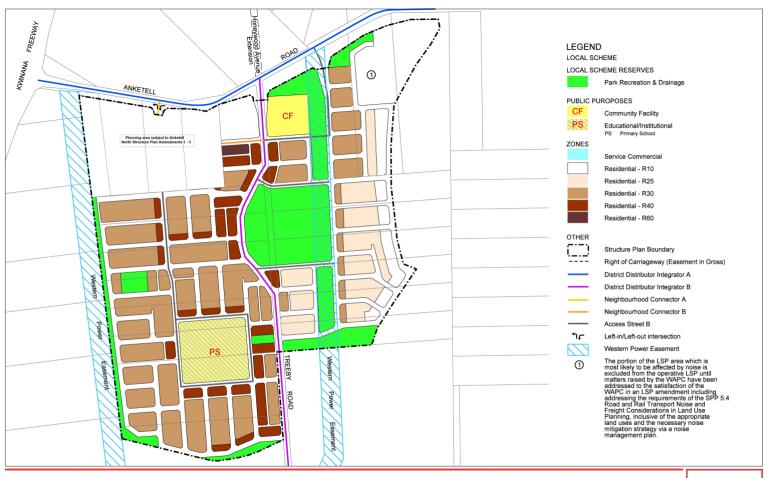
- Development Contribution Area 9 for the funding of community infrastructure; and
- Development Contribution Area 4 for 'hard' infrastructure.

b) Anketell Road Widening

A condition may be imposed by Western Australian Planning Commission on the grant of subdivision approval for land to be set aside as a separate lot(s) pending acquisition for the necessary road widening of Anketell Road. An easement may be required over all of the lot(s) to be set aside for the benefit of the remaining lot(s) for the purpose of providing right of footway, water, sewer, drainage, gas, electricity, telecommunications and other necessary service infrastructure, pending construction of the future road widening.

c) Road Intersections

The intersection of the proposed new internal north-south road and Anketell Road is to be constructed as a restricted movement left-in/left-out intersection, in accordance with Main Roads WA's Vehicle Access Strategy for Anketell Road.



Plan No.: 20932-7 Revision: REV.8 : 1:6000@A3

ANKETELL NORTH LOCAL STRUCTURE PLAN

FILE: 190225 Anketell North Local Structure plan rev9.dgn

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PART TWO (EXPLANATORY)

2 Introduction

This Structure Plan has been prepared as Amendment No. 5 to the Western Australian Planning Commission (WAPC) originally endorsed *Anketell North Local Structure Plan* approved 18 December 2015 ("the approved Structure Plan").

This Structure Plan provides for minor modifications to the road layout and residential densities (R-Coding) of the approved Structure Plan, in addition to identifying land within the investigation area for future residential use.

The approved Structure Plan sets aside approximately 1.23 hectares of land within the northern half of Lot 4 as 'subject to further investigation'. This Structure Plan Amendment No.5 proposes structure planning over the balance of the investigation area for Lot 4 Anketell Road and a small portion of Lot 89 necessary to provide appropriate road layout to complete neighbourhood cells. This will add to the land area of the existing approved Structure Plan, bringing the total area to approximately 99.63 hectares.

Plan 1 shows the actual proposed amendment and **Plan 5** shows the area of the original approved Structure Plan the subject of Amendment No. 5.

As part of the approved Structure Plan, technical reports and planning rationale were provided with the approved Structure Plan documentation. Rather than duplicate this information, which remains relevant (notwithstanding the modifications and updates in this Structure Plan document), **the original approved Structure Plan (2015) should be read in conjunction** with this Structure Plan Amendment No. 5. The original approved Structure Plan (excluding appendices) is contained in **Appendix 6**.

This report provides supplementary updates, details and planning justification for Amendment No. 5 to the approved Structure Plan. Where there is any inconsistency between the approved Structure Plan and this document, this document prevails.

Subdivision is already commencing at Lots 2 & 3 Anketell Road under WAPC conditional subdivision approval. It is anticipated that some other landowners to the west of Treeby Road will subdivide in the short term. Lot 7 Anketell Road will be the pioneering urban development in the eastern portion of Anketell North Structure Plan.

Preliminary discussions were held with key stakeholders which is set out in the 'Pre-Lodgement Consultation' (**Appendix 9**). In addition, various technical investigations have been completed which are attached with the Structure Plan and forms part of the explanatory report.

Given that Lot 89 forms only a small area of Amendment No. 5 and that the general form of development under the approved Structure Plan will not materially change by way of Amendment No. 5, this report primarily focuses on details pertaining to Lot 4 Anketell Road.

3 Land Description

3.1 Location & Description

Lot 4 Anketell Road, Anketell ("the subject site") is situated approximately 31km south of Perth CBD and 11km east of Kwinana Town Centre. The cadastral boundaries with aerial image of the subject site is shown in **Figure 1**. The area of the subject site is approximately 5.96 hectares and is privately owned under single landownership. Table 1 sets out the ownership and land description.

Table 1 ownership details

LOT NO.	ADDRESS	CERTIFICATE OF TITLE	OWNER	AREA (HA)
7	734 Anketell Road	2115/210	Anketell Property Investments (WA) Pty Ltd	5.96

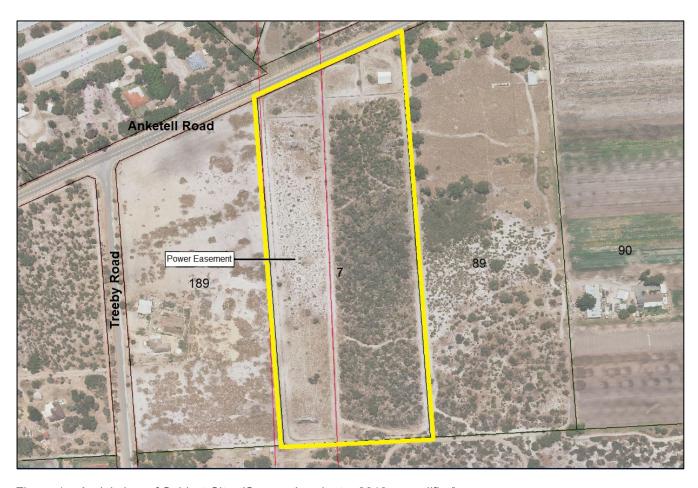


Figure 1. Aerial view of Subject Site (Source: Landgate, 2019 – modified)

3.2 Existing Use and Surrounding Land Use

The subject site has been partially cleared within the high voltage power easement corridor and to accommodate a shed in the northern area for rural use. Access is via an informal crossover onto Anketell Road. The subject site is located within a future urban development area (Anketell North) and is bound by Anketell Road to the north and rural lifestyle properties to the west, east and south.

The surrounding rural properties are generally earmarked for future urban development. Urban subdivision (Albero Estate) has already commenced at Lots 2 & 3 Anketell Road to the west. **Figure 2** is an aerial image of the subject site and immediate surrounds.

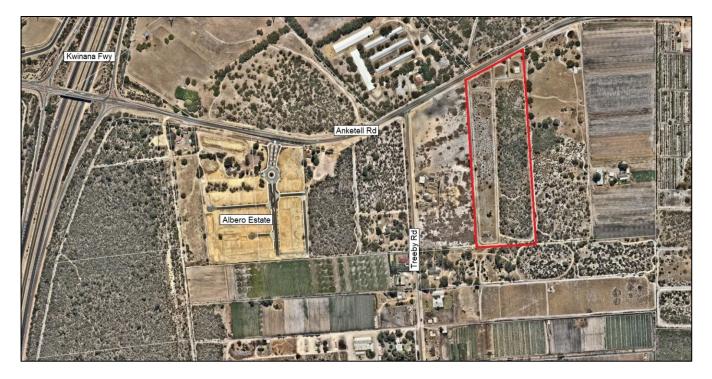


Figure 2. Aerial view of Subject Site and Surrounds (Source: Nearmaps, 2019 - modified)

4 Site Description

The following site description includes technical information provided in the Environmental Assessment Report (EAR) (**Appendix 1**), Bushfire Management Plan (BMP) (**Appendix 3**) and Preliminary Servicing Report (**Appendix 7**).

More detailed information and references pertaining to each sub-heading below can be found in these appendices. The following is a general overview of site characteristics and assessment relating to the potential for urban development under the Structure Plan.

4.1 Topography, Landform & Soils

The EAR describes the subject site as being located within the Spearwood System and Bassedean System of the Swan Coastal Plain. The predominant soils found within the subject site is Spearwood 2a Phase (211Sp_2a), comprising moderately deep siliceous yellow-brown sands or pale sales with yellow-brown subsoils and minor limestone outcrops and Bassendean B2 Phase (212Bs_B2), comprising deep bleached grey sands with a pale yellow B horizon.

The topography of the subject site gently undulating with a fall from the south-west (32.5m AHD) to 23.5m (AHD) in the north-west of the site. The topography and soils of the subject site present no significant constraints to urban development that need to be addressed in the Structure Plan.

4.2 Vegetation, Flora & Fauna

In the EAR, the vegetation is mapped as being part of the Bassendean – Central and South vegetation complex. This vegetation is described as 'Vegetation ranging from woodland of *Eucalyptus marginata-Allocasuarina fraseriana-Banksia* species to low woodland of *Melaleuca* species and sedgelands on the moister sites and includes the transition of *E. marginata* to *E. todtiana*.

The EAR found there were two vegetation types on the subject site: *Banksia menziesii* Low Woodland over *Kunzea glabrescens* Low Tall Open Shrubland on the central lower area, and *Allocasuarina fraseriana/Banksia attenuata/B. menziesii* Low Open Woodland on slightly more elevated land at the northern and southern ends. The vegetation closely matched four Floristic Community Types (FCT 28, 23a, 21a and 21c) and could be a transitional FCT based on the proximity of the site to the Bassendean-Spearwood landform boundary.

The existing vegetation condition varies across the site from 'Very Good' to 'Completely Degraded'. The EAR concludes that there are no broad areas or environmental assets that are considered of high environmental value that would impact urban development. As the subject site contains moderate undulations and slope, the extent of overall earthworks necessary will limit ability to retain any existing vegetation.

The clearing of vegetation will impact on Commonwealth listed TEC and habitat for three federally listed Black Cockatoo Species and accordingly referral under the EPBC Act would be a prerequisite to development. The EAR concludes that the area of impact for the TEC and level of impact on Black Cockatoos would be low.

4.3 Hydrology

There are no surface water expressions or features found on the subject site. The subject site is not impacted by any wetland mapping. Sheet drainage generally occurs from south to north, with infiltration generally at source due to filtration of the relatively sandy soils.

The groundwater table beneath the natural surface of the subject site is generally at 18.0m AHD to 20.0m AHD, approximately 5.5m - 8.5m below the natural surface of the site, and flowing to the north-west.

There are no significant hydrological constraints present on the subject site that would impact urban development.

4.4 Acid Sulfate Soils

A desk top review indicates that generally the subject site has a 'Moderate to Low' risk of Acid Sulfate Soils (ASS) being encountered within 3 metres of the natural surface. Accordingly, there are no significant ASS constraints impacting urban development of the subject site.

4.5 Site Contamination

A search of the Department of Water and Environment Regulation 'Contaminated Sites Database' indicates that there are no recorded contaminated sites for the subject site. Due to the limited use of the site for rural activities, there is considered to be limited contamination. More detailed geotechnical investigations will occur at subdivision stage. Should any contamination material be discovered as part of further geotechnical investigations, appropriate remedial actions will be taken.

4.6 Servicing

A Preliminary Engineering Servicing Report (**Appendix 7**) has been prepared which indicates that the subject site is suitable for urban development and can readily be connected to the necessary services to support urban development. Subdivision and/or development for urban use would be subject to consultation with service providers and the necessary upgrades to existing infrastructure to support development.

4.6.1 Water and Sewer Services

The subject site is not presently connected to sewer or water. There is capability for sewer connection to the subject site and there is sufficient water supply in the area to service the proposed urban development.

There is an existing deep gravity reticulated sewer located within the southern road reserve verge of Anketell Road, to which the development proposes to connect. The connection of the subject site to the reticulated water and sewer in Anketell Road will allow for future extensions to adjoining neighbouring properties, particularly to the south.

4.6.2 Power & Gas

There is sufficient power supply existing in the area to service the proposed urban development. There are high and low voltage overhead cables within the Anketell Road reserve. A 330kv high tension pylon transmission line extends through the western portion of the site and is contained within an easement granted to Western Power. All works to be undertaken within and abutting the easement corridor shall be done in consultation with Western Power.

Reticulated gas supply can be provided to the proposed urban development from an existing 160mm diameter ATCO gas main located within the southern verge of Anketell Road.

4.6.3 Telecommunications

The proposed urban development can be serviced by telecommunications Telstra underground infrastructure in Anketell Road. Fibre Optic cabling is located in this area and provision for NBN service can be made for the proposed development.

4.7 Access

The site has direct frontage and is readily accessible via Anketell Road, which is a bitumen sealed road. However, direct vehicular access from Anketell Road is to be restricted in future for the proposed urban development, except for access from the proposed main north-south 'Local Access B' road connecting with Anketell Road.

Future planning for provision of roads and connections to service the urban development will be discussed in further detail in this report. There are no access constraints to the subject site. Development of the subject site for urban will ultimately provide for future road connections to adjoining neighbouring properties.

4.8 Indigenous and European Heritage

A search of the Department of Planning, Lands and Heritage (Aboriginal Heritage Inquiry System) indicates that no listed Aboriginal Heritage sites exist on the land and no mapped Heritage Places.

There are no places or sites of cultural significance within the subject site under the City of Kwinana Municipal Heritage Inventory and State Heritage Register.

4.9 Bushfire Management

The subject site is located within the Department of Fire and Emergency Services Bushfire Prone Mapping. A Bushfire Management Plan (**Appendix 3**) has been prepared for the Structure Plan.

The bushfire report demonstrates that the subject site is capable of supporting urban development, whereby the threat of bushfire from internal and neighbouring vegetation can be adequately addressed and managed.

The bushfire report demonstrates that potentially, proposed urban development for residential lots could achieve BAL ratings not exceeding BAL - 29, however some future residential lots abutting the eastern and southern boundaries of the subject site can only be subdivided once the bushfire hazards are removed (or modified) on those neighbouring properties. This is outlined in the bushfire report.

There are no issues with provision of secondary emergency access (in a different direction) as future internal structure plan road connections can be provided to neighbouring properties west and south, in addition to the current direct frontage to Anketell Road.

Accordingly there are no significant bushfire hazards or risks that cannot be adequately managed as part of the Structure Plan to accommodate future urban development of the subject site.

4.10 Transport Noise

The subject site is located adjacent to Anketell Road being a future major freight distributor road. Anketell Road is forecast to carry a high traffic volume which has the potential to generate transport noise.

An Acoustic Assessment (refer to **Appendix 2**) has been undertaken which modelled transport noise impacts for Anketell Road.

The Acoustic Assessment demonstrates that the impact of transport noise for sensitive land uses in proximity to Anketell Road can be adequately managed through appropriate noise mitigation strategies, including provision of an acoustic wall and implementation of 'Quiet House Design' within the future built form environment. Accordingly the impact of transport noise is not a significant constraint to urban development.

5 Key Planning framework

Regional Context

5.1 Perth and Peel@3.5million

The Perth and Peel @ 3.5 million provides strategic land use planning documents to facilitate accommodation of a forecast population growth of 3.5 million for Perth and Peel regions by 2050. Within the context of this document, the subject site is located within the *South Metropolitan Peel Sub-Regional Planning Framework*.

The *South Metropolitan Peel Sub-Regional Planning Framework* provides a framework for delivering the objectives of Directions 2031 and Beyond. The subject site (and the wider area of Anketell North) is identified in the Framework as '*Urban*' forming part of the future urban footprint in the Perth Metropolitan south west area.

Land identified as 'Urban' in the Framework is generally given higher priority for short – medium term urban development than 'Urban Expansion' and 'Urban Investigation' areas identified in the Framework. The subject site is proposed for urban development in the short term by the landowner. It is noted that the Framework does not identify any specific district or regional planning infrastructure for the subject site. However, Anketell Road abutting the northern boundary of the site is identified as a major transport regional road under the Framework. Planning for the subject site needs to take into consideration the regional road infrastructure requirements.

5.2 Metropolitan Region Scheme

The subject site is predominantly zoned 'Urban' and a portion reserved 'Other Regional Roads' regional reservation under the Metropolitan Region Scheme. The surrounding land and neighbouring properties are also zoned Urban under the MRS. Both Baldivis Road and Fifty Road are not reserved roads under the MRS.

5.3 Liveable Neighbourhoods

Liveable Neighbourhoods (LN) has been prepared to guide the sustainable development of communities. It addresses both strategic and operational aspects of structure planning and subdivision for both *greenfield* and urban infill sites.

The Structure Plan has been designed in accordance with the principles of Liveable Neighbourhoods, in particular, the layout of roads and Public Open Space (POS). Consistent with LN, the Structure Plan provides a high level of connectivity with good external linkages to existing and planned road, cycle and pedestrian transport networks.

The road design in the Structure Plan is legible and reduces car travel distances by creating alternative routes. These aspects are further addressed in the report when referring to the indicative Subdivision Concept Plan (**Plan 3**) for the subject site.

LN encourages walkable access to POS. Within the Structure Plan, all lots are within 400 metres walking distance from POS areas. This includes the power easement restricted POS area, which once improved will provide opportunity for active forms of recreation along pathways, such as walking & jogging. This provides residents with opportunities for active lifestyle and recreation within 5 minutes walking distance from residences.

Consistent with LN, it is important for the Structure Plan design to respond to site characteristics and site context. The Structure Plan design has taken into consideration the natural topography, surrounding land uses and solar orientation. Proposed lots can achieve an E-W or N-S orientation, which provides good opportunity for solar orientation for dwelling design and outdoor living areas.

Lot shape and proportion of width to depth is considered important and the lots in the Structure Plan have been designed to be rectangular in shape with a greater depth than width wherever possible. This ensures the ability to develop the lots with high quality housing and built form and conformity with the Residential Design Codes of Western Australia. Other aspects of LN principles, such as local water management and target residential density are addressed further in this report.

5.4 State Planning Policy 3.7 'Planning in Bushfire Prone Areas'

The subject site has been identified and designated by the Fire and Emergency Services Commissioner under the Fire and Emergency Services Act 1998 as a bushfire prone area. As such SPP 3.7 and its accompanying WAPC *Guidelines for Planning in Bushfire Prone Areas,* apply to urbanisation of the subject land.

In accordance with the requirements of SPP 3.7 a Bushfire Management Plan (Appendix 3) has been prepared and its findings indicate there are no significant bushfire constraints that cannot be adequately managed to enable the subject site to be developed for urban use.

5.5 State Planning Policy 5.4 'Road and Rail Transport Noise and Freight Considerations in Land Use Planning'

The primary purpose of SPP 5.4 is to minimise the adverse impact of transport noise in land use planning, to ensure where sensitive development is proposed in proximity to transport noise that appropriate mitigation measures are implemented, without adding unreasonable cost to transport infrastructure.

Anketell Road which adjoins the northern boundary of the subject site is forecast to accommodate a substantial volume of domestic, commercial and freight traffic, sufficient to warrant noise impact consideration. As outlined in Section 4.10 above, an Acoustic Assessment has been undertaken for the Structure Plan. The Acoustic Assessment (Appendix 2) demonstrates that the subject site can be developed for urban use in proximity to Anketell Road, subject to consideration and management of the impacts of transport noise. The Acoustic Assessment recommends noise mitigation measures including provision of an acoustic wall and/or implementation of 'Quiet House Design' to sensitive land uses within the future built form environment.

Local Context

5.6 City of Kwinana Town Planning Scheme No. 2

Under the City of Kwinana Town Planning Scheme No. 2 (TPS 2), the subject site is zoned 'Development' zone within 'Development Contribution Area No. 4'. A northern portion of the subject site is reserved consistent with the MRS as 'Other Regional Roads'.

5.7 Anketell North Structure Plan (as amended)

The Anketell North Local Structure Plan (as amended) was originally endorsed by Western Australian Planning Commission (WAPC) on 18 December 2015. Amendments No. 1-3 provided planning for the north-west portion of the *investigation area* for residential and service commercial land uses. The services commercial land uses are directly opposite the area identified for the future Wandi District Centre on the northern side of Anketell Road.

This Amendment is generally consistent with the previous planning undertaken for the original approved Structure Plan, except for the minor modifications being proposed to road layout and residential density.

Planning of the *investigation area* within the subject site is identified in the approved Structure Plan as requiring the following prerequisites:

"The portion of LSP area which is most likely affected by noise is excluded from the LSP area until matters raised by the WAPC have been addressed to the satisfaction of the WAPC, including addressing the requirements of SPP 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning, inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan.

Planning for public open space and residential use has already been undertaken over the subject site in the approved Structure Plan technical and supporting information, as can be seen in Figure 3. This Amendment builds on that previous planning work to formalise the land uses and intent for the subject site.

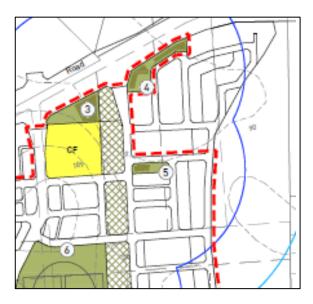


Figure 3. Extract from (Figure 13) Public Open Space Plan (Anketell North Structure Plan 2015)

6 Structure Plan Amendment

6.1 Land Uses

The Structure Plan Map outlines the Zones and Reserves applicable within the Structure Plan Area which will guide future subdivision and development of the land.

6.2 Residential Density and Yield

The Subdivision Concept Plan (SCP) contained in Plan 3 provides a preferred option for the urban development of the subject site. The SCP indicatively has potential for up to 56 residential lots, with the upper yield achievable if the site abutting the POS area is developed for residential use. The SCP reflects a contemporary mix of front-loaded lot typologies with a residential density of R30.

The SCP could potentially accommodate up to 145 people, based on an average household of 2.6 persons (2016 Consensus data) at the upper lot yield specified above. The final lot yield and design would be determined as part of detailed subdivision at later stages of planning, with consideration to the target density of 15 dwellings per gross hectare under Directions 2031. This would bring the estimated population of the Anketell North Structure Plan (as amended) to 4,152 persons.

Table 1 and **Table 2** provide a snapshot of development statistics for Anketell North Structure Plan (as amended) based on the SCP in terms of the potential to meet the target densities under Directions 2031 and Liveable Neighbourhoods.

Although the SCP is indicative only at this Structure Plan level of planning (and not the subject of subdivision approval), the Structure Plan technical reports have been based on the SCP to support the Structure Plan. These technical investigations and preliminary designing could therefore provide the basis for future subdivision of the subject site.

Tables 1 & 2 shows that the Structure Plan can potentially deliver the expected residential target densities under Directions 2031.

 Table 1
 Anketell North Structure Plan (as amended) Target Density inclusive of SCP – Plan 3)

	Site Outcomes	Target Density
Total Structure Plan area	99.63 hectares	-
Area set aside for: Service Commercial (Amendments 1 – 3) Road Reserve POS & Drainage (inc. power easement) Public Purpose – Community Public Purpose – Primary School 'Investigation Area 1' Power Easement	3.81 hectares 22.55 hectares 16.99 hectares 1.67 hectares 4.00 hectares 8.69 hectares 4.31 hectares	-
Balance area for residential development	37.61 hectares	-
Estimate ultimate number of dwellings	1,483 dwellings	-
Estimated number dwellings per site hectare1	39 dwellings/ha	Liveable Neighbourhoods 12 – 20 dwellings per site hectare for standard lot layouts; or 20 – 30 dwellings per site hectare for areas within 400m of neighbourhood centres
SP target density per <i>gross urban hectare</i> ²	16 dwellings/site ha (Excludes 'Investigation Area 1' subject to further structure planning)	Directions 2031 15 dwellings per gross urban hectare

Liveable Neighbourhoods definition of site hectare is the area available for residential development excluding roads, non-residential uses, public open space and drainage areas.

² Directions 2031 definition of *gross urban hectare* is the gross area available for urban development.

 Table 2
 Lot 4 Anketell Road Development Statistics (based on Subdivision Concept Plan)

	Site Outcomes	Target Density
Total Structure Plan Area	59,600m ²	-
Area set aside for commercial, roads, drainage & POS including power easement	39,807m ²	-
Balance area for residential development	19,793m²	
Estimate ultimate number of dwellings	56 dwellings ³	-
Estimated number dwellings per site hectare ¹	28 dwellings/site hectare	Liveable Neighbourhoods 12 – 20 dwellings per site hectare for standard lot layouts; or 20 – 30 dwellings per site hectare for areas within 400m of neighbourhood centres
Structure Plan target density per gross urban hectare ²	15 dwellings/hectare	Directions 2031 15 dwellings per gross urban hectare

¹ Liveable Neighbourhoods definition of *site hectare* is the area available for residential development excluding roads, non-residential uses, public open space and drainage areas.

Directions 2031 definition of *gross urban hectare* is the gross area available for urban development. However the calculation excludes the area within the high voltage power easement and MRS Other Regional Roads reservation as inclusion of these areas distort the calculation.

³ Includes grouped housing development abutting POS.

6.3 Proposed Movement Network

A Transport Assessment (**Appendix 8**) has been prepared which outlines the modifications to the road layout and context within the overall transport strategy for approved structure plan. The TA demonstrates that there are no significant transport issues or impacts affecting the structure plan. No vehicle access from the Structure Plan is proposed onto Anketell Road, noting that the existing informal crossover onto Anketell Road would ultimately be removed.

6.3.1 Existing roads

Anketell Road is constructed as a undivided two-way single lane carriageway with no pedestrian or bicycle pathways around the subject site.

The posted speed limit is 80km/hr along the section abutting Anketell North Structure Plan. Anketell Road is under the care and control of the local authority and is classified as a *Regional Distributor* road by MRWA.

Anketell Road is planned to be upgraded in future to support urbanisation and as a major freight transport corridor servicing the planned Outer Harbour.

Treeby Road is constructed as a undivided two-way single lane carriageway and currently provides access to rural properties within the approved Structure Plan. At present the intersection of Treeby Road with Anketell Road is a priority T-intersection. Future planning will require the upgrading of the intersection to signalised controlled intersection, as Treeby Road will be the main internal collector road for the Anketell North Structure Plan area.

Lot 7 can be developed independently given its direct access/frontage onto Anketell Road from the new planned intersection road with Anketell Road, which runs parallel with the power easement corridor under the approved Structure Plan. However, at present the subject site does not have access to Treeby Road until neighbouring property(s) to the west subdivide and create the necessary internal local access roads, which will link Lot 7 to Treeby Road, under the approved Structure Plan.

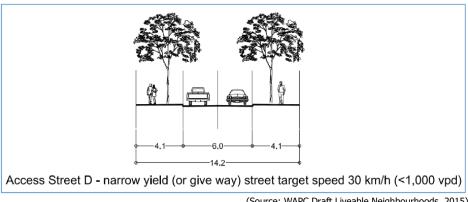
6.3.2 Proposed Roads

The Structure Plan forms part of the Anketell North Structure Plan and in the context of the existing and planned road network, only local access roads are proposed (and considered necessary) in the Structure Plan.

The Structure Plan road layout provides an appropriate responsive design to the existing natural topography and landform to accommodate servicing of lots and stormwater drainage.

Road Hierarchy

Based on the proposed urban development as shown in the SCP (Plan 3), the internal proposed roads are classified as 'Access Street B' for the main north-south road connecting with Anketell Road and 'Access Street D' roads for all other internal residential streets. These typical local access roads (as shown in Plate 1) will connect with future road network (containing similar classified local access roads) when the neighbouring property to the east subdivides, subject to future structure planning.



(Source: WAPC Draft Liveable Neighbourhoods, 2015)

Plate 1. Typical 'Access Street D' indicative cross section

Connection with Existing and Planned Road Network

The proposed local access roads in the Structure Plan will provide for adequate circulation for traffic and waste services. No changes are proposed to the existing road network other than the planned upgrading of Anketell Road.

Intersection Treatments

The 'T' intersection with Anketell Road and the 'Access Road B' will be a restricted 'left-in/left-out' intersection. Treeby Road will be the main intersection with Anketell Road where full movement is permitted. No direct road or vehicular access is proposed onto Anketell Road and the Structure Plan reflects this requirement.

As demonstrated in the TA, there are no specific intersection treatments required for the 'T' intersections of local access roads with the main north-south 'Access Road B' in the SCP. However, a future '4-way' intersection is envisaged at the southern boundary of the subject site (refer to the TA – Figure 3) and this will likely be a priority-controlled intersection with give way signs on the minor road approaches.

Appropriate entry treatments to the local access roads (i.e. raised plateaus) can be considered and details of all intersection treatments are to be finalised at subdivision stage.

6.3.3 **Pathways**

The Structure Plan Amendment design allows for provision of pathways at detailed subdivision stage on proposed local access roads within the subject site, which will connect into the wider planned pathway network. Pathways would be provided for within proposed local access roads and would link in with the surrounding future pathway network (refer to Plan 4 showing indicative pathways).

The exact location of pathways will be determined in liaison with the local authority at the subdivision stage once a more specific form of development for the subject site is proposed. In general, pathways are proposed to be provided on all streets in accordance with the requirements of Liveable Neighbourhoods.

6.3.4 Public Transport

Currently there is no direct public transport service for the subject site and immediate surrounding area. The nearest public transport bus service operated by Transperth is Bus Service (No. 537) which operates within Honeywood Avenue to the north in Wandi.

It is noted however that eventually Honeywood Avenue (internal collector road) will extend and connect with Anketell Road. This will provide some public transport bus service to the Anketell North Structure Plan area.

The Perth to Mandurah rail line is located approximately 4.5km west of the subject site and the nearest transit station (with Park 'n Ride facility) is Warnbro Station at the junction of Safety Bay Road and Ennis Avenue. Bus Service (No. 568) currently provides a service to Warnbro Transit Station, with more bus services planned in future for the Baldivis North area.

6.4 Public Open Space

The Structure Plan makes provision for Public Open Space (POS) contained within the subject site. A combined area of 1.96 hectares is provided within the high voltage power easement corridor and northern POS.

The Amendment proposes the removal of a small area of POS (known as 'Local Park No. 5' within Lot 4 Anketell Road – refer to Figure 3) as this strip of POS is not required for drainage or recreation. The strip (approx. 20m in width) would not effectively serve as being sufficient for passive or active recreation due to its limited width. Moreover, there is already a significant surplus of POS within the Anketell North Structure Plan, which will be further discussed below. Accordingly Local Park No. 5 can be removed from the original approved Structure Plan.

Neighbourhood Park No. 4 in the original approved Structure Plan is slightly reduced by the Amendment. However, overall the Amendment will not significantly impact the delivery of POS to meet the minimum 10% POS requirement for Anketell North Structure Plan. This will be further discussed below.

Plan 4 shows the location of POS in the amended Structure Plan, in addition to indicative location for pathways and the stormwater bio-retention basin that will accommodate the stormwater generated by the proposed roads in the urban development.

A Landscaping Concept Plan (**Appendix 4**) has been prepared which demonstrates how the public open space could be developed with a multiple-use recreation and drainage function. The landscaping plan shows drainage basins as a potential *artificial wetland*, which would create an attractive feature and add amenity and interest to the park.

POS areas will be developed to provide a mix of turf areas, native landscaping gardens and bioretention basins to provide for an interesting and usable park for local residents. All residents within the Structure Plan will have access to public open space within a 400m walking distance via a local pathway network in accordance with Liveable Neighbourhoods.

Northern Park

The northern park (approximately 3,155m² in area) will form as part of a future planned local park abutting Anketell Road. This POS will integrate with future POS to be provided from the eastern neighbouring property consistent with the approved Structure Plan.

The park will incorporate contemporary landscaping and multiple use stormwater design to provide for an attractive high amenity park also servicing as an entry statement into the development. The POS also serves as a buffer area from transport noise associated with Anketell Road.

Power Easement Parkway

The power easement corridor is restricted for development, but can be landscaped to provide an area for public open space (linear parkway). The linear parkway will form an attractive part of the development as it will be a large landscaped open space containing native landscaping mulched areas and a pathway. No trees are permitted to be planted within the easement, but low height landscaping is permissible by Western Power.

The linear parkway will be used by residents for both active and passive recreation. Residents can readily access the linear parkway for walking, jogging, dog exercise and sitting via pathways and the road network. Use of power easement corridors for POS is common in Perth Metropolitan area. However, as the land within the easement is restricted in terms of improvements for POS, the power easement parkway is identified as a deduction for the purpose of POS calculations, notwithstanding it will ultimately be developed as 'restricted use' POS.

Overall POS Calculations Resulting from the Amendment

An overall updated **POS Schedule** is provided in **Appendix 9** for the whole Anketell North Structure Plan area (as amended). Calculations are based on the SCP and LWMS contained in this report. It is noted that there is a surplus of POS in the original approved Structure Plan as shown in the updated POS schedule in Appendix 9. In summary, the Amendment proposes a minor reduction of the original POS contribution from 11.2 hectares (12.7%) to 10.68 hectares (12.5%). This remains above the minimum 10% POS requirement under the planning framework.

6.5 Stormwater Management

A Local Water Management Strategy (**Appendix 5**) has been prepared for the Structure Plan which outlines the overall strategy for the capture and treatment of stormwater management, in accordance with industry best practice for urban water management.

Stormwater generated from the Structure Plan development will be wholly contained within the subject site. The power easement and northern POS area of the Structure Plan will provide for a multiple use recreation and drainage function. Stormwater drainage infrastructure will be located in within these areas and this will primarily be used to for the detention and management of stormwater from roads.

In general stormwater for the Structure Plan development will be managed via the following measures outlined in Table 4:

Table 4 1yr & 5yr & 100yr ARI stormwater management

ARI Event	Stormwater Water Management Principles
1 Year	Stormwater runoff from new subdivision roads will be diverted to the drainage basins in the power easement and public open space in the northern portion of the site via piped drainage. Stormwater from development will be contained within each lot prior to discharge/infiltration to groundwater via conventional methods including soakwells.
5 Year	Stormwater runoff from new subdivision roads in excess of the 1:1 year storm event will be diverted and detained within the drainage basins in the public open space.
100 Year	Stormwater is proposed to be contained within the power easement open space area.

The LWMS will be used as a future reference for the preparation and approval of an Urban Water Management Plan at the subdivision approval stage.

6.6 Earthworks

Site works will be required to create level, free draining lots for dwelling construction and provision of roads and services. Level sites that are terraced reflect the ideal building site to reduce housing cost and create more affordable housing. As the subject site contains moderate undulations and slope, the extent of overall earthworks necessary will limit ability to retain any existing vegetation.

Retaining walls will be used to provide terraced lots and absorb level differences. Wherever possible, the height of retaining walls will be kept to a minimum and may vary due to natural ground level differences. In most areas retaining walls need only be low to medium height retaining walls in order to provide for servicing and absorb level differences. All retaining walls will be constructed to the satisfaction of the local authority.

All retaining walls will be constructed to the satisfaction of the local authority. Earthworks on site will generally involve removal of topsoil, cut and fill and possible importation of sand fill to provide the necessary finished levels. Wherever possible any suitable fill which can be obtained from within the power easement area (i.e. removal of sand to construct drainage infrastructure) will be utilised, in order to avoid any importation of fill.

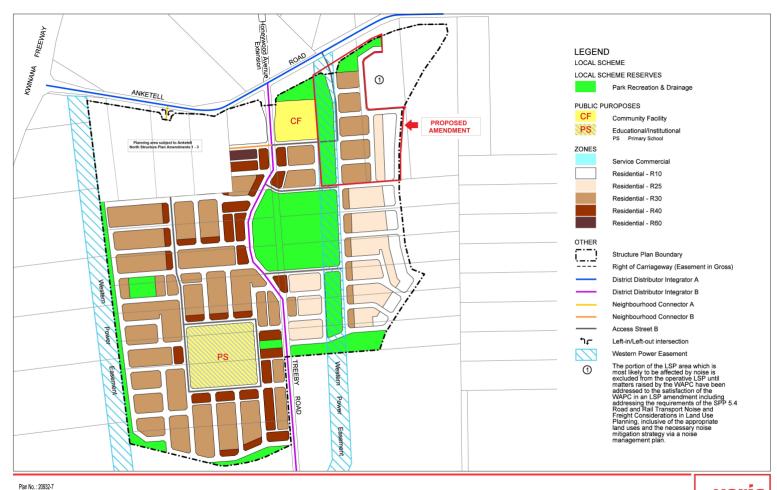
7 Conclusion

The Structure Plan Amendment is consistent with the relevant state planning framework for urban development in the Anketell North area. This report demonstrates that there are no environmental, access, transport noise or servicing constraints that would preclude the subject site from urban development.

The Structure Plan Amendment provides guidance for future subdivision of development of the subject site, whereby appropriate interface and connectivity is identified in the Structure Plan to allow for a seamless integration with the adjoining properties to the south, west and east.

The Amendment provides for minor modifications to the road layout and residential densities (R-Coding) that will not have any material impact on the operation and function of the existing approved Structure Plan. The modifications provide for an improved design and response outcome to the expectations and objectives of the planning framework.

Plans



Revision : REV.8 Scale : 1:6000@A3 \$ 190 190

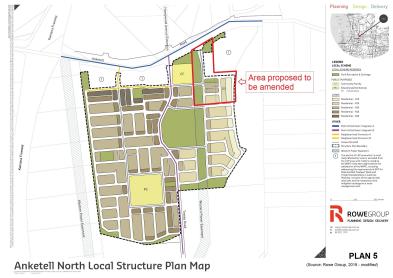
ANKETELL NORTH LOCAL STRUCTURE PLAN











Appendices

Appendix 1

Environmental Assessment Report

LOT 7 ANKETELL ROAD, ANKETELL

ENVIRONMENTAL ASSESSMENT REPORT

Prepared for: Anketell Property Investments (WA) Pty Ltd

Report Date: 27 April 2018

Version:

Draft

Report No. 2018-368



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Table 2: List of Fauna Species Identified from Fauna Database Searches

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Plate 2: Aerial Photography from 2001 (Landgate, 2015b))

Plate 3: Older tree stump as evidence of logging

Plate 4: Woodland Habitat

Plate 5: Cleared Habitat

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Figure 1: Site Location

Figure 2: Site Boundary and Topography

Figure 3: Vegetation Type

Figure 4: Vegetation Condition

Figure 5: Significant Trees

Figure 6: Context Plan

Appendices

Appendix 1: Naturemap Report

Appendix 2: Protected Matters Search Tool Report

Appendix 3: Conservation Codes

Appendix 4: Significant Trees

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1 INTRODUCTION

1.1 Background

Lot 7 Anketell Road, Anketell (the site) is located approximately 29km south of the Perth Central Business District (Figure 1). The site is bound by Anketell Road to the north and market gardens and native vegetation to the east, south and west (Figure 2). Currently most of the site is zoned 'Urban' under the Metropolitan Region Scheme (MRS) and 'Urban Deferred' in a small part in the north. The site is predominately zoned 'Development' with the area in the northern part of the site zoned as 'Rural A' under the City of Kwinana Town Planning Scheme No. 2 (WAPC, 1992).

The site is approximately 5.8ha in size, of which 2.7ha contains remnant native vegetation.

PGV Environmental was commissioned by Anketell Property Investments (WA) Pty Ltd to prepare an Environmental Assessment Report to determine the environmental values on the site and the potential impacts of urban development.

1.2 Scope of Works

1.2.1 Environmental Assessment Report

The Environmental Assessment includes a desktop assessment of the key environmental attributes of the site to ascertain the potential environmental limitations to development.

The Environmental Assessment includes the results of a Significant Tree Survey and Black Cockatoo Habitat Assessment outlined below as well as the following:

- Physical characteristics including a description of:
 - Landform:
 - Drainage and water bodies; and
 - Geological, hydrogeological and hydrological characteristics;
- Recent and present land use including:
 - Surrounding land uses; and
 - Assessment of current and historical activities on the subject site and surrounding areas which have the potential to result in contamination issues at the site;
- Results of the 2015 Level 2 Flora and Vegetation Survey (PGV Environmental, 2016);
- Level 1 Fauna Survey including State and Federal Database searches, description of habitat and the likelihood of significant fauna species occurring on the site;
- Database searches including:
 - Department of Water and Environmental Regulation Contaminated Sites and Water Information databases; and
 - Department of Aboriginal Affairs and National Heritage database.
- Implications, if any, under Western Australian policies and legislation such as the Environmental Protection Act 1986 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999; and
- Other public information available.

1.2.2 Significant Tree Survey

The Significant Tree Survey has been undertaken as per requirements of the City of Kwinana in accordance with Local Planning Policy No. 1 Landscape Feature and Tree Retention (City of Kwinana, 2016). The objectives of the policy are as follows:

To ensure that:

- a) an appropriate level of information concerning significant trees and landscape features is provided at each stage of the planning framework;
- b) retention of significant trees and landscape features are optimised through the strategic and statutory planning framework to retain the character of the area.

1.2.3 Black Cockatoo Habitat Assessment

An assessment of the site for Black Cockatoo habitat (foraging, breeding and roosting) was undertaken using the criteria listed in the EPBC Act referral guidelines for three threatened black cockatoo species (SEWPaC, 2012). The Black Cockatoo habitat assessment included the following:

- A site visit to record any evidence of foraging such as chewed Banksia cones and Jarrah/Marri/Sheoak nuts; and
- Recording the location of any potential breeding habitat trees with a diameter greater than 500mm at breast height.

The Black Cockatoo Habitat Assessment has been prepared by PGV Environmental to:

- Describe the Black Cockatoo habitat on the site;
- Assess the impact of potential development of the site on the Black Cockatoos; and
- Ascertain whether referral is required under the EPBC Act for any proposed impact on habitat.

2 EXISTING ENVIRONMENT

2.1 Land Use

The site was almost completely vegetated in 1979 as shown in historical aerial photography (Plate 1). There were a few tracks running through the site.



Plate 1: Aerial Photography from 1979 (Landgate, 2015b)

The western part of the site was cleared prior to 1981 for the installation of a high voltage power line that runs north-south through this area.

Some further clearing in the northern part of the site was undertaken between 1995 and 2001 to construct a shed on the site (Plate 2). Land use of the site has not changed since that time.



Plate 2: Aerial Photography from 2001 (Landgate, 2015b)

The site is not listed on the Contaminated Sites database (DWER, 2018). There is evidence of historical logging of large mature trees on the site and some harvesting of dead wood (Plate 3).



Plate 3: Older tree stump as evidence of logging

2.2 Topography

The site is gently undulating with the highest point at 31m Australian Height Datum (AHD) to the south of the site. The site falls gently down to 23.5m AHD in the northern half (DoW, 2018) (Figure 2).

2.3 Geology and Soils

2.3.1 Geology

The site is mapped as part of the Spearwood System and Bassendean System, the second oldest and oldest of the three dune systems on the Swan Coastal Plain (Bolland, 1998). The Bassendean System consists of very low relief, leached, grey siliceous Pleistocene sand dunes, intervening sandy and clayey swamps and gently undulating plains. The Spearwood System contains sand dunes and plains and consists of aeolian sand and limestone over sedimentary rocks (DPIRD, 2018).

2.3.2 Soils

The soil on the site has been mapped and described as:

- Bassendean B2 Phase (212Bs_B2) which are on flat to very gently undulating well drained sandplain of the surface. The soils are described as deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m (DPIRD, 2018). This soil is mapped on eastern part of the site.
- Spearwood 2a Phase (211Sp_2a) which are on lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown

subsoils and minor limestone outcrops (DPIRD, 2018). The Spearwood soils are mapped on the western part of the site in the power line easement.

2.3.3 Acid Sulphate Soils

Acid sulphate soils (ASS) are wetland soils and unconsolidated sediments that contain iron sulphides which, when exposed to atmospheric oxygen in the presence of water, form sulphuric acid. ASS form in protected low energy environments such as barrier estuaries and coastal lakes and commonly occurs in low-lying coastal lands such as Holocene marine muds and sands. When disturbed, these soils are prone to produce sulphuric acid and mobilise iron, aluminium, manganese and other heavy metals. The release of these reaction products can be detrimental to biota, human health and built infrastructure (WAPC, 2009).

The ASS Risk on the site has been mapped as largely being Moderate to Low (<3m from the surface) (National Map, 2018). The western part of the site is mapped as Low (<3m from the surface).

2.4 Hydrology

The Department of Water identifies three distinct aquifers beneath the site. From natural surface level in descending order, the hydrological units are (DoW, 2015):

- Superficial Aquifer (unconfined);
- Leederville Aquifer (confined); and
- Yarragadee north (confined).

Groundwater is between approximately 18 and 20m AHD, which is 5.5 to 8.5m below the surface level, and generally flows to the north-west (DoW, 2018).

There are no surface water features present on the site including no rivers, creek lines or wetlands. The nearest wetland is greater than 200m to the north-west of the site.

2.5 Flora

A flora and vegetation survey of the site was conducted by Dr Paul van der Moezel on 10 September 2015 (PGV Environmental, 2015).

The flora survey recorded a total of 73 plant species, comprising 62 native and 11 introduced species on Lot 7 Anketell Road. There were no Threatened (Declared Rare) or Priority Flora species recorded on the site.

2.6 Vegetation

2.6.1 Vegetation Complex

The vegetation is mapped as being part of the Bassendean – Central and South vegetation complex which is described as 'Vegetation ranging from woodland of *Eucalyptus marginata-Allocasuarina* fraseriana-Banksia species to low woodland of *Melaleuca* species and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth' (Heddle et al., 1980).

2.6.2 Vegetation Types

Two vegetation types were described and mapped on the site: *Banksia menziesii* Low Woodland over *Kunzea glabrescens* Low Tall Open Shrubland on the central lower area, and *Allocasuarina fraseriana/Banksia attenuata/B. menziesii* Low Open Woodland on slightly more elevated land (Figure 3) at the northern and southern ends. Both vegetation types are upland types occurring on dry sandy soils, however the presence of Spearwood (*Kunzea glabrescens*) in high density in the central lower lying part of the site indicates the presence of groundwater close to the surface although not high enough to constitute a wetland (PGV Environmental, 2016).

The vegetation closely matched four Floristic Community Types (FCT 28, 23a, 21a and 21c) and could be a transitional FCT based on the proximity of the site to the Bassendean-Spearwood landform boundary (PGV Environmental, 2016).

2.6.3 Vegetation Condition

The vegetation condition over the site was assessed using the condition scale adopted in Bush Forever. The vegetation in the central lower lying part of the site was rated as being in Good to Degraded condition (Figure 4). The understorey has a high density of Veldtgrass and Freesia which appears to have impacted on the density of native species (PGV Environmental, 2016).

The vegetation at the southern end of the site on more elevated land is in better condition with a dense understorey and a lower frequency of weed species. There does not appear to be any signs of Dieback disease (*Phytophthora cinnamomi*) on the site (PGV Environmental, 2016).

2.6.4 Conservation Significant Vegetation

Vegetation Complex

The vegetation on the site is considered to be representative of the Bassendean – Central and South vegetation complex (Heddle *et al.* 1980). According to Bush Forever (Government of Western Australia, 2000) approximately 10,919ha (24%) of the original 46,220ha on the Southern Swan Coastal Plain remains of which 5,883ha (13%) will have some protection with the full implementation of Bush Forever. The percentage protection is above the 10% minimum criteria for vegetation complexes in the Perth Metropolitan Region Constrained Area.

The vegetation on the site was not recognised as a Bush Forever site (Government of Western Australia 2000).

Bush Forever Site 347 'Wandi Nature Reserve and Anketell Road Bushland, Wand/Oakford' is located approximately 250m east of the site and immediately to the south of Lot 88 across De Haer Road. Bush Forever Site is 412.3ha in size and contains native vegetation from the Bassendean — Central and South Complex

Floristic Community Type

The vegetation on the site was considered to be similar to four FCTs:

FCT28 - Spearwood Banksia attenuata or B. attenuata – Eucalyptus woodlands (Spearwood soil);

- FCT23a Central Banksia attenuata B. menziesii woodlands (Bassendean soil);
- FCT21a Central *Banksia attenuata E. marginata* woodlands (Bassendean and Spearwood soil); and
- FCT21c Low lying *Banksia attenuata* woodlands or shrublands (Bassendean soil) (PGV Environmental, 2016).

None of these FCTs is listed as a Threatened Ecological Community under State listing. FCT21c 'Low lying *Banksia attenuata* woodlands or shrublands' is a Priority 3 ecological community. Priority 3 ecological communities are those that are known from several locations, and the community does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Priority ecological communities are not protected by State or Commonwealth environmental legislation.

Banksia Woodland TEC

The vegetation types mapped on the site contains Banksia trees in a woodland structure. Therefore, it was considered to potentially be representative of the Commonwealth listed Threatened Ecological Community *Banksia Woodlands of the Swan Coastal Plain* to occur on the site. The listing was made after the PGV Environmental Flora and Vegetation Survey and therefore not addressed in that report. An assessment of the vegetation on the site follows with regards to the Banksia Woodland TEC.

An area of vegetation containing *Banksia* trees on the Swan Coastal Plain is not necessarily the TEC unless it meets certain criteria. The key diagnostic characteristics of the Banksia Woodland TEC are contained in the Approved Conservation Advice for the TEC published at the time of the listing on 16 September 2016.

The Conservation Advice contains the following step-wise approach to use in determining if the TEC occurs on a site:

- Step 1: use the key diagnostic characteristics to determine if the ecological community is present
- Step 2: determine the condition of the patch
- Step 3: consider if the patch meets a minimum size threshold
- Step 4: the surrounding context

The assessment of the vegetation on Lot 7 Anketell Road according to the four steps is outlined below.

Step 1: use the key diagnostic characteristics to determine if the ecological community is present

The vegetation on the site contains *Banksia attenuata* and *B. menziesii* and some *B. ilicifolia* which are three of the four Banksia species that occur in the TEC. The *Banksia* species are found on site in association with other trees species, specifically *Allocasuarina fraseriana* and *Eucalyptus marginata*, which are recognised as being present as an emergent species above the *Banksia* trees in the TEC.

The vegetation structure of the TEC can be quite variable with the Conservation Advice stating that the term woodland is the most typical structure, but the community may also include examples of shrubland, open woodland or forest. The vegetation type on the site containing *Banksia* trees is described as Open Woodlands and Woodland.

Therefore, according to Step 1, the vegetation type on the site could be identified as the Banksia Woodland TEC, subject to the further steps below.

Step 2: determine the condition of the patch

The vegetation on the site is mostly rated as being Degraded to Good condition with one area in Good condition at the southern part of the site. An area of *Banksia* woodland needs to be at least in Good condition to be considered the TEC. Any Degraded *Banksia* woodlands do not qualify as the TEC.

Therefore, the Good-Degraded area on the site does not meet the minimum condition required for the TEC. The area in Very Good condition does meet the minimum required condition.

Step 3: consider if the patch meets a minimum size threshold

The Banksia woodland TEC needs to meet a minimum 'patch' size depending on its condition to qualify as the TEC, as follows:

- 'Pristine' no minimum patch size
- 'Excellent' 0.5ha
- 'Very Good' 1ha
- 'Good' 2ha

There is approximately 0.8ha of native Banksia Woodland in Very Good condition, which is under the threshold for the minimum patch size of 1ha for Very Good condition vegetation

Step 4: the surrounding context

The Conservation Advice for the Banksia Woodland TEC requires at Step 4 consideration of other factors in determining the presence of the TEC on a site.

The Banksia Woodland may be representative of the *Banksia Woodlands on the Swan Coastal Plain* TEC. The referral documentation requires contextual analysis and as the Flora and Vegetation survey was completed prior to the listing a search of Parks and Wildlife Service TEC database search would be included into the documentation.

The Advice describes a 'patch' of Banksia woodland TEC as a discrete and mostly continuous area of the ecological community. The patch may include variations of less than 30m such as gaps caused by tracks/paths, watercourses or localised differences in vegetation types provided that the gap does not significantly alter the overall functionality of the ecological community. Gaps of more than 30m wide usually indicate that separate patches are present.

Similar to the argument above, the areas mapped as Good Banksia woodland on the site are more or less contiguous with the Good to Degraded areas of Banksia woodland. The firebreak between the

areas is narrower than 30m. Therefore, the areas of Good and Very Good condition Banksia woodland could be considered as an entire patch and is considered part of the TEC.

Diagnosis

The vegetation on Lot 7 Anketell Road meets the definition of the EPBC listed TEC *Banksia Woodlands of the Swan Coastal Plain*.

2.7 Significant Tree Survey

2.7.1 Methodology

A Significant Tree Survey was undertaken by Dr Paul van der Moezel and Jackie Cabot from PGV Environmental on 13 February 2018. Each tree was assessed according to:

- Location;
- Species;
- Size;
- Structural health;
- habitat value; and
- landscape amenity value.

The measurement of trunk diameter followed the method shown in Appendix A of Australian Standard 4970 *Protection of Trees on Development Sites.* According to AS 4970 trees can have single trunk diameter measured at breast height or, for trees with multiple trunks, each trunk can be measured, and the formula as specified in AS 4970 applied to achieve a minimum 500mm measurement.

2.7.2 Trees Recorded on the Site

The significant tree survey recorded six trees that had a diameter at breast height greater than 500mm using the AS 4970 methodology (Figure 6). There were several trees that were just under the 500mm cut-off. The trees consisted of three species, of which Jarrah (*Eucalyptus marginata*) was the most abundant (Table 1). All of the species are native and endemic to the area (Table 1).

Table 1: Tree Species on the Site

Species	Common Name	Native/Introduced	Number
Allocasuarina fraseriana	Sheoak	Native	1
Eucalyptus marginata	Jarrah	Native	4
Eucalyptus todtiana	Coastal Blackbutt	Native	1
Total	6		

2.7.3 Tree Characteristics

Condition

Three of the trees were classified as being in Good or Very Good condition. The remaining trees were in Fair or Poor condition with dead branches, leaning or coppiced at the base.

<u>Height</u>

The trees were between 8 and 12m in height.

<u>Diameter</u>

All trees had trunks 700mm or less using the AS 4970 method.

Habitat Values

All the trees would provide some habitat for birds, including Black Cockatoos, and bats. There were few small hollows.

Landscape Amenity Values

The site contained six significant trees in Good to Fair condition. Jarrah Tree number 3 is in very good condition and is worthy of consideration for retention. The remainder are either in poor condition and have low amenity value.

2.8 Fauna

2.8.1 Desktop Studies

Desktop studies were undertaken to identify conservation significant species potentially present on the site. A search of the Department of Biodiversity, Conservation and Attractions' (DBCA) Naturemap database (Appendix 1) and the EPBC Act Protected Matters Search Tool (Appendix 2) identified 28 threatened species of fauna listed as potentially occurring within a 5km radius of the site (Table 2).

Table 2: List of Fauna Species Identified from Fauna Database Searches

Scientific Name	Common Name	Conservation Status, WA	Status under EPBC Act
Pseudocheirus occidentalis	Western Ringtail Possum, Ngwayir	Schedule 1 - CR	Vulnerable
Botaurus poiciloptilus	Australasian bittern	Schedule 2 - EN	Endangered
Calyptorhynchus baudinii	Baudin's Black Cockatoo	Schedule 2 - EN	Endangered
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Schedule 2 - EN	Endangered
Rostratula australis (Rostratula benghalensis australis)	Australian Painted Snipe	Schedule 2 - EN	Endangered Marine/ Migratory
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	Schedule 3 - VU	Vulnerable
Dasyurus geoffroii	Chuditch, Western Quoll	Schedule 3 - VU	Vulnerable
Leipoa ocellata	Mallee Fowl	Schedule 3 - VU	Vulnerable
Calidris ferruginea	Curlew Sandpiper	Schedule 3 - VU Schedule 5 - IA	Critically Endangered
Numenius madagascariensis	Eastern Curlew	Schedule 3 - VU Schedule 5 - IA	Critically Endangered
Apus pacificus	Fork-tailed Swift	Schedule 5 - IA	Marine/Migra tory
Calidris acuminata	Sharp-tailed Sandpiper	Schedule 5 - IA	Marine/ Migratory
Motacilla cinerea	Grey Wagtail	Schedule 5 - IA	Migratory/ Marine

Scientific Name	Common Name	Conservation Status, WA	Status under EPBC Act	
Pandion cristatus (Pandion	Ochrov	Schedule 5 - IA	Marine/	
haliaetus)	Osprey	Scriedule 5 - IA	Migratory	
Plegadis falcinellus	Glossy Ibis	Schedule 5 - IA	Marine/Migra	
Fieguais Juiciliellus	Glossy lbis	Schedule 5 - IA	tory	
Tringa nebularia	Common Greenshank	Schedule 5 - IA	Marine/	
Tringa nebalaria	Common Greenshank	Schedule 5 - IA	Migratory	
Phascogale tapoatafa	South-western Brush-tailed	Schedule 6 - CD		
wambenger	Phascogale, Wambenger	Schedule 0 - CD		
Ardea alba (Ardea modesta)	Great Egret, White Egret	te Egret		
Ardea ibis	Cattle Egret		Marine	
Haliaeetus leucogaster	White-bellied Sea-eagle		Marine	
Merops ornatus	Rainbow Bee-eater		Marine	
Lerista lineata	Perth Slider, Lined Skink	Priority 3		
Isoodon obesulus fusciventer	Southern Brown Bandicoot,	Priority 4		
isoddon obesulus jusciventei	Quenda	Priority 4		
Macropus eugenii derbianus	Tammar Wallaby	Priority 4		
Macropus irma	Macropus irma Western Brush Wallaby Priority 4			
Oxyura australis	alis Blue-billed Duck Priority 4			
Synemon gratiosa	mon gratiosa Graceful Sun-moth Priority 4			
Thinornis rubricollis (Charadrius	Hooded Plover	Driority 4	Manina	
rubricollis)	Hooded Flovel	Priority 4	Marine	

Fauna are classified under five different Priority codes and rare and endangered fauna are classified under the *Wildlife Conservation (Specially Protected Fauna) Notice 2014* into five schedules of taxa. These are outlined in Appendix 3.

2.8.2 Fauna Habitat

The fauna habitat was described on the site reconnaissance visit undertaken on 13 February 2018. The fauna habitat on the site is described as a Woodland Habitat and Cleared Habitat. The Woodland Habitat is on the eastern part of the site that contains native vegetation (Plate 4).



Plate 4: Woodland Habitat

The Cleared Habitat includes the western part of the site containing the high voltage power lines and the northern part of the site containing the sheds and driveway (Plate 5).



Plate 5: Cleared habitat

Fauna habitat can be assessed using a number of factors including, the size of the habitat, the level of habitat connectivity, availability of specific resources (e.g. tree hollows) and overall vegetation quality. The habitat was assessed according to the following categories:

High quality fauna habitat – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.

Very good fauna habitat - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally effected [sic] by disturbance.

Good fauna habitat – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.

Disturbed fauna habitat – These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.

Highly degraded fauna habitat – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or

no fauna habitat connectivity. Faunal assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance. (Coffey Environments, 2009).

The Very Good Woodland Habitat on the site is Good Fauna Habitat as the vegetation is impacted by weeds but is in Good-Degraded and Good Condition. The site has limited connectivity with surrounding high-quality bushland. The Cleared Habitat has limited habitat value and is Completely Degraded and therefore is considered to be Highly Degraded Fauna Habitat.

2.8.3 Conservation Significant Species

Outlined below in Table 3 is a short description of each of the species that were identified in the NatureMap Species Report search and the EPBC Protected Matters Search Tool in Table 2. The preferred habitat has been compared to the habitats on the site described above and the likelihood of each species to be present was determined.

Table 3: Likelihood of Conservation Significant Species being Present on the Site

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Pseudocheirus occidentalis	Western Ringtail Possum, Ngwayir	The Western Ringtail Possum is a medium sized nocturnal marsupial. This species occurs in and near coastal Peppermint Tree (Agonis flexuosa) forest and Tuart (Eucalyptus gomphocephala) dominated forest with a Peppermint Tree understorey.	Highly Unlikely – preferred habitat does not occur on the site
Botaurus poiciloptilus	Australasia n bittern	The Australasian Bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	No – no wetlands on the site
Calyptorhynchus baudinii	Baudin's Black Cockatoo	Baudin's Black-Cockatoo mainly occurs in eucalypt forests, especially Jarrah (<i>Eucalyptus marginata</i>), Marri (<i>Corymbia calophylla</i>), also Karri (<i>E. diversicolor</i>) forest, often feeding in the understorey on proteaceous trees and shrubs, especially banksias (SEWPaC, 2012).	Possible but outside of modelled range
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Carnaby's Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of <i>Banksia</i> , <i>Dryandra</i> , <i>Hakea</i> , <i>Eucalyptus</i> , <i>Grevillea</i> , <i>Pinus</i> and <i>Allocasuarina</i> spp. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 - 12m above the ground and have an entrance 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell) (SEWPaC, 2012)	Potentially – Foraging habitat on the site (Banksia, Jarrah, Coastal Blackbutt and Sheoak)

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Rostratula australis (Rostratula benghalensis australis)	Australian Painted Snipe	The Australian Painted Snipe has been recorded at wetlands in all states of Australia but is most common in eastern Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include a cover of vegetation, including grasses.	No – no wetlands on the site
Calyptorhynchus banksii naso	Forest Red- tailed Black- Cockatoo	Forest Red-tailed Black Cockatoos frequent the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (SEWPaC, 2012). It nests in tree hollows with a depth of 1-5m, that are predominately Marri (<i>Corymbia calophylla</i>), Jarrah (<i>Eucalyptus marginata</i>) and Karri (<i>E. diversicolor</i>) and it feeds primarily on the seeds of Marri.	Potentially – Foraging habitat on the site (Sheoak and some Jarrah)
Dasyurus geoffroii	Chuditch, Western Quoll	The Chuditch have been known to occupy a wide range of habitats including woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. They are opportunistic feeders, and forage on the ground at night, feeding on invertebrates, small mammals, birds and reptiles.	Unlikely due to human disturbance and domestic predators
Leipoa ocellata	Mallee Fowl	Mallee fowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards in mallee bushland.	No – no suitable mallee habitat on the site
Calidris ferruginea	Curlew Sandpiper	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	No – no suitable habitat on the site
Numenius madagascariensis	Eastern Curlew	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	No – no suitable habitat on the site

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Apus pacificus	Fork-tailed Swift	The Fork-tailed Swift is almost exclusively aerial and is not known to breed in Australia. They are seen in inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. Apus pacificus subsp. pacificus is the only subspecies to migrate to Australia.	No – no suitable habitat on the site – this species may fly over the site but is unlikely to land
Calidris acuminata	Sharp-tailed Sandpiper	The Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	No – no wetland habitat on the site
Motacilla cinerea	Grey Wagtail	The Grey Wagtail is mostly recorded in coastal areas in Western Australia (ALA, 2015) however is widespread. There is non-breeding habitat only in Australia and the species has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes.	No – no wetland habitat on the site
Pandion cristatus (Pandion haliaetus)	Osprey	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They feed on fish, especially mullet where available, and rarely take molluscs, crustaceans, insects, reptiles, birds and mammals.	No – no suitable habitat on the site
Plegadis falcinellus	Glossy Ibis	The Glossy Ibis is the smallest ibis known in Australia. This species preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, floodplains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation but do not breed in Southwest Western Australia.	No – no suitable habitat on the site
Tringa nebularia	Common Greenshank	The Common Greenshank is a wader and does not breed in Australia. This species can be found in many types of wetlands and has the widest distribution of any shorebird in Australia. This species typically feeds on molluscs, crustaceans, insects, and occasionally fish and frogs.	No – no suitable habitat on the site

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Phascogale tapoatafa wambenger	South- western Brush-tailed Phascogale, Wambenge r	Southern Brush-tailed Phascogales are arboreal marsupials which require tree hollows in suitable woodland or forest and rely on abundant invertebrate prey to sustain populations (Pescott, 2012).	Highly Unlikely due to site disturbance and feral predators
Ardea alba (Ardea modesta)	Great Egret, White Egret	The Eastern Great Egret has been reported in a wide range of wetland habitats and usually frequents shallow waters. This species feeds on fish, insects, crustaceans, molluscs, frogs, lizards, snakes and small birds and mammals.	No – no suitable habitat on the site
Ardea ibis	Cattle Egret	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands with breeding in Western Australia recorded in the far north in Wyndham in colonies in wooded swamps such as mangrove forest. This species forages away from water on low lying grasslands, improved pastures and croplands generally in areas that have livestock eating insects, frog, lizards and small mammals.	Potentially an intermittent visitor to the cleared area
Haliaeetus leucogaster	White- bellied Sea- eagle	The White-bellied Sea-Eagle is found in coastal habitats with large areas of open water, especially those close to the sea-shore. This species feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal.	No – not coastal habitat
Merops ornatus	Rainbow Bee-eater	Populations that breed in northern Australia are considered to be resident, and in many northern localities the Rainbow Bee-eater is present throughout the year. The Rainbow Bee-eater nests in a burrow dug in the ground. It is found across the better-watered parts of WA including islands preferring lightly wooded, sandy country near water.	Possibly an intermittent visitor
Lerista lineata	Perth Slider, Lined Skink	The Lined Skink is a burrowing species that occurs in pale sandy soils with coastal heath and shrubland areas in isolated populations in the south-west and mid-west coast of Western Australia. It feeds on termites and other small insects (AROD, 2014).	Possible – often found in Banksia habitat
Isoodon obesulus fusciventer	Southern Brown Bandicoot, Quenda	Southern Brown Bandicoots are small grey marsupials that prefer dense scrub (up to one metre high). Their diet includes invertebrates (including earthworms, adult beetles and their larvae), underground fungi, subterranean plant material, and very occasionally, small vertebrates (DEC, 2012a).	Possibly present on the site

Scientific Name	Common Name	Habitat*	Likelihood to occur on the site
Macropus eugenii derbianus	Tammar Wallaby	The Tammar Wallaby prefers dense, low vegetation for daytime shelter and open grassy areas for feeding. This species inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland (DEC, 2012b).	Unlikely due to human habitation and the disturbed understorey vegetation
Macropus irma	Western Brush Wallaby	The Western Brush Wallaby is a medium sized marsupial and its optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets (DEC, 2012c).	Unlikely due to surrounding disturbance
Oxyura australis	Blue-billed Duck	The Blue-billed Duck is found on terrestrial wetlands in temperate regions, that are freshwater to saline, and may be natural or artificial. It nests in rushes, sedges, Lignum Muehlenbeckia cunninghamii and paperbark Melaleuca (Birdlife International, 2015). The species is almost completely aquatic and is seldom seen on land. Non-breeding flocks, often with several hundred individuals, congregate on large, deep open freshwater dams and lakes in autumn. The daylight hours are spent alone in small concealed bays within vegetation or communally in large exposed rafts far from the shore (Birds in Backyards, 2015).	No – no permanent water on the site
Synemon gratiosa	Graceful Sun-moth	The Graceful Sun-moth is a diurnal moth with dull coloured brown to black forewings and brightly coloured orange hind wings. The larvae burrow into the rhizomes of <i>Lomandra maritima</i> and <i>Lomandra hermaphrodita</i> exclusively and therefore require the presence of one or both of these species to be present in an area (Bishop <i>et al.</i> , 2011).	No – no suitable Lomandra habitat on the site
Thinornis rubricollis (Charadrius rubricollis)	Hooded Plover	The Hooded Plover primarily inhabits sandy, ocean beaches, with the highest densities on beaches with large amounts of beach-washed seaweed that are backed by extensive open dunes. In Western Australia the species also inhabits inland and coastal salt lakes (Birdlife International 2014)	No – not coastal habitat

^{*} Habitat descriptions from DoEE (2016) SPRAT Database

Species identified in the database searches as possibly present on the site were:

- Baudin's Black Cockatoo (Calyptorhynchus baudinii);
- Carnaby's Black Cockatoo (Calyptorhynchus latirostris);
- Forest Red-tailed Black-Cockatoo (Calyptorhynchus banksii naso);

- Perth Slider, Lined Skink (Lerista lineata); and
- Southern Brown Bandicoot, Quenda (Isoodon obesulus fusciventer).

Listed Marine species under the EPBC Act that may intermittently visit the site are:

- Rainbow Bee-eater (Merops ornatus); and
- Cattle Egret (Ardea ibis).

2.8.4 Pest Fauna

The site shows signs of use by rabbits and foxes are also likely to be present. There is also the potential for mosquitoes and midges to occur in the area as these species are recognised pests in the City of Kwinana.

2.8.5 Biodiversity Value

The EPA's (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No. 3* indicated an ecological assessment of a site must consider its biodiversity value at the genetic, species and ecosystem levels; and its ecological functional value at the ecosystem level.

From a fauna perspective, the vegetated area in the eastern part of the site is considered to be Good Fauna Habitat. There is likely to be a decrease of native mammals and reptiles present as a result of surrounding disturbances on the site, introduced feral species such as foxes and rabbits and increased domestic predators such as cats.

2.9 Black Cockatoo Habitat Assessment

2.9.1 Black Cockatoo Species

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of *Banksia*, *Dryandra*, *Hakea*, *Eucalyptus*, *Grevillea*, *Pinus* and *Allocasuarina* spp. It is nomadic, often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 – 12m above the ground and have an entrance of 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell). Eggs are laid from July to October, with incubation lasting 29 days (DoE, 2014).

The site is within the modelled distribution and breeding range for Carnaby's Black Cockatoo (SEWPaC, 2012). The species has been recorded in the area as shown on the Naturemap Report (Appendix 1).

Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) is most common in the far south-west of Western Australia. It is known to breed from the southern forests north to Collie and east to near Kojonup. Baudin's Black Cockatoo is typically found in vagrant flocks and utilises the taller, more open Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands where it feeds mainly on Marri seeds and various Proteaceous species (Johnstone and Kirkby, 2011).

The site is on the boundary of the modelled distribution for Baudin's Black Cockatoos (SEWPaC, 2012). The species has not been recorded in the area as shown on the Naturemap Report (Appendix 1).

Forest Red-tailed Black Cockatoos (*Calyptorhynchus banksii naso*) are endemic to the humid to subhumid south-west of Western Australia (SEWPaC, 2012). The range of Forest Red-tailed Black Cockatoos is bound by Gingin in the north to Mt Helena, Christmas Tree Well, West Dale, North Bannister, Mt Saddleback, Kojonup, Rocky Gully, upper King River and Green Range (east of Albany) (SEWPaC, 2012; DoE, 2014). It nests in tree hollows with a depth of 1-5m, that are predominately Marri, Jarrah and Karri (*E. diversicolor*) and it feeds primarily on the seeds of Marri and Jarrah (Johnstone and Kirkby, 2011).

The site is within the modelled distribution and breeding range for Forest Red-Tailed Black Cockatoos (SEWPaC, 2012). The species has been recorded in the area as shown on the Naturemap Report (Appendix 1) and by PGV Environmental during site reconnaissance visits.

2.9.2 Methodology

PGV Environmental undertook the Black Cockatoo Habitat Assessment in accordance with the *EPBC Act referral guidelines for three threatened Black Cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed Black Cockatoo (vulnerable) Calyptorhynchus banksii naso (SEWPaC, 2012) (Black Cockatoo Referral Guidelines) and the methodology that is outlined in the SPRAT Database for each of the Black Cockatoo species for Black Cockatoo Habitat Assessments.*

A site visit was undertaken by PGV Environmental on 13 February 2018. The site was traversed on foot and information on Black Cockatoo foraging, roosting and breeding habitat was assessed.

The quality of the vegetation was determined in the context of foraging habitat for Black Cockatoos. During the site visit a search for feeding signs or feeding debris such as 'chewed' Marri, Banksia, Jarrah and Sheoak nuts was undertaken.

The site was also searched for evidence of roosting including areas of droppings, moulted feathers, feather down or clippings from branches under trees.

Breeding habitat is defined in the Black Cockatoo Referral Guidelines as trees of species known to support breeding within the range of the Black Cockatoo species which either have a suitable nest hollow OR are of a suitable diameter at breast height (DBH) to develop a nest hollow.

2.9.3 Habitat definitions

'Foraging habitat' for Black Cockatoos is determined from the plant species that are present on the site and evidence of feeding such as direct observation of birds or by chewed nuts and cones. 'Roosting habitat' is usually evident due to the presence of Black Cockatoos on the site in the evening and early morning and of scat under the roosting area. 'Breeding habitat' is defined as trees of species known to support breeding within the range of the species which either have a suitable nest hollow OR have a DBH of 500mm or greater.

2.9.4 Foraging

The site contains 2.7ha of native vegetation. There are six native species recorded on the site that are recognised as foraging habitat for Carnaby's Black Cockatoos (Valentine and Stock, 2008; Groom, 2011). These are listed in Table 4.

Table 4: Foraging Species for Carnaby's Black Cockatoos Recorded on the Site

Species	Common Name
Eucalyptus marginata	Jarrah
Allocasuarina fraseriana	Sheoak
Banksia attenuata	Candlestick Banksia
Banksia ilicifolia	Holly-leaved Banksia
Banksia menziesii	Firewood Banksia
Xanthorrhoea preissii	Grass Tree

The overstorey is dominated by species that provide foraging habitat for Carnaby's and Baudin's Black Cockatoos. There was limited concrete evidence observed of Black Cockatoos foraging on the site during the site inspections, however some aged Banksia cones had marks that potentially could be chew marks from foraging by Black Cockatoos.

Forest Red-tailed Black Cockatoos do not forage on Banksias so the available foraging habitat on the site is limited to the Jarrah and Sheoak trees, which is a very small area.

2.9.5 Roosting

The site does not contain a known roosting site for Carnaby's Black Cockatoos and no evidence of the site being utilised as roosting habitat by Black Cockatoos was observed during the site visit. The nearest recorded roosting sites are 2.6km to the east, 3.4km to the north-east and 2.3km to the south (DoP, 2011). No roosting was recorded in Anketell during the Great Cocky Count (2016).

2.9.6 Breeding

Black Cockatoos are known to breed in hollows of large eucalypts. The site is not known as a breeding site for Carnaby's Black Cockatoos (DoP, 2011) and no breeding has been recorded within 5km of the site. No evidence of breeding by Black Cockatoos was observed on the site by PGV Environmental during the site visit.

The Black Cockatoo Referral Guidelines define trees of certain species with a DBH of 500mm or greater as breeding habitat regardless of the presence or not of hollows. The theory behind this definition is the concept that while the trees may not currently contain hollows they are mature enough that in the next 50 years or, so a hollow might form and be of use to Black Cockatoos for the purposes of breeding.

PGV Environmental recorded a total of three Jarrah trees with a trunk diameter greater than 500mm at breast height. No trees contained hollows large enough for Black Cockatoos to use for breeding.

The details of the significant trees on the site are in Appendix 4 and are shown on Figure 5.

2.9.7 Regional Context

To assist in determining the significance of any impact on Black Cockatoo habitat on the site an assessment of Black Cockatoo habitat within the vicinity of the site was undertaken. The site is located between the Beeliar Regional Park and the Jandakot Regional Park which are a total of 3,400ha and 3,000ha respectively. Eight Bush Forever sites, some of which are part of the Regional parks, occur within 5km of the site (Figure 6) are outlined in Table 5.

Table 5: Bush Forever sites within 5km of the site

Site Name	Site Number	Cockatoo Habitat (ha)
The Spectacles	269	273.5
Sandy Lake and Adjacent Bushland, Anketell	270	201.4
Modong Nature Reserve and Adjacent Bushland, Oakford	348	242
Wandi Nature Reserve and Anketell Road Bushland, Wandi/Anketell	347	393.3
Harry Waring Marsupial Reserve, Wattleup	392	237.2
Casuarina Prison Bushland	273	116.9
Sicklemore Road Bushland, Parmelia/Casaurina	272	84.6
Mandogalup Road Bushland, Mandogalup	268	95.9
Mandogalup Road Bushland, Hope Valley	267	15.7
Total		1,660.5

2.9.8 Significance of Impact

According to the EPBC Act Significant Impact Guidelines 1.1 (DoE, 2013), the significance of the impact on Black Cockatoos depends on the sensitivity, value and quality of the environment and the intensity, duration, magnitude and geographic extent of the impacts. The category of listing (for example; Endangered, Vulnerable or Migratory) determines the significant impact criteria for listed flora and fauna species and ecological communities.

This Black Cockatoo Habitat Assessment assumes all of the foraging and potential breeding trees on the site would be cleared to assume a worst-case scenario. Using this assumption, the clearing would result in 2.7ha of foraging habitat and three potential breeding trees being cleared.

The following assessments are for the Carnaby's Black Cockatoo, and Baudin's Black Cockatoo which are listed as Endangered and the Forest Red-tailed Black Cockatoo which is listed as Vulnerable.

Carnaby's Black Cockatoo and Baudin's Black Cockatoo

The impact on Carnaby's Black Cockatoos and Baudin's Black Cockatoos from clearing the Black Cockatoo habitat on the site has been assessed against the criteria set out in the Significant Impact Guidelines 1.1 for the impact on an Endangered species and is shown below:

• Lead to a long-term decrease in the size of a population

There was no evidence that the site supports breeding or roosting of Carnaby's Black Cockatoos and Baudin's Black Cockatoos. There are large areas (1,660.5ha) of Bush Forever sites within 5km consisting of larger areas of foraging and potential breeding habitat. Therefore, clearing of the site will not result in this outcome.

• Reduce the area of occupancy of the species

Clearing of the site will not result in a reduction of any known breeding and roosting habitat although it will result in a reduction of 2.7ha of foraging habitat. Within 5km of the site, however, there is approximately 1,660.5ha of foraging habitat located in Bush Forever sites and therefore clearing of the site will not result in this outcome.

Fragment an existing population into two or more populations

Clearing of the site is unlikely to fragment the population of Carnaby's Black Cockatoos and Baudin's Black Cockatoos in the area into sub-populations due to the Bush Forever sites in the area providing linkages consisting of large areas of Black Cockatoo habitat. Carnaby's Black Cockatoos and Baudin's Black Cockatoos can fly large distances between foraging areas. Clearing of the site will therefore not result in this outcome.

• Adversely affect habitat critical to the survival of a species

There was no evidence of breeding or roosting by Carnaby's Black Cockatoos or Baudin's Black Cockatoos on the site. The two trees that contained potentially suitable hollows/spouts and the approximately 2.7ha of foraging habitat is not considered to be critical to the survival of the species due to the large amount of foraging and potential breeding habitat within 5km of the site, therefore clearing of the site would not result in this outcome.

Disrupt the breeding cycle of a population

The site contained no evidence of breeding and there were only two trees that contained potentially suitable hollows/spouts therefore clearing of the site would not result in this outcome.

• Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Clearing of the site will not result in this outcome due to the large extent of Black Cockatoo habitat reserved in Bush Forever sites within 5km of the site.

• Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

Clearing of the site will not result in the establishment of an invasive species harmful to Carnaby's Black Cockatoos or Baudin's Black Cockatoos.

• Introduce disease that may cause the species to decline

Clearing of the site will not cause disease to be introduced therefore will not result in this outcome.

• Interfere with the recovery of the species

The Carnaby's Black Cockatoos and Baudin's Black Cockatoos that utilise the site for foraging have access to approximately 1,660.5ha of Black Cockatoo habitat within 5km reserved in Bush Forever sites. Therefore, any clearing of habitat on the site would not interfere substantially with the recovery of the species.

The conclusion of this assessment in accordance with the criteria set out in the Significant Impact Guidelines 1.1 is that development on Lot 7 Anketell Road will not have a significant impact on Carnaby's Black Cockatoos or Baudin's Black Cockatoos.

Forest Red-tailed Black Cockatoo

The impact on Forest Red-tailed Black Cockatoos from clearing the small area of habitat suitable for this species has been assessed against the criteria set out in the Significant Impact Guidelines 1.1 for the impact on a Vulnerable species and is shown below:

• Lead to a long-term decrease in the size of an important population of a species

In the Significant Impact Guidelines 1.1 an important population is defined as "a population that is necessary for a species' long-term survival and recovery" and may be "key source populations either for breeding or dispersal, populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species' range".

There was no evidence of breeding occurring on the site and the surrounding area contains eight larger Bush Forever sites providing large areas of foraging and breeding habitat for Cockatoos that utilise the site. Development of the site would therefore not result in this outcome.

• Reduce the area of occupancy of an important population

There was no evidence found of Forest Red-tailed Black Cockatoos breeding or roosting on the site. Clearing of the site will reduce the area of foraging available by a small area of foraging habitat, however there is approximately 1,660.5ha of potential foraging habitat within 5km of the site in Bush Forever sites therefore clearing of the site would not result in this outcome.

• Fragment an existing important population into two or more populations

There are large areas of Bush Forever sites within 5km of the site that provide foraging and potential breeding habitat. Forest Red-tailed Black Cockatoos can fly large distances between foraging areas. Therefore, clearing of the site would not result in this outcome.

Adversely affect habitat critical to the survival of a species

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site and there are large areas of foraging habitat within 5km of the site, as Bush Forever sites, therefore the site is not considered critical to the survival of the species.

• Disrupt the breeding cycle of an important population

There was no evidence that Forest Red-tailed Black Cockatoos breed on the site and there were only two trees on the site that contained potentially suitable hollows/spouts, therefore clearing of the site would not result in this outcome.

• Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The large areas of foraging and breeding habitat located in the Bush Forever sites within 5km of the site would prevent the population from declining as a result of clearing of the site.

• Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Clearing the site will not result in invasive species being introduced, therefore would not result in this outcome.

• Introduce disease that may cause the species to decline

Clearing the site will not result in disease being introduced, therefore would not result in this outcome.

Interfere substantially with the recovery of the species

The Forest Red-tailed Black Cockatoos that would utilise the site have access to approximately 1,660.5ha of Black Cockatoo habitat within 5km reserved in Bush Forever sites. Therefore, the clearing the small area of foraging habitat on the site would not interfere substantially with the recovery of the species.

In accordance with the criteria set out in the Significant Impact Guidelines 1.1 the conclusion of this assessment is that development of Lot 7 Anketell Road, would not have a significant impact on Forest Red-tailed Black Cockatoos.

2.9.9 Black Cockatoo Referral Guidelines

The EPBC Act referral guidelines for three threatened Black Cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed Black Cockatoo (vulnerable) Calyptorhynchus banksii naso (SEWPaC, 2012) (Black Cockatoo Referral Guidelines) contain several steps to determine whether or not a referral is required. These steps are:

- The definition of habitat (breeding, roosting and foraging Table 1 in the Black Cockatoo Referral Guidelines);
- 2. A description of the type of action that may have a high or low risk of being a significant impact and therefore require referral (Table 3 in the Black Cockatoo Referral Guidelines);
- 3. Formulation of a mitigation strategy to reduce the scale of impact; and
- 4. A flowchart to assist in decision making on whether or not an action should be referred.

Step 1 Black Cockatoo Habitat

There is approximately 2.7ha native vegetation containing foraging habitat for Carnaby's Black Cockatoos and Baudin's Black Cockatoos on the site and limited foraging habitat for Forest Redtailed Black Cockatoos. There are six trees that are considered to be potential breeding trees under the definition provided by the DoEE. There is no recorded roosting on the site or evidence of such.

Step 2 Level of Impact

Foraging

The site contains approximately 2.7ha of native vegetation foraging habitat for Carnaby's and Baudin's Black Cockatoos. In accordance with the Referral Guidelines greater than 1ha of foraging

habitat may constitute a significant impact. Therefore, clearing the site is an action recommended to be referred under the EPBC Act for an impact on foraging habitat. The impact on foraging habitat for Forest Red-tailed Black Cockatoos is less than 1ha and therefore may not have a significant impact under the referral guidelines.

Roosting

The Black Cockatoo Referral Guidelines consider the clearing of a known roosting site as a high risk of being a significant impact. The site is not mapped as having a known roosting site by the Department of Planning mapping of January 2011, although there are known roosting sites in the vicinity. There were no roosting sites recorded and the risk of a significant impact on a known roosting site is considered to be low.

Breeding

According to Table 3 in the Black Cockatoo Referral Guidelines the clearing of any known nesting tree has a high risk of being a significant impact. A known nesting tree is defined in the Black Cockatoo Referral Guidelines as any existing tree in which breeding has been recorded or suspected. There are no known nesting trees that occur on the site and therefore there is no risk of a significant impact on known breeding habitat of Black Cockatoos.

The Black Cockatoo Referral Guidelines also consider that the clearing or degradation of any part of a vegetation community known to contain breeding habitat is likely to have a high risk of a significant impact. In Table 1 of the Black Cockatoo Referral Guidelines breeding habitat is defined as woodlands, forests or isolated trees that contain or consist of live or dead trees of certain species with either a DBH of or greater than 500mm or the presence of suitable nest hollows. The site contains three Jarrahs with a DBH of or greater than 500mm. According to Table 1 of the Black Cockatoo Referral Guidelines there is potential for Black Cockatoos to breed in trees on the site.

The Black Cockatoo Referral Guidelines state that breeding habitat predominantly applies to those areas within the breeding range of the Black Cockatoo species as shown in the maps attached to the Black Cockatoo Referral Guidelines. The site is within the breeding range of Carnaby's Black Cockatoos. The breeding range of Forest Red-tailed Black Cockatoos is not specified within the map attached to the Black Cockatoo Referral Guidelines, however the site is within the mapped distribution range. The site is not within the distribution range of Baudin's Black Cockatoos.

Step 3 Mitigation

No mitigation is currently proposed.

Step 4 Referral Advice

The Decision Making flowchart in Figure 1 of the Black Cockatoo Referral Guidelines was applied to the site on the assumption that the native vegetation will not be cleared:

- 1 Could the impacts of your action occur within the modelled distribution of the black cockatoos? YES
- 2 Could the impacts of your action affect any black cockatoo habitat or individuals? YES
- 3 Have you surveyed for black cockatoo habitat using the recommended methods? YES

- 4 Could your action have an impact on black cockatoos or their habitat? YES
- 5 Is your impact mitigation best practice so that it may reduce the significance of your impacts on black cockatoos? Prioritise impact avoidance over impact minimisation N/A

RESULT - Referral May be Required.

2.10 Heritage

2.10.1 Aboriginal Heritage

There are no listed Aboriginal Heritage Sites within Lot 7 Anketell Road. There is a small area of Heritage Place 3427 on the northern part of the site. The status of the Place is 'Stored Data / Not a Site' as the place has been assessed as not meeting the criteria pursuant to Section 5 of the *Aboriginal Heritage Act 1972*.

2.10.2 European Heritage

Heritage sites can be listed under the following lists/registers:

- World Heritage Sites;
- National Heritage Sites;
- Commonwealth Heritage Sites;
- Sites on the register of the National Estate;
- Sites on the Western Australian Heritage Council Register; and
- Sites listed in the City of Kwinana Municipal Heritage Inventory List.

There are no listed Heritage Sites or Interim Heritage Sites on the site (National Map, 2018; Heritage Council of Western Australia, 2018; DoEE, 2018).

3 ENVIRONMENTAL ASSESSMENT

3.1 Land Use

Part of the site has historically been cleared. The site is not listed as a Contaminated Site and historically the only development on the site is the high voltage power lines and the shed to the north.

3.2 Geology and Soils

3.2.1 Geology

The Bassendean and Spearwood Dune geological unit is not constrained for residential development.

3.2.2 **Soils**

The soils on the site do not provide an impediment to the development of the lot. The WAPC Acid Sulphate Soils Planning Guidelines (WAPC, 2009) indicate that "acid sulphate soils are technically manageable in the majority of cases". ASS Investigation and Management Plans will be required once the detailed design of the road and the areas and depth of disturbance is known in accordance with the Acid Sulphate Soils Guideline Series: Identification and Investigation of Acid Sulphate Soils and Acidic Landscapes (DEC, 2009) and Treatment and Management of Soils and Water in Acid Sulphate Soil Landscapes (DEC, 2011). As the impact of disturbing ASS is manageable this is not an impediment to the development of the Lot.

3.2.3 *Phytophthora* Dieback

The site is largely Uninfested by *Phytophthora* Dieback. Standard hygiene protocols should be in place during construction to protect any retained vegetation that may not be infected and vegetation in surrounding areas.

3.3 Hydrology

Groundwater is generally greater than 5m from the surface and is not an impediment to development. Stormwater management will be required to be addressed in accordance with *Better Urban Water Management* (WAPC, 2008). A Local Water Management Strategy (LWMS) is required at Local Structure Plan stage and an Urban Water Management Plan (UWMP) will be required at the subdivision stage. There are no surface water features on the site and stormwater should be managed by on-site infiltration.

3.4 Flora and Vegetation

The Flora and Vegetation survey found the following:

- A total of 73 plant species, comprising 62 native and 11 introduced species were recorded on the site;
- No Threatened (Declared Rare) or Priority Flora species were recorded on the site;

- The vegetation is mapped as being part of the Bassendean Central and South vegetation complex, which has a greater than 10% reservation;
- Two vegetation types were described and mapped on the site: Banksia menziesii Low Woodland over Kunzea glabrescens Low Tall Open Shrubland on the central lower area, and Allocasuarina fraseriana/Banksia attenuata/B. menziesii Low Open Woodland on slightly more elevated land. Both vegetation types are upland types occurring on dry sandy soils, however the presence of Spearwood (Kunzea glabrescens) in high density in the central lower lying part of the site indicates the presence of groundwater close to the surface although not high enough to constitute a wetland;
- The vegetation was mostly described as Good to Degraded with a 0.8ha area of Very Good in the southern portion;
- The vegetation closely matched four Floristic Community Types (FCT 28, 23a, 21a and 21c) and could be a transitional FCT based on the proximity of the site to the Bassendean-Spearwood landform boundary and FCT21c is a Priority Ecological Community at State level; and
- The vegetation is likely to be representative of the Banksia Woodlands on the Swan Coastal Plain TEC.

Proposed development of the site does not impact on any Declared rare or Priority flora species, however the vegetation may be representative of a Priority Ecological Community and a Commonwealth Listed TEC. The impact on approximately 2.7ha of the TEC will require referral of the proposed development to the DoEE under the EPBC Act.

3.5 Significant Trees

The Significant Tree Survey undertaken in accordance with AS 4760 recorded six trees on the site. Three Jarrah trees were considered to be in Good condition, and one Jarrah trees could be considered for retention. The remainder of the trees on the site were not considered to have some landscape amenity.

3.6 Fauna

The Level 1 Fauna Survey found the following:

- There are two fauna habitats described on the site; Woodland Habitat and Cleared Habitat
- The habitat is considered to be Good Fauna Habitat and Highly Disturbed Fauna Habitat due to disturbance and lack of connectivity;
- Listed species that have the potential to utilise the site are:
 - Baudin's Black Cockatoo (Calyptorhynchus baudinii);
 - Carnaby's Black Cockatoo (Calyptorhynchus latirostris);
 - Forest Red-tailed Black-Cockatoo (Calyptorhynchus banksii naso);
 - Perth Slider, Lined Skink (Lerista lineata); and
 - Southern Brown Bandicoot, Quenda (Isoodon obesulus fusciventer).
- Listed Marine species under the EPBC Act that may intermittently visit the site are:
 - Rainbow Bee-eater (Merops ornatus); and
 - Cattle Egret (Ardea ibis).

 Pest fauna likely to occur on the site are Rabbits and Foxes. Mosquitos and Midges may also be present.

The proposed development of Lot 7 Anketell Road will impact on 2.7ha of Good Fauna Habitat that has values for three endangered, two Priority and two listed Marine species. The habitat on the site for the three Black Cockatoo species required additional investigation as outlined in Section 3.7. The Rainbow Bee-eater, Cattle Egret and Quenda are likely to be intermittent visitors and not rely on the site for survival.

The Black Striped Snake may occur on the site and a relocation program is likely to be required prior to clearing.

A Management Strategy for Mosquitoes and Midges, in accordance with requirements of the City of Kwinana may be required as a condition of subdivision.

3.7 Black Cockatoos

The Black Cockatoo Habitat Assessment found the following:

- The site contains foraging habitat for Carnaby's, Baudin's and Forest Red-tailed Black Cockatoos of approximately 2.7ha;
- There has been no roosting recorded on the site;
- There is no recorded breeding or evidence of breeding on the site;
- There were three potential breeding habitat trees (Jarrah) recorded on the site;
- There are significant reserves containing foraging and potential breeding habitat in the surrounding area in conservation reserves.

The impact of clearing the site is unlikely to be significant due to the small area of foraging habitat to be cleared and the significant surrounding reserves and the loss of three potential breeding trees, however referral under the EPBC Act is recommended to assess the impact in accordance with the Black Cockatoo Referral Guidelines.

Consideration should be given to incorporating Jarrah and Banksia or other habitat trees in future development the site to mitigate the clearing of any Black Cockatoo habitat.

3.8 Heritage

There are no listed Heritage Sites on the site and the proposed development of the site is not constrained by heritage.

4 SUMMARY AND CONCLUSION

4.1 Summary

The Environmental Assessment of Lot 7 Anketell Road, Anketell found the following:

- The historical land use is not an impediment to the development on the site;
- The geology and soils are not a constraint to development with potential Acid Sulphate Soils and Phytophthora able to be managed during the development phase;
- The hydrology of the site is not an impediment to development with the implementation of appropriate stormwater controls;
- There is no Declared Rare or Priority flora recorded on the site and therefore flora is not an impediment to development;
- The vegetation may be an example of a Priority Floristic Community;
- The vegetation is also considered to be part of the Banksia Woodlands on the Swan Coastal Plain TEC and therefore the development should be referred under the EPBC Act for assessment of the impact of clearing the vegetation on the TEC;
- There are six trees deemed as significant in accordance with AS 4970, and the retention of one Jarrah in good condition recommended;
- There is 2.7ha of foraging habitat for Carnaby's and Baudin's Black Cockatoos and less than
 1ha of foraging habitat for Forest Red-tailed Black Cockatoos, and three potential breeding
 trees for all three species. In accordance with the referral guidelines, referral under the
 EPBC Act of the proposed development is advised;
- The site contains fauna habitat for some other Conservation Significant species however, the level of impact would not be significant. The impacts are able to be managed during clearing using fauna friendly techniques and trapping and relocation prior to clearing;
- Pest fauna such as mosquitos and midges may require the preparation of a Midge and Mosquito Management Strategy at Subdivision;
- There are no known heritage sites on the lot and therefore heritage does not impact on the proposed development.

4.2 Conclusion

The proposed development on Lot 7 Anketell Road, Anketell is not highly constrained by environmental factors. The clearing of the vegetation will impact on a Commonwealth listed Threatened Ecological Community and habitat for three federally listed Black Cockatoo Species. The area of impact for the TEC and level of impact on Black Cockatoos is considered to be low, however a referral under the EPBC Act is recommended.

5 REFERENCES

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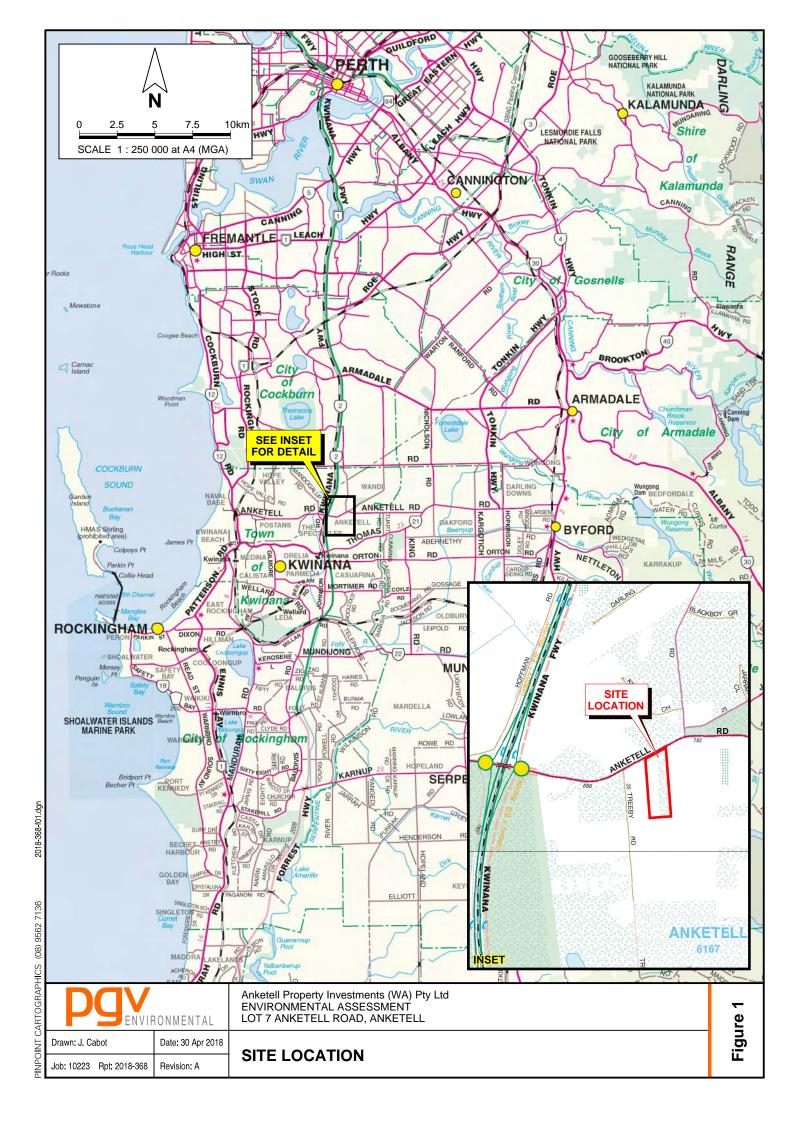
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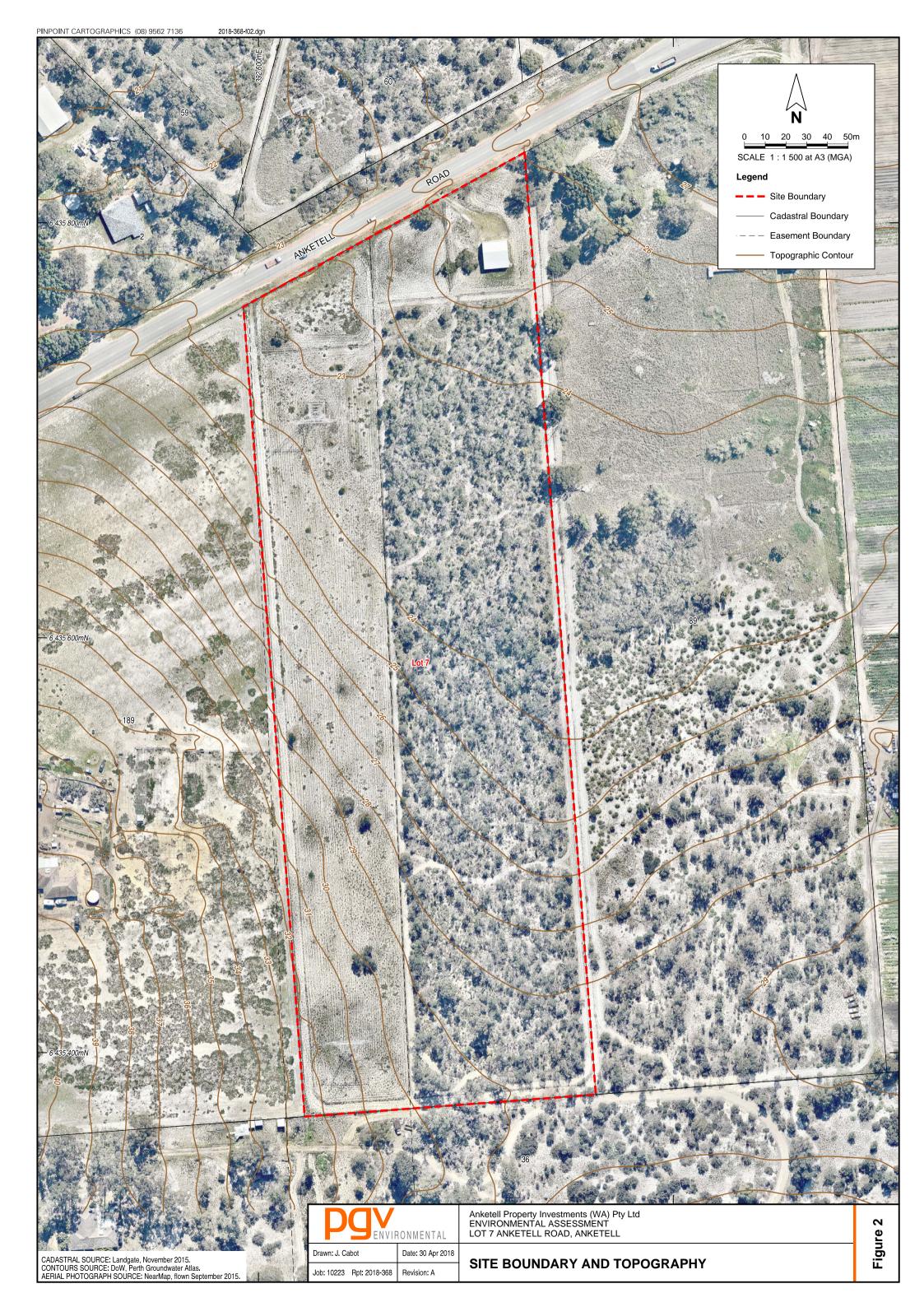
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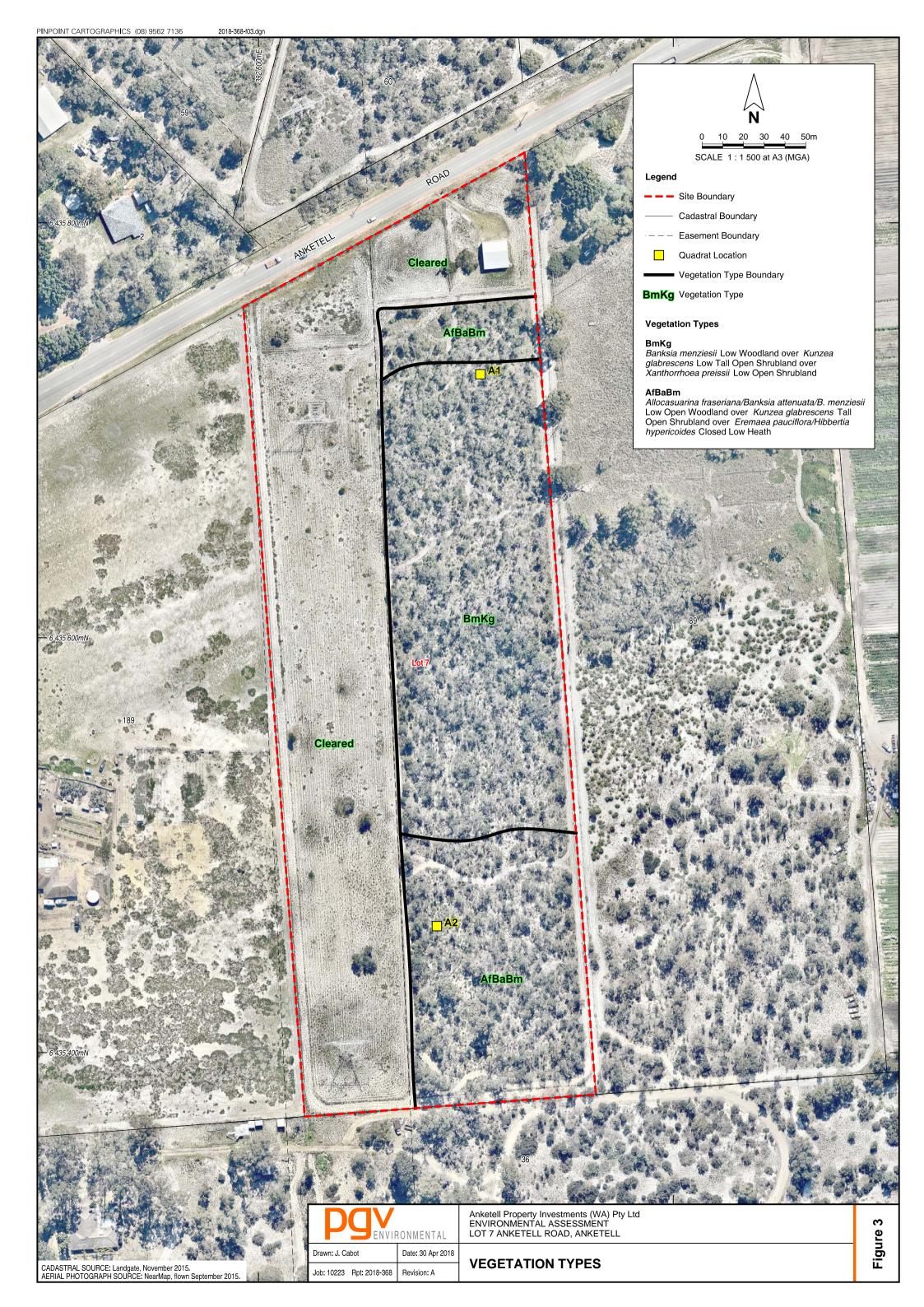
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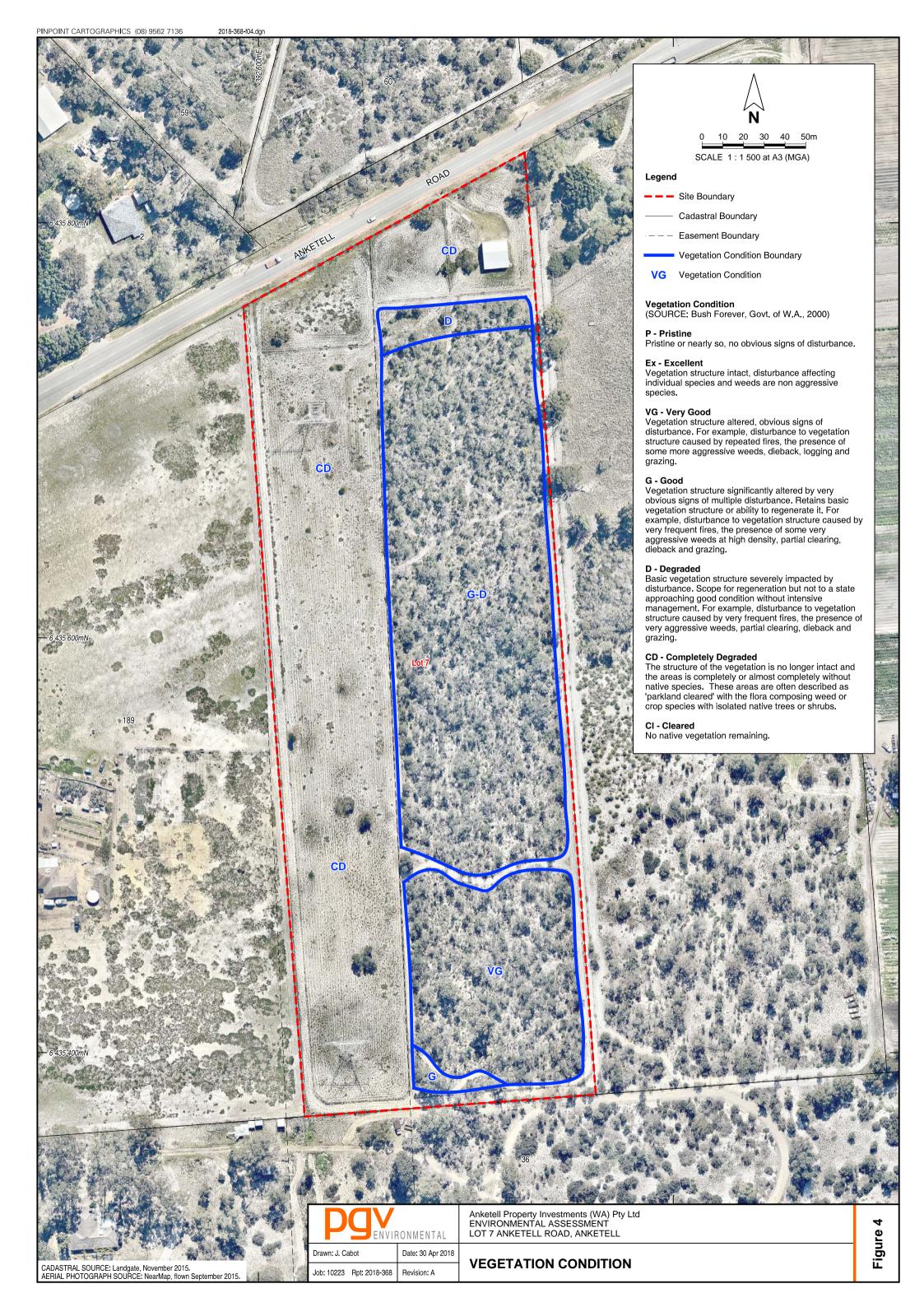
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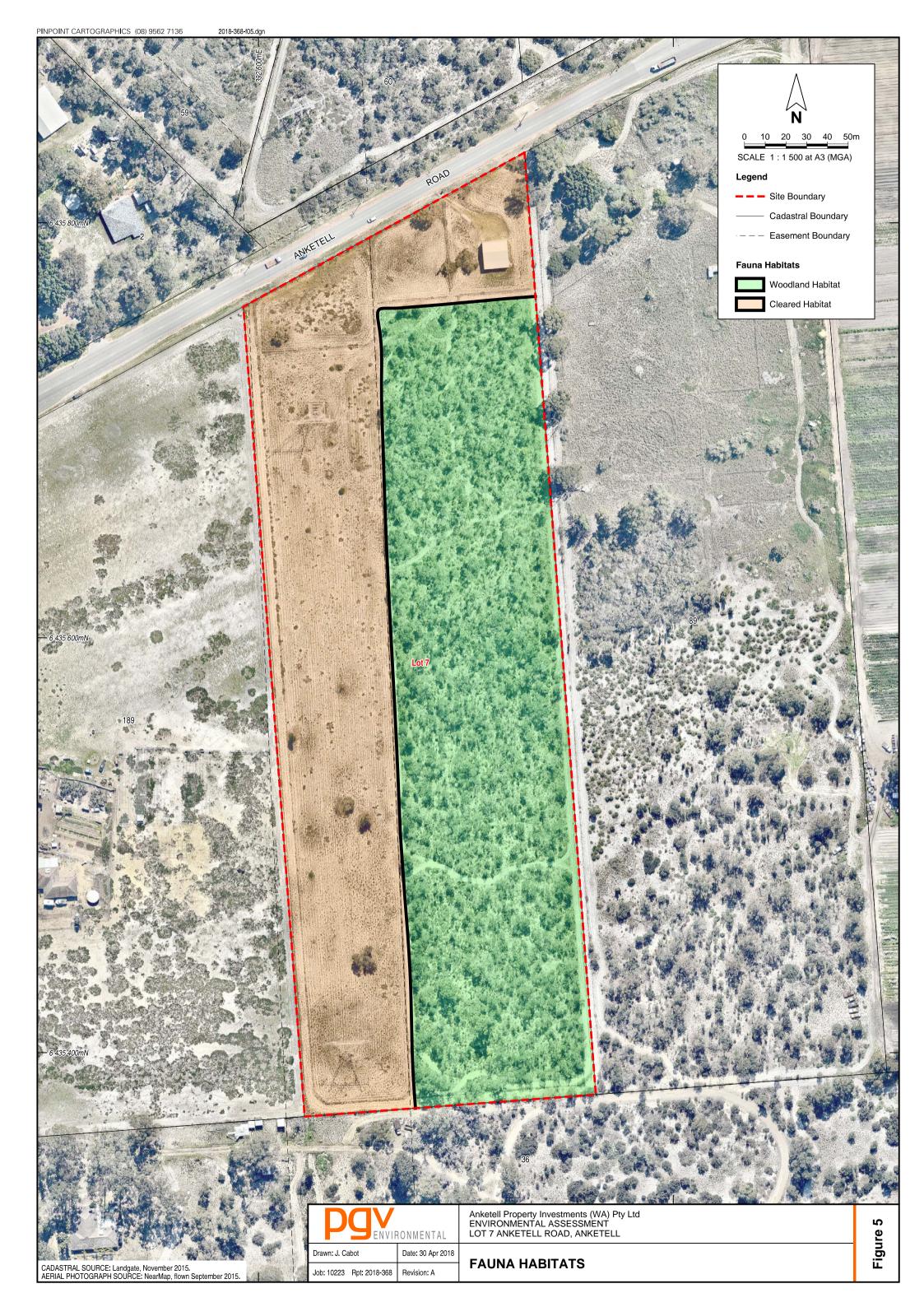


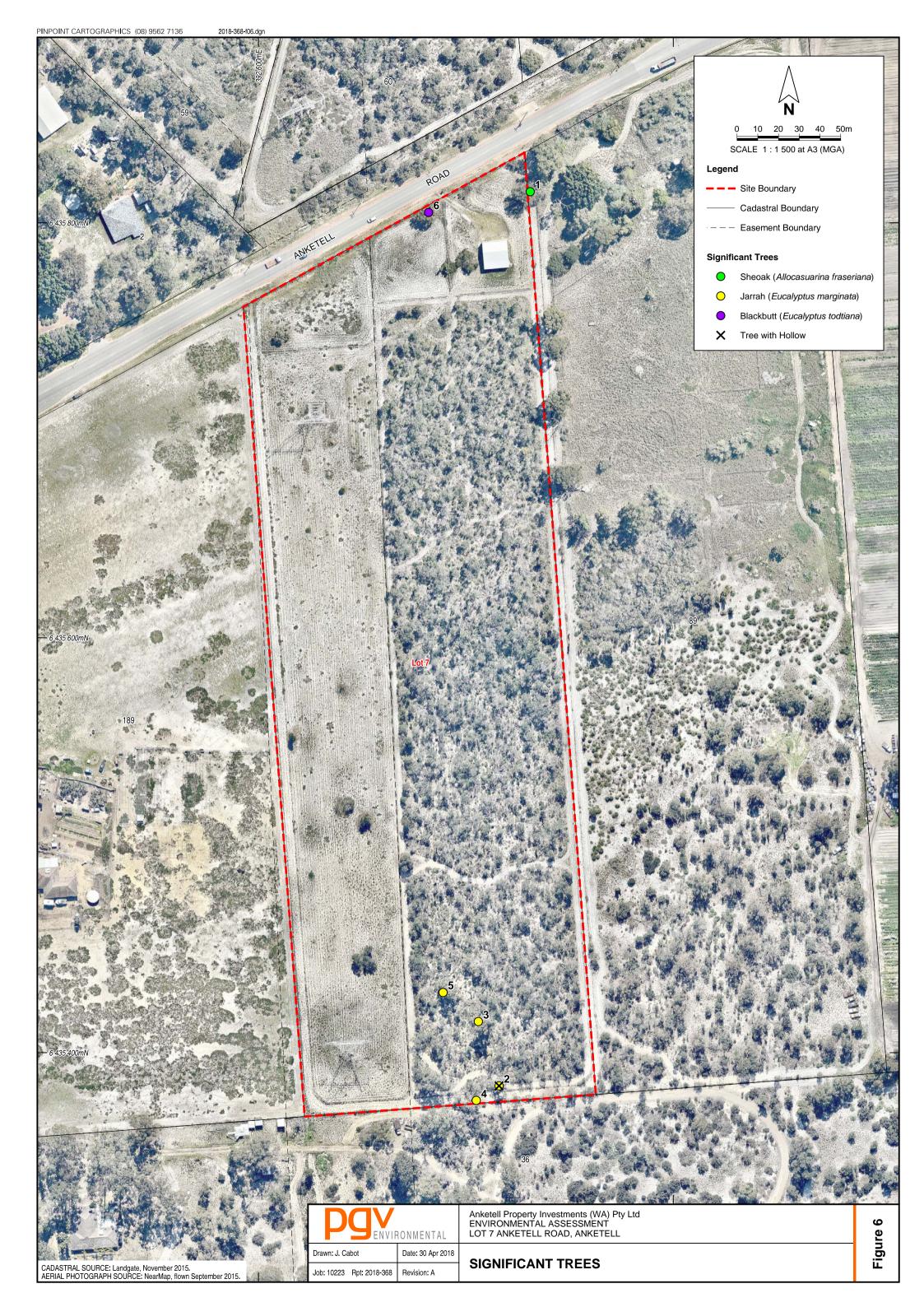












APPENDIX 1 Naturemap Report



NatureMap Species Report

Created By Guest user on 27/02/2018

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 115° 51' 41" E,32° 12' 41" S

Buffer 5km

Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	609	3910
Priority 3	5	20
Priority 4	7	268
Protected under international agreement	3	22
Rare or likely to become extinct	8	172
TOTAL	632	4392

Rare or likely to become extinct		Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1. 1596 Caladenia hungeiii (Grand Spider Orchit) T	Rare or like	ely to bed	come extinct			
24734 Calipstorhynchus latinatris (Camaby's Cockatoo) T		-			Т	
A. A480	2.	24731	Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)		Т	
A. Ash O. Calipytomychus sp. (white-failed black cockatoo) T	3.	24734	Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo),		_	
S. 24092 Dasyurus geoffroii (Chuditch, Western Quolii)			Carnaby's Cockatoo)		ļ	
1	4.	48400	Calyptorhynchus sp. (white-tailed black cockatoo)		Т	
7. 1637 Diuris purdiei (Purdie's Donkey Orchid) T 8. 1639 Drakaae elastica (Glossy-leaved Hammer Orchid) T Protected under intermational agreement Protected under intermational agreement 9. 41324 Ardea modesta (great egret, white egret) IA 10. 24893 Merops ornatus (Rainbow Bee-eater) IA 11. 24813 Plegadis falcinellus (Glossy Ibis) IA 12. 16245 Cyathochaeta teretifolia P3 13. 20462 Jacksonia gracillima P3 14. 25147 Leistia ineata (Perth Silder, Lined Skink) P3 15. 8163 Pithocarpa corymbulosa (Corymbose Pithocarpa) P3 16. 25800 Sylvidium paludicole P3 Priority 4 P1 17. 141 Aponogeton hexatepalus (Slalked Water Ribbons) P4 18. 473 Dodonae hacketiana (Hackett's Hopbush) P4 19. 25478 Isodon obesulus subsp. bushveter (Ouende, Southern Brown Bandicoot) P4 21. 24133 Macropus imma (Western Brush Wallaby) P4 22. 24330 Oyura australis (Slue-billed Duck) P4 <	5.	24092	Dasyurus geoffroii (Chuditch, Western Quoll)		Т	
Reconstructed under international agreement	6.	12938	Diuris micrantha		Т	
Protected under international agreement 9. 41324 Ardea modesta (great egret, white egret) 1A 10. 24598 Merops omatus (Rainbow Bee-eater) 1A 11. 24843 Plegadis falcinellus (Glossy lbis) 1A Protected 1A 11. 24843 Plegadis falcinellus (Glossy lbis) 1A Protected 1A 1A 24843 Plegadis falcinellus (Glossy lbis) 1A Protected 1A 24843 Plegadis falcinellus (Glossy lbis) 1A Protected 1A 24843 Plegadis falcinellus (Glossy lbis) 1A 24843 Plegadis falcinellus (Glossy lbis) 1A 24843 Plegadis falcinellus (Perth Silder, Lined Skink) P3 24844 24845 Plihocarpa conymbiolisa (Corymbose Plihocarpa) P3 24844 Papongeton hexatepalus (Stalked Water Ribbons) P4 P4 P4 P4 P4 P4 P4 P	7.	1637	Diuris purdiei (Purdie's Donkey Orchid)		T	
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13. 20462 Jacksonia gracillima P3 14. 25147 Lorista lineata (Porth Silder, Lined Skink) P3 15. 8163 Pithocarpa corymbulosa (Corymbose Pithocarpa) P3 16. 25800 Stylidium paludicola P3 Priority 4 Priority 4 17. 141 Apongeton hexatepalus (Stalked Water Ribbons) P4 18. 4763 Dodonaea hackettiana (Hackett's Hopbush) P4 19. 25478 Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot) P4 20. 24153 Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot) P4 21. 24333 Macropus imma (Western Brush Wallaby) P4 22. 24332 Oxyura australis (Blue-billed Duck) P4 23. 33992 Synemon gratiosa (Graceful Sunmoth) P4 Non-conservation taxon 24. 15466 Acacia pulchella (Prickly Moses) 25. 3374 Acacia pulchella (Prickly Moses) 27. 15481 <t< td=""><td>-</td><td>16245</td><td>Cyathochaeta teretifolia</td><td></td><td>P3</td><td></td></t<>	-	16245	Cyathochaeta teretifolia		P3	
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		Species Name	Naturalised	 ¹ Endemic To Query Area
36.	25536	Accipiter fasciatus (Brown Goshawk)		
37.	42368	Acritoscincus trilineatus (Western Three-lined Skink)		
38.		Acrocephalus australis (Australian Reed Warbler)		
39.		Actinotus glomeratus		
40.		Adenanthos cygnorum (Common Woollybush)		
41.		Adenanthos cygnorum subsp. cygnorum (Common Woollybush)		
42. 43.	1791	Adenanthos obovatus (Basket Flower) Afraflacilla huntorum		Υ
43. 44.	18/	Aira caryophyllea (Silvery Hairgrass)	Υ	Ť
45.	104	Aira caryophyllea/cupaniana group	'	
46.	185	Aira cupaniana (Silvery Hairgrass)	Υ	
47.		Aira praecox (Early Hairgrass)	Υ	
48.	1728	Allocasuarina fraseriana (Sheoak, Kondil)		
49.	20184	Amphipogon laguroides subsp. laguroides		
50.	200	Amphipogon turbinatus		
51.		Aname mainae		
52.	1060	Anarthria laevis		
53.	24312	Anas gracilis (Grey Teal)		
54.		Anas rhynchotis (Australasian Shoveler)		
55.		Anas superciliosa (Pacific Black Duck)		
56.		Angianthus preissianus		
57. 58.		Anhinga novaehollandiae (Australasian Darter) Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)		
59.	1411	Anser anser		
60.	24561	Anthochaera carunculata (Red Wattlebird)		
61.		Anthochaera lunulata (Western Little Wattlebird)		
62.		Aotus cordifolia		
63.	3688	Aotus gracillima		
64.	1117	Aphelia cyperoides		
65.	24991	Aprasia repens (Sand-plain Worm-lizard)		
66.	24285	Aquila audax (Wedge-tailed Eagle)		
67.		Araneus cyphoxis		
68.		Araneus senicaudatus		
69.		Arctotheca calendula (Cape Weed, African Marigold)	Υ	
70.		Arcyria cinerea		
71.		Arcyria incarnata		
72. 73.		Ardea novaehollandiae (White-faced Heron) Ardea pacifica (White-necked Heron)		
73. 74.	24341	Argiope protensa		
75.	1264	Arnocrinum preissii		
76.		Artamus cinereus (Black-faced Woodswallow)		
77.		Artamus cyanopterus (Dusky Woodswallow)		
78.		Artoria flavimana		
79.		Artoria linnaei		
80.		Artoriopsis expolita		
81.	8779	Asparagus asparagoides (Bridal Creeper)	Υ	
82.	20283	Astartea scoparia (Common Astartea)		
83.		Asteraceae sp.		Υ
84.		Asterella drummondii		
85.		Astroloma pallidum (Kick Bush)		
86.		Austrastina flavorana		
87. 88.		Austrostipa flavescens Avena barbata (Bearded Oat)	Y	
89.		Aythya australis (Hardhead)	ť	
90.		Babiana nana	Υ	
91.		Babingtonia camphorosmae (Camphor Myrtle)		
92.		Backobourkia brounii		
93.	38979	Badhamia utricularis		
94.	1800	Banksia attenuata (Slender Banksia, Piara)		
95.	32580	Banksia dallanneyi var. dallanneyi		
96.	1822	Banksia ilicifolia (Holly-leaved Banksia)		
97.	1834	Banksia menziesii (Firewood Banksia)		
98.	1852	Banksia telmatiaea (Swamp Fox Banksia)		
99.		Barnardius zonarius		
100.	5382	Beaufortia elegans (Elegant Beaufortia)		
101.	0.45 : :	Bianor maculatus		
102.		Biziura lobata (Musk Duck)		
103. 104.		Bolboschoenus caldwellii (Marsh Club-rush) Boronia crenulata subsp. viminea		
104.		Boronia crenulata suosp. virninea Boronia crenulata var. crenulata		
100.	11000			***************************************







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
106.	3710	Bossiaea eriocarpa (Common Brown Pea)			
107.	6341	Brachyloma preissii (Globe Heath)			
108.	7878	Brachyscome iberidifolia			
109.	42381	Brachyurophis semifasciatus (Southern Shovel-nosed Snake)			
110.		Brassica tournefortii (Mediterranean Turnip)	Υ		
111.		Briza maxima (Blowfly Grass)	Υ		
112.		Briza minor (Shivery Grass)	Y		
113.		Burchardia bairdiae			
114. 115.		Burchardia congesta Cacatua sanguinea (Little Corella)			
116.		Cacatua sanguniea (Entile Corella) Cacatua tenuirostris (Eastern Long-billed Corella)	Υ		
117.		Cacomantis flabelliformis (Fan-tailed Cuckoo)	'		
118.		Cacomantis pallidus (Pallid Cuckoo)			
119.		Caesia micrantha (Pale Grass Lily)			
120.	1277	Caesia occidentalis			
121.		Caesia sp.			
122.	1586	Caladenia discoidea (Dancing Orchid)			
123.	1592	Caladenia flava (Cowslip Orchid)			
124.	1599	Caladenia latifolia (Pink Fairy Orchid)			
125.	15361	Caladenia longicauda subsp. calcigena			
126.	17760	Caladenia nobilis			
127.		Caladenia sp.			
128.		Calandrinia corrigioloides (Strap Purslane)			
129.		Calectasia narragara			
130. 131.		Callitris pyramidalis (Swamp Cypress) Calothamnus hirsutus			
131.		Calothannus lateralis			
133.		Calyptorhynchus banksii (Red-tailed Black-Cockatoo)			
134.		Calytrix angulata (Yellow Starflower)			
135.		Calytrix flavescens (Summer Starflower)			
136.	5460	Calytrix fraseri (Pink Summer Calytrix)			
137.	5476	Calytrix sapphirina			
138.	2795	Carpobrotus edulis (Hottentot Fig)	Υ		
139.	1162	Cartonema philydroides			
140.	2952	Cassytha glabella (Tangled Dodder Laurel)			
141.		Cassytha micrantha			
142.		Cassytha racemosa (Dodder Laurel)			
143.		Cassytha racemosa forma racemosa Centaurium tenuiflorum	Υ		
144. 145.		Centrolepis aristata (Pointed Centrolepis)	Y		
146.		Centrolepis drummondiana			
147.		Centrolepis mutica			
148.	1134	Centrolepis polygyna (Wiry Centrolepis)			
149.	2889	Cerastium glomeratum (Mouse Ear Chickweed)	Υ		
150.		Cercophonius sulcatus			
151.	18156	Chamaecytisus palmensis (Tagasaste)	Υ		
152.	1280	Chamaescilla corymbosa (Blue Squill)			
153.		Charadrius ruficapillus (Red-capped Plover)			
154.		Chenonetta jubata (Australian Wood Duck, Wood Duck)			
155.	24980	Christinus marmoratus (Marbled Gecko)			
156. 157	24200	Circus approximans (Swamp Harrier)			
157. 158.		Circus approximans (Swamp Harrier) Cirsium vulgare (Spear Thistle, Scotch Thistle)	Υ		
159.		Cladorhynchus leucocephalus (Banded Stilt)	1		
160.		Colluricincla harmonica (Grey Shrike-thrush)			
161.		Columba livia (Domestic Pigeon)	Υ		
162.	4550	Comesperma calymega (Blue-spike Milkwort)			
163.	4555	Comesperma integerrimum			
164.	15611	Conospermum stoechadis subsp. stoechadis (Common Smokebush)			
165.	6348	Conostephium pendulum (Pearl Flower)			
166.		Conostephium preissii			
167.		Conostylis aculeata (Prickly Conostylis)			
168.		Conostylis aculeata subsp. aculeata			
169.		Conostylis juncea	V		
170. 171.	7941	Conyza parva Conyza sp.	Υ		
171.	20074	Conyza sumatrensis	Υ		
173.		Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
174.		Cortinarius phalarus			
175.	25592	Corvus coronoides (Australian Raven)			
				December 1	******







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
176.		Corynotheca micrantha (Sand Lily)			
177.		Cotula coronopifolia (Waterbuttons)	Y		
178.		Coturnix pectoralis (Stubble Quail)			
179. 180.		Cracticus tibicen (Australian Magpie) Cracticus tibicen subsp. dorsalis (White-backed Magpie)			
181.		Cracticus torquatus (Grey Butcherbird)			
182.		Crassula colorata (Dense Stonecrop)			
183.		Crassula colorata var. colorata			
184.	25399	Crinia glauerti (Clicking Frog)			
185.	30893	Cryptoblepharus buchananii			
186.		Ctenotus australis			
187.	25039	Ctenotus fallens			
188.	0.4000	Cyclosa trilobata			
189. 190.		Cygnus atratus (Black Swan) Cyperus polystachyos (Bunchy Sedge)	Υ		
191.		Dacelo novaeguineae (Laughing Kookaburra)	Y		
192.		Dacryopinax spathularia	'		
193.		Dampiera linearis (Common Dampiera)			
194.		Dampiera pedunculata			
195.	25673	Daphoenositta chrysoptera (Varied Sittella)			
196.	35618	Darwinia sp. Karonie (K. Newbey 8503)			
197.		Dasypogon bromeliifolius (Pineapple Bush)			
198.		Daviesia divaricata (Marno)			
199.		Daviesia physodes			
200.		Daviesia triflora			
201. 202.		Delma fraseri (Fraser's Legless Lizard) Descomyces angustisporus			
202.		Desmocladus fasciculatus			
204.		Desmocladus flexuosus			
205.		Dianella revoluta (Blueberry Lily)			
206.	39019	Didymium clavus			Υ
207.	17838	Dielsia stenostachya			
208.	9027	Diplolaena drummondii			
209.		Disa bracteata	Υ		
210.		Dischisma arenarium	Y		
211.	7055	Dischisma capitatum (Woolly-headed Dischisma)	Y		
212. 213.	12030	Diuris corymbosa/magnifica Diuris magnifica			
214.		Drosera erythrorhiza (Red Ink Sundew)			
215.		Drosera gigantea (Giant Sundew)			
216.		Drosera gigantea subsp. geniculata			
217.	3098	Drosera glanduligera (Pimpernel Sundew)			
218.	3106	Drosera macrantha (Bridal Rainbow)			
219.	3109	Drosera menziesii (Pink Rainbow)			
220.		Drosera menziesii subsp. penicillaris			
221.		Drosera paleacea (Dwarf Sundew)			
222.		Drosera pallida (Bela Bainbay)			
223. 224.		Drosera pallida (Pale Rainbow) Drosera porrecta			
225.	29170	Drosera sp. "climbing"			
226.	3135	Drosera zonaria (Painted Sundew)			
227.		Egernia napoleonis			
228.		Egretta novaehollandiae			
229.		Ehrharta ?longiflora			Υ
230.		Ehrharta calycina (Perennial Veldt Grass)	Υ		
231.	349	Ehrharta longiflora (Annual Veldt Grass)	Υ		
232.		Ehrharta sp.			
233.	47027	Elanus axillaris Elseyornis melanops (Black-fronted Dotterel)			
234. 235.		Elythranthera brunonis (Purple Enamel Orchid)			
236.	10-10	Eolophus roseicapillus			
237.	11756	Epilobium billardiereanum subsp. cinereum (Variable Willow Herb)			
238.		Epilobium ciliatum	Y		
239.	6133	Epilobium hirtigerum (Hairy Willow Herb)			
240.	13950	Eremaea asterocarpa subsp. asterocarpa			
241.		Eriophora biapicata			
242.		Eryngium pinnatifidum (Blue Devils)			
243. 244.		Erythrogonys cinctus (Red-kneed Dotterel) Fucalyntus marginata (Jarrah Diara)			
244.		Eucalyptus marginata (Jarrah, Djara) Eucalyptus marginata subsp. marginata (Jarrah)			
210.	.3047	The state of the s			******
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
246.		Eucalyptus rudis (Flooded Gum, Kulurda)			
247.		Eucalyptus todtiana (Coastal Blackbutt)			
248.		Euchilopsis linearis (Swamp Pea)			
249. 250.		Euchiton sphaericus Euphorbia hyssopifolia	Υ		
251.		Euphorbia nyssopiiolia Euphorbia peplus (Petty Spurge)	Y		
252.		Euphorbia terracina (Geraldton Carnation Weed)	Y		
253.		Eutaxia virgata	•		
254.		Evandra pauciflora			
255.		Falco cenchroides (Australian Kestrel, Nankeen Kestrel)			
256.	25623	Falco longipennis (Australian Hobby)			
257.	24041	Felis catus (Cat)	Υ		
258.	1747	Ficus carica (Common Fig)	Υ		
259.	25727	Fulica atra (Eurasian Coot)			
260.	24761	Fulica atra subsp. australis (Eurasian Coot)			
261.	2969	Fumaria capreolata (Whiteflower Fumitory)	Υ		
262.		Fumaria sp.			
263.		Galium murale (Small Goosegrass)	Υ		
264.		Gallinula tenebrosa (Dusky Moorhen)			
265.		Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)	V		
266. 267		Genista linifolia (Flaxleaf Broom) Genista linifolia (Flaxleaf Broom)	Υ		
267. 268.		Gerygone fusca (Western Gerygone) Gladiolus caryophyllaceus (Wild Gladiolus)	Υ		
269.		Glyciphila melanops (Tawny-crowned Honeyeater)	ī		
269. 270.		Gomphocarpus fruticosus (Narrowleaf Cottonbush)	Υ		
271.		Gompholobium tomentosum (Hairy Yellow Pea)	,		
272.		Gonocarpus pithyoides			
273.		Goodenia pulchella			
274.		Grallina cyanoleuca (Magpie-lark)			
275.		Gymnopilus allantopus			
276.		Haemodorum sp.			
277.	1475	Haemodorum spicatum (Mardja)			
278.	2216	Hakea varia (Variable-leaved Hakea)			
279.	24293	Haliaeetus leucogaster (White-bellied Sea-Eagle)			
280.	24295	Haliastur sphenurus (Whistling Kite)			
281.		Hardenbergia comptoniana (Native Wisteria)			
282.		Heleioporus eyrei (Moaning Frog)			
283.		Hemiandra pungens (Snakebush)			
284.		Hemiandra sp. Jurien (B.J. Conn & M.E. Tozer BJC 3885)			
285. 286.		Hemiergis quadrilineata Hensmania turbinata			
287.	1293	Heurodes turritus			
288.	5135	Hibbertia hypericoides (Yellow Buttercups)			
289.		Hibbertia hypericoides subsp. hypericoides			
290.		Hibbertia perfoliata			
291.		Hibbertia racemosa (Stalked Guinea Flower)			
292.		Hibbertia subvaginata			
293.	5176	Hibbertia vaginata			
294.	47965	Hieraaetus morphnoides (Little Eagle)			
295.	25734	Himantopus himantopus (Black-winged Stilt)			
296.	24491	Hirundo neoxena (Welcome Swallow)			
297.		Holasteron perth			
298.		Holcus lanatus (Yorkshire Fog)	Y		
299.	445	Holcus setiger (Annual Fog)	Υ		
300.	0000	Holoplatys dejongi			
301.		Homalosciadium homalocarpum			
302.		Hovea tripporma var. tripporma			
303. 304.		Hovea trisperma var. trisperma			
304. 305.		Hyalosperma cotula Hybanthus calycinus (Wild Violet)			
306.		Hydrocotyle blepharocarpa			
307.		Hydrocotyle callicarpa (Small Pennywort)			
308.		Hydrocotyle scutellifera			
309.		Hypocalymma angustifolium (White Myrtle, Kudjid)			
310.		Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)			
311.		Hypocalymma robustum (Swan River Myrtle)			
312.	8086	Hypochaeris glabra (Smooth Catsear)	Υ		
313.	9352	Hypochaeris radicata (Flat Weed, Cats-ear)	Υ		
314.	1070	Hypolaena exsulca			
315.	17841	Hypolaena pubescens			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
316.		Idiommata blackwalli			
317.	48508	Inocybe brunneidisca			
318.	40870	Inocybe rufuloides	Υ		
319.		Iridaceae sp.			Υ
320.	20200	Isolepis cernua var. setiformis			
321.		Isolepis marginata (Coarse Club-rush)			
322.		Isolepis oldfieldiana			
323.	924	Isolepis stellata (Star Club-rush)			
324.		Isopeda leishmanni			
325.		Isotropis cuneifolia (Granny Bonnets)			
326.		Jacksonia furcellata (Grey Stinkwood)			
327.		Jacksonia sternbergiana (Stinkwood, Kapur)	.,		
328.		Juncus bufonius (Toad Rush)	Y Y		
329. 330.		Juncus microcephalus Juncus pallidus (Pale Rush)	Ť		
331.		Juncus planifolius (Broadleaf Rush)			
331.		Kennedia prostrata (Scarlet Runner)			
333.		Kunzea ericifolia (Spearwood, Pondil)			
334.		Kunzea glabrescens (Spearwood)			
335.		Lachnagrostis preissii			
336.		Lactuca serriola (Prickly Lettuce)	Υ		
337.		Lagenophora huegelii			
338.		Lampona cylindrata			
339.	4052	Latrobea tenella			
340.		Latrodectus hasseltii			
341.	1307	Laxmannia ramosa (Branching Lily)			
342.	1309	Laxmannia squarrosa			
343.	7574	Lechenaultia floribunda (Free-flowering Leschenaultia)			
344.	39038	Leocarpus fragilis			
345.	44490	Leontodon rhagadioloides	Υ		
346.	925	Lepidosperma angustatum			
347.		Lepidosperma longitudinale (Pithy Sword-sedge)			
348.		Lepidosperma pubisquameum			
349.	944	Lepidosperma scabrum			
350.		Lepidosperma sp. Baldivis			Υ
351.		Lepidosperma sp. Margaret River (B.J. Lepschi 1841)			
352.		Lepidosperma squamatum			
353.		Lepidosperma striatum			
354.		Leptreella fimbriata (Harre Orchid)			
355. 356.		Leptocarpus canus (Hoary Twine-rush) Leptocarpus scariosus			
357.		Leptomeria empetriformis			
358.		Leptomeria pauciflora (Sparse-flowered Currant Bush)			
359.		Lerista elegans			
360.		Leucopogon australis (Spiked Beard-heath)			
361.		Leucopogon conostephioides			
362.	6436	Leucopogon propinquus			
363.		Levenhookia pusilla/stipitata			
364.	7677	Levenhookia stipitata (Common Stylewort)			
365.	25005	Lialis burtonis			
366.	31280	Lichenomphalia chromacea			
367.	31333	Lichenomphalia umbellifera			
368.		Lichmera indistincta (Brown Honeyeater)			
369.		Limnodynastes dorsalis (Western Banjo Frog)			
370.		Litoria adelaidensis (Slender Tree Frog)			
371.		Lobelia anceps (Angled Lobelia)			
372.		Lolium perenne (Perennial Ryegrass)	Y		
373.	478	Lolium rigidum (Wimmera Ryegrass)	Y		
374.		Lomandra ?cresinoii			
375. 376	4000	Lomandra ?preissii			
376. 377		Lomandra caespitosa (Tufted Mat Rush)			
377. 378.		Lomandra hermaphrodita Lomandra micrantha (Small-flower Mat-rush)			
378. 379.		Lomandra micrantna (Smail-flower iviat-rush) Lomandra nigricans			
379. 380.		Lomandra preissii			
381.		Lomandra sericea (Silky Mat Rush)			
382.		Lomandra suaveolens			
383.	.2.3	Lophoictinia isura			
384.	8564	Lotus subbiflorus	Υ		
385.	1198	Luzula meridionalis (Field Woodrush)			
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
386.	39048	Lycogala epidendrum			
387.		Lycosa ariadnae			
388.	1097	Lyginia barbata			
389.	40040	Lyginia barbata/imberbis			
390.		Lygginia imberbis			
391. 392.		Lyperanthus serratus (Rattle Beak Orchid) Lysimachia arvensis (Pimpernel)	Υ		
393.		Lysinema ciliatum (Curry Flower)	'		
394.		Lysinema elegans			
395.		Lythrum hyssopifolia (Lesser Loosestrife)	Υ		
396.		Macarthuria australis			
397.	18119	Macrozamia fraseri			
398.	24326	Malacorhynchus membranaceus (Pink-eared Duck)			
399.	25654	Malurus splendens (Splendid Fairy-wren)			
400.		Maratus pavonis			
401.		Medicago polymorpha (Burr Medic)	Υ		
402.		Megalurus gramineus (Little Grassbird)			
403.		Melaleuca cuticularis (Saltwater Paperbark)			
404.		Melaleuca incana subsp. incana			
405. 406.		Melaleuca lateritia (Robin Redbreast Bush) Melaleuca pauciflora			
406.		Melaleuca preissiana (Moonah)			
408.		Melaleuca seriata			
409.		Melaleuca thymoides			
410.		Melanodryas cucullata (Hooded Robin)			
411.	4085	Melilotus indicus	Υ		
412.	25184	Menetia greyii			
413.	955	Mesomelaena pseudostygia			
414.	957	Mesomelaena tetragona (Semaphore Sedge)			
415.		Microcarbo melanoleucos			
416.		Microeca fascinans (Jacky Winter)			
417.		Microlaena stipoides (Weeping Grass)			
418. 419.		Microtis atrata (Swamp Mignonette Orchid) Microtis media (Tall Mignonette Orchid)			
420.		Microtis media subsp. media			
421.		Moraea flaccida (One-leaf Cape Tulip)	Υ		
422.		Morethia lineoocellata			
423.	25192	Morethia obscura			
424.	24223	Mus musculus (House Mouse)	Υ		
425.	25248	Neelaps bimaculatus (Black-naped Snake)			
426.	24738	Neophema elegans (Elegant Parrot)			
427.	400	Nephila edulis			
428.	492	Neurachne alopecuroidea (Foxtail Mulga Grass) Nicodamus mainae			
429. 430.	25252	Notechis scutatus (Tiger Snake)			
431.		Nuytsia floribunda (Christmas Tree, Mudja)			
432.		Nycticorax caledonicus (Rufous Night Heron)			
433.		Ocrisiona parmeliae			
434.	24407	Ocyphaps lophotes (Crested Pigeon)			
435.		Ommatoiulus moreletii			
436.	18255	Opercularia vaginata (Dog Weed)			
437.		Ophioglossum gramineum			
438.		Oryctolagus cuniculus (Rabbit)	Y		
439.		Oxalis purpurea (Largeflower Wood Sorrel)	Υ		
440. 441.		Pachycephala rufiventris (Rufous Whistler) Parasuta gouldii			
442.		Pardalotus punctatus (Spotted Pardalote)			
443.		Pardalotus striatus (Striated Pardalote)			
444.		Parentucellia viscosa (Sticky Bartsia)	Υ		
445.	527	Paspalum dilatatum	Υ		
446.	24642	Passer montanus (Eurasian Tree Sparrow)	Υ		
447.	1550	Patersonia occidentalis (Purple Flag, Koma)			
448.		Patersonia occidentalis var. occidentalis			
449.		Pelargonium capitatum (Rose Pelargonium)	Υ		
450.		Pelecanus conspicillatus (Australian Pelican)	V		
451. 452.		Pentameris airoides (False Hairgrass) Pericalymma ellipticum (Swamp Teatree)	Y		
452. 453.		Pericalymma ellipticum var. ellipticum			
454.		Persoonia saccata (Snottygobble)			
455.		Petrochelidon nigricans (Tree Martin)			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
456.		Petroica boodang (Scarlet Robin)			
457.		Petroica goodenovii (Red-capped Robin)			
458. 459.		Petrophile linearis (Pixie Mops)			
459. 460.		Petrophile macrostachya Petrophile striata			
461.		Phalacrocorax carbo (Great Cormorant)			
462.		Phalacrocorax melanoleucos (Little Pied Cormorant)			
463.		Phalacrocorax sulcirostris (Little Black Cormorant)			
464.		Phaps chalcoptera (Common Bronzewing)			
465.		Philotheca spicata (Pepper and Salt)			
466.		Phlebia subceracea			
467.	1478	Phlebocarya ciliata			
468.		Phryganoporus candidus			
469.	48071	Phylidonyris niger (White-cheeked Honeyeater)			
470.	24596	Phylidonyris novaehollandiae (New Holland Honeyeater)			
471.		Phyllangium paradoxum			
472.		Phyllanthus calycinus (False Boronia)			
473.		Physarum luteolum			Υ
474.		Physarum viride	.,		
475.	2/93	Phytolacca octandra (Red Ink Plant)	Υ		
476.	10117	Phytophthora cinnamomi Pimelea rosea subsp. rosea			
477. 478.	10117	Pinkfloydia harveii			
479.	24841	Platalea flavipes (Yellow-billed Spoonbill)			
480.		Platysace compressa (Tapeworm Plant)			
481.		Pletholax gracilis (Keeled Legless Lizard)			
482.		Pluteus atromarginatus			
483.	38825	Pluteus pauperculus			
484.		Poaceae sp.			
485.	25704	Podiceps cristatus (Great Crested Grebe)			
486.	8175	Podolepis gracilis (Slender Podolepis)			
487.		Podotheca ?gnaphalioides			
488.	8184	Podotheca gnaphalioides (Golden Long-heads)			
489.		Pogona minor (Dwarf Bearded Dragon)			
490.		Poliocephalus poliocephalus (Hoary-headed Grebe)			
491.		Polypogon monspeliensis (Annual Beardgrass)	Υ		
492.		Polypogon tenellus			
493. 494.		Polytelis anthopeplus (Regent Parrot) Poranthora microphylla (Small Paranthora)			
494. 495.	4091	Poranthera microphylla (Small Poranthera) Poranthera microphylla/moorokatta			
496.	25731	Porphyrio porphyrio (Purple Swamphen)			
497.		Porphyrio porphyrio subsp. bellus (Purple Swamphen)			
498.		Prasophyllum hians (Yawning Leek Orchid)			
499.		Prasophyllum plumiforme			
500.	8189	Pseudognaphalium luteoalbum (Jersey Cudweed)			
501.	25511	Pseudonaja affinis (Dugite)			
502.	25259	Pseudonaja affinis subsp. affinis (Dugite)			
503.		Pterostylis aff. nana			
504.		Pterostylis aff. nana long sepal			Υ
505.		Pterostylis aspera			
506.		Pterostylis glebosa			
507.		Pterostylis recurva (Jug Orchid)			
508. 509.		Pterostylis sanguinea Ptilotus drummondii var. drummondii (Pussytail)			
510.		Pultenaea ochreata			
511.		Pultenaea reticulata			
512.		Purpureicephalus spurius			
513.	16367	Pyrorchis nigricans (Red beaks, Elephants ears)			
514.		Quinetia urvillei			
515.	24243	Rattus fuscipes (Western Bush Rat)			
516.	24245	Rattus rattus (Black Rat)	Υ		
517.		Raveniella peckorum			
518.	24776	Recurvirostra novaehollandiae (Red-necked Avocet)			
519.	6012	Regelia ciliata			
520.		Rhipidura albiscapa (Grey Fantail)			
521.		Rhipidura leucophrys (Willie Wagtail)			
522.	13300	Rhodanthe citrina			
523.	4440-	Rickenella fibula			
524. 525.		Romulea flava var. minor Romulea rosea (Guildford Grass)	Y		
525.	1000	Romulea rosea (Guildford Grass)	ī		
				OPEN December 1	







		Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
2016	526.	14924	Romulea rosea var. communis	Υ		
Second						
Solition						
S31. BSR Stocknown calculations						
1931						
531						
2016. 6 Streigheid gracialism (Pay Cuberous)	533.	1017	Schoenus subbulbosus			
	534.	6033	Scholtzia involucrata (Spiked Scholtzia)			
S877						
SSB. Some patient (Perich Castelly) Y		25534				
553. 200 Stering guides Frenche Chambrilly Y						
540. S2C Showner Intriffuence Procurbent Showners Showner Intriffuence Showner		2000	·	V		
Selection Statement International Processing Selection Sel						
1543. 30445 Simicronia brovincating (Weshell)						
544. 7020 Subrum immanum (Paper of Subray) 546. 6321 Subruha devangus (Common Southlaile) 547. 6321 Subruha devangus (Common Southlaile) 548. 4211 Subrearcholum vinninam (Laufiess Globe Pae) 548. 4211 Subrearcholum vinninam (Laufiess Globe Pae) 549. Sileanding Grape in Subruha (Paper of Subruha (Pap						
545. TOZE Solvenum ringtom (Black Barry NiDhitallade)	543.	30948	Smicrornis brevirostris (Weebill)			
Section Sect	544.	7020	Solanum linnaeanum (Apple of Sodom)	Υ		
541. 1312 Soverbase laction (Purple Tassels)	545.	7022	Solanum nigrum (Black Berry Nightshade)	Υ		
548. 4211 Sphenotobium vinineum (Leelless Clobe Pea) 549. Selectobium grozen 540. 30007 Semonites gelondores 551. 2216 Stringo isatificia (Silubory) 552. 25597 Streppen versicolor (Giny Currainory) 553. 25598 Silespiepeelis oliministis (Spolend Turille Down) Y 554. 25595 Silespiepeelis oliministis (Spolend Turille Down) Y 555. 2551 Silyidum arescipylum (Silu Walker) 566. 3750 Silyidum arescipylum (Silu Walker) 567. 7693 Sylidum arescipylum (Silu Walker) 568. 7690 Sylidum arescipylum (Silu Walker) 569. 7711 Sylidum disvolentim (Turille Fundania Triggerpland) 569. 7711 Sylidum disvolentim (Turille Fundania Triggerpland) 560. 7711 Sylidum disvolentim (Turille Fundania Triggerpland) 561. 7713 Sylidum guitatum (Down On United Triggerpland) 562. 7717 Sylidum guitatum (Down On United Triggerpland) 563. 7765 Sylidum separe (Maletta Triggerpland) 564. 2520 Sylidum acknownia separe (Selectim Turille Sylidum (Selectim Control Sylidum Syli	546.			Υ		
549. Stretcke grosse 551. 2316 Selfingia katifolia (Bikaboy) 552. 25557 Simpero versitoker (Griy Curravorg) 553. 25558 Silveppendia minerias (Coprid Turite-Dove) Y 554. 25500 Simperopoia varingolarenia (Aughing Turite-Dove) Y 555. 25531 Silvifiami amenacipylumi Millione) 556. Silvifiami amenacipylumi Millione) 557. 7583 Silvifiami amenacipylumi Millione) 558. 7693 Silvifiami amenacipylumi Millione) 559. 7711 Silvifiami manosum (Filicitry-levored Traggerpland) 559. 7711 Silvifiami amenacipylumi Millione) 550. 7713 Silvifiami manosum (Filicitry-levored Traggerpland) 550. 7713 Silvifiami manosum (Filicitry-levored Traggerpland) 551. 7714 Silvifiami manosum (Filicitry-levored Traggerpland) 552. 7714 Silvifiami manosum (Filicitry-levored Traggerpland) 553. 7715 Silvifiami manosum (Filicitry-levored Traggerpland) 564. 2500 Silvifiami manosum (Filicitry-levored Traggerpland) 565. 7718 Silvifiami manosum (Filicitry-levored Traggerpland) 564. 2500 Silvifiami manosum (Filicitry-levored Traggerpland) 565. 772 Silvifiami manosum (Filicitry-levored Traggerpland) 566. 1200 Silvifiami manosum (Filicitry-levored Traggerpland) 567. 2229 Symphona spruntusos utular, spruntusos 569. 25705 Tachybaptus novariedolizados (Australasian Grobe, Black-throated Grobe) 5770. 25805 Tachybaptus novariedolizados (Australasian Grobe, Black-throated Grobe) 5781. 2571 Tachybaptus novariedolizados utular, novariedolizados (Australasian Grobe, Black-throated Grobe) 5792 Tarageris disinguennia 5793. 2793 Tarageris proteinos (Silvifiami Shelduck, Mountain Duck) 5793. 1794 Tarageris proteinos (Silvifiami Shelduck, Mountain Duck) 5794 Tarageris proteinos (Silvifiami Shelduck, Mountain Duck) 5795 Tarageris disinguennia 5796 Silvifiami carriania (Silvifiami Shelduck, Mountain Duck) 5796 Tarageris proteinos (Silvifiami Shelduck, Mountain Duck) 5797 Tarageris contrata (Silvifiami Shelduck, Mountain Duck) 5798 Tarageris contrata (Silvifiami Shelduck, Mountain Duck) 5799 Tarageris contrata (Silvifiami Shelduck, Mountain Duck) 5790 Tarageris contrata (Silvifi			. , ,			
		4211				
561. 2316 Stiflingia staffolia (Blabbory) 562. 25697 Stirpapora versichor (Groy Currawrag) 563. 26690 Stirpapopalia chinansia (Spotted Turtle-Dove) Y 564. 26590 Stirpapopalia sorregalizinis (Laughira) Turtle-Dove) Y 565. 26595 Stirpatopalia sorregalizinis (Laughira) Turtle-Dove) Y 566. 26595 Stirpatopalia sorregalizinis (Laughira) Turtle-Dove) Y 567. 7670 SS Spiritum areacephyllum (Stirpatopalini) 5681. 7693 Spiritum carnosum (Flesty-leaved Triggarphini) 5692. 7771 Spiritum diversatinium (Turcl-me-not) 5693. 7771 Spiritum diversatinium (Turcl-me-not) 5771 Spiritum diversatinium (Turcl-me-not) 5801. 7774 Spiritum prince (Marter) Targerplanti 5802. 7774 Spiritum prince (Marter) Targerplanti 5803. 7775 Spiritum arcanisum 5804. 25906 Spiritum arcanisum 5805. 7778 Spiritum arcanisum 5806. 7778 Spiritum arcanisum 5807. 2590 Spiritum arcanisum 5808. 7809 Spiritum arcanisum 5809. 27705 Targerplanti (Turcl-me-not) 5809. 27705 Spiritum arcanisum 5809. 27705 Targerplanti (Turcl-me-not) 5809. 27705 Targerplanti arcanisum 5809. 27705 Targerplanti arcanisum (Australiasian Grobe, Black-fravotat Glade) 5809. 27705 Targerplantia rovealerlandiae subsp. novealerlandiae (Australiasian Grobe, Black-fravotat Glade) 5809. 27705 Targerplantia rovealerlandiae subsp. novealerlandiae Subsp. novealerlandiae (Australiasian Grobe, Black-fravotat Glade) 5809. 27705 Targerplantia rovealerlandiae subsp. novealerlandiae (Australiasian Grobe, Black-fravotat Glade) 5809. 27705 Targerplantia rovealerlandiae subsp. novealerlandiae (Australiasian Grobe, Black-fravotat Glade) 5809. 27705 Targerplantia rovealerlandiae subsp. novealerlandiae Glade 5809. 27705 Targerplantiae subsp. novealerlandiae Glade 5809. 27705 Targerplantiae subsp. no		20097	-			
552 25879 Streptopole chinonisi (Spoted Turle-Dove) Y 553 25590 Streptopole chinonisi (Spoted Turle-Dove) Y 554 25590 Streptopole chinonisi (Spoted Turle-Dove) Y 555 25813 Sylidum anaccylythum (Silt Walker) Y 557 7983 Sylidum anaccylythum (Tirle Fourtain Tiggerplant) 558 7593 Sylidum anaccylythum (Tirle Fourtain Tiggerplant) 559 7717 Sylidum consum (Tirles) evenut Triggerplant) 550 7718 Sylidum devariation (Touted Triggerplant) 561 7734 Sylidum gutetum (Doted Triggerplant) 562 7747 Sylidum repens (Matted Triggerplant) 563 7785 Sylidum repens (Matted Triggerplant) 564 25806 Sylidum repens (Matted Triggerplant) 565 7789 Sylidum secknows 566 7798 Sylidum secknows 567 2230 Syraphes spinuluses 568 15532 Syraphes spinuluses 569 225797 Sarbypatra covariation (Silva Curlei)			·			
553. 2588 Sireptopelia chienansi (Spotind Turlie Dove) Y 554. 2559 Streptopelia cenegalerais (Laurphing Turlie Dove) Y 555. 25891 Sipidium anacchyllum (Sill Walker) 556. Sipidium anacchyllum (Sill Walker) 557. 7583 Sipidium bunceinum (Prestry-leaved Triggerplant) 558. 7699 Sipidium (anacchyllum (Fouth-me-rol) 559. 7717 Sipidium (anacchienum (Fouth-me-rol) 559. 7717 Sipidium (anacchienum (Touth-me-rol) 561. 7734 Sipidium pallerum (Content Tragerplant) 562. 7774 Sipidium pallerum (Content Tragerplant) 563. 7785 Sipidium pallerum (Content Tragerplant) 564. 25696 Sipidium scancosum 565. 7788 Sipidium scancosum 566. 1200 Sipyandra scancosum 567. 2220 Siraphea spinulicaa 568. 1570 Sipidium scancosum 569. 25705 Tachybaptus noveehollandiae (Australesian Grebe, Black-throated Grebe) 570. 2482 Tachybaptus noveehollandiae subop, noveehollandiae (Australesian Grebe, Black-throated Grebe) 571. 2433 Tadorna tedomoides (Australesian Grebe, Black-throated Grebe) 572. 172 Tamopas activing under Sipidium Subop, noveehollandiae (Australesian Grebe, Black-throated Grebe) 573. Tamopas activing under Sipidium Subop, noveehollandiae (Australesian Grebe, Black-throated Grebe) 574. 2431 Tadorna tedomoides (Australesian Grebe, Black-throated Grebe) 575. 172 Tamopas partities Subop, noveehollandiae (Australesian Grebe, Black-throated Grebe) 576. 1705 Theybritae scantonuches (Australesian Grebe, Black-throated Grebe) 577. 1714 Theybritae scantonuches (Australesian Grebe, Black-throated Grebe) 578. 1710 Theybritae scantonuches (Australesian Grebe, Black-throated Grebe) 579. 2017 Theybritae scantonuches (Australesian Grebe, Black-throated Grebe) 571. 1711 Theybritae scantonuches (Australesian Grebe, Black-throated Grebe) 572. 172 Tamopas activity (Australesian Grebe, Black-throated Grebe) 573. 174 Tamopas activity (Australesian Grebe, Black-throated Grebe) 574 2431 Tradorna tedomoides (Australesian Grebe, Black-throated Grebe)						
555. 28831 Stylidium areacphyllum (Still Welker) 556. Sylidium areacphyllum (Still Welker) 557. 7693 Sylidium areacphyllum (Still Welker) 558. 7698 Sylidium cannosum (Fleshy-leaved Triggerplant) 559. 7717 Sylidium dvandstum (David-ring-pelant) 560. 7718 Sylidium dvandstum (Stall-ring-pelant) 561. 7734 Sylidium dvandstum (Stall-ring-pelant) 562. 7774 Sylidium gultatum (Cortent Triggerplant) 563. 7785 Sylidium micromore (Cortent Butterly Triggerplant) 564. 25000 Sylidium schoroniolus (Corv Kicks) 565. 7798 Sylidium schoroniolus (Corv Kicks) 566. 1200 Sypanden glauca (Birth Grass) 567. 2329 Synaphea spirulosa subsp. spirulosa 568. 1552 Syraphea spirulosa subsp. spirulosa 569. 25705 Tachybaptus novaehollandiae (Australiasian Grebe, Black-throated Grebe) 570. 2482 Tachybaptus novaehollandiae (Australiasian Grebe, Black-throated Grebe) 571. 2433 Tadoma tadomodos (Australian Shelduck, Mountain Duck) 573. Tanoposis perthensis 574. 24167 Taraipes partatus striney Passum, Noobanger) 575. 1702 Theymitra campanulata (Shiri Orchid) 576. 1703 Theymitra campanulata (Shiri Orchid) 577. 11143 Thelymitra campanulata (Shiri Orchid) 581. 1319 Tryaanotus arabusulata strine (Shiri Orchid) 583. 1319 Tryaanotus arabusulata strine (Shiri Orchid) 584. 1319 Tryaanotus arabusulata (Shiri Orchid) 585. 1319 Tryaanotus arabusulata (Shiri Orchid) 586. 1319 Tryaanotus arabusulata (Shiri Orchid) 587. 11143 Thelymitra campanulata (Shiri Orchid) 588. 1319 Tryaanotus arabusulata (Shiri Orchid) 589. 2023 Thelymitra valgaria 580. 24845 Traeskornis spirinciolis (Staw-necked this) 581. 1319 Tryaanotus arabusulata strine (ormplex 583. 1339 Tryaanotus arabusulata (Shiri Orchid) 584. 1351 Tryaanotus arabusulata (Sandry Forende Fringe Lily) 585. 1360 Tryaanotus mangiesianus (Fringed Lily) 586. 267. 1361 Tryaanotus mangiesianus (Fringed Lily) 587. 1386 Tryaanotus mangiesianus (Fringed Lily) 588. 2680 Tachybaptus palasarus (Cortender) 589. 2682 Tachybaptus palasarus (Cortender) 589. 2682 Tachybaptus palasarus (Cortender) 589. 2683 Tachybaptus palasarus (Cor				Υ		
556. Sylvátium areacopyhpum/neurophyllum 557. 7693 Sylvátium brunonianum (Pink Funtain Trigusplant) 558. 7699 Sylvátium dravanium (Pietaly-leaved Triggerplant) 559. 7711 Sylvátium dravanium (Datoch-me-nod) 561. 7718 Sylvátium dravanium (Datoch-me-nod) 561. 7734 Sylvátium gutantum (Datoch Triggerplant) 562. 7774 Sylvátium gutantum (Datoch Triggerplant) 563. 7718 Sylvátium sepanosum 564. 2590s Sylvátium sepanosum 565. 5718 Sylvátium sepanosum 566. 1260 Sylvátium sepanosum 567. 1260 Sylvátium sepanosum 568. 1260 Sylvátium sepanosum 568. 1260 Sylvátium sepanosum 569. 2670 Tealybapatus solvaehollandiae (Australaias Grebe, Black-throated Grebe) 570. 2482 Synapheae spinulusas 589. 2570 Tealybapatus novaehollandiae suksp. novaehollandiae (Australaias Grebe, Black-throated Grebe) 571. 2482 Tealybapatus novaehollandiae suksp. novaehollandiae (Australaias Shelkuk, Mountein Duck) 572. Tamopais distinguanda 573. Tamopais distinguanda 574. 24167 Tarispes rostratus (Honey Possum, Noolbengar) 575. 1702 Thelymitra campanulata (Shiri Orchis) 576. 1703 Thelymitra campanulata (Shiri Orchis) 577. 11143 Thelymitra graminee 578. 2013 Therymitra surplane 579. 2013 Therymitra surplane 580. 24845 Travaskorius spinicolitis (Strav-necked fluis) 581. 1318 Thypanotus artuscula 582. 1319 Thysanotus artuscula 583. 1338 Thysanotus artuscula 584. 1339 Thysanotus artuscula 585. 1339 Thysanotus martisissunos (Strav-necked Firinge Lily) 586. 1339 Thysanotus martisissunos (Strav-necked Firinge Lily) 587. 1389 Thysanotus martisissunos (Strav-necked Firinge Lily) 588. 1339 Thysanotus martisissunos (Strav-necked Firinge Lily) 589. 25207 Tiliqua ruyosa 589. 25549 Todrarphymer pilosa (Raive Parsipi) 580. 2620 Tadrayhymer pilosa (Raive Parsipi) 580. 2620 Tadrayhymer pilosa (Raive Parsipi)	554.			Υ		
557. 7883 Sylvidium Euroonianum (Pick Fountion Triggerplant) 558. 7699 Sylvidium camosum (Fleshy-leaved Triggerplant) 559. 7717 Sylvidium diversicitum (Dadry-long-lega) 560. 7718 Sylvidium diversicitum (Corbon-not) 561. 7734 Sylvidium gutatum (Dotted Triggerplant) 562. 7774 Sylvidium patterum (Cormon Butterfly Triggerplant) 563. 7785 Sylvidium schoenoides (Cow Kicks) 564. 2590 Sylvidium schoenoides (Cow Kicks) 565. 7788 Sylvidium schoenoides (Cow Kicks) 566. 1280 Sypandra glauca (Bittant) 567. 2339 Synaphea spinulosa 568. 15532 Synaphea spinulosa 569. 25705 Tachylopatus noveahollandrale (Australasian Grabe, Black-throated Grabe) 570. 2482 Tachylopatus noveahollandrale (Australasian Grabe, Black-throated Grabe) 571. 24331 Tadoma tadomoides (Australian Shelduck, Mountain Duck) 572. Tamopais perthensis 574. 24107 Tarsipos rostratus (Honey Possum, Noolbenger) 575. 1702 Tetaymitra campanulatia (Shirt Orchid) 576. 1702 Tetaymitra campanulatia (Shirt Orchid) 577. 11143 Thelymitra campanulatia (Shirt Orchid) 578. 2073 Thelymitra campanulatia (Shirt Orchid) 579. 2072 Thelymitra vulgaris 580. 2031 Thelymitra campanulatia (Shirt Orchid) 581. 1318 Trysanotus atlantosicile 582. 1319 Trysanotus atlantosicile 583. 1320 Trysanotus atlantosicile 584. 1338 Trysanotus subtrosicile 585. 1357 Trysanotus subtrosicile 586. 1357 Trysanotus subtrosicile 587. 1357 Trysanotus subtrosicile 588. 1357 Trysanotus subtrosicile 589. 1358 Trysanotus subtrosicile 580. 25697 Tiliqua rugosa subsp. rugosa 581. 25207 Tiliqua rugosa subsp. rugosa 581. 25207 Tiliqua rugosa subsp. rugosa 582. 25694 Tofornyhus sanctus (Sacret Kingfeher) 583. 3845 Trechispora farinacea	555.	25831	Stylidium araeophyllum (Stilt Walker)			
558. 7699 Sylidium camosum (Flestry-Lesved Triggerplant) 559. 7717 Sylidium divariataum (Datidy-long-legs) 560. 7718 Sylidium divariataum (Datidy Triggerplant) 561. 7734 Sylidium gultarum (Datid Triggerplant) 562. 7774 Sylidium gultarum (Datid Triggerplant) 563. 7765 Sylidium scariosum 564. 25806 Sylidium scariosum 565. 7778 Sylidium scariosum 566. 1260 Sylpandra glauca (Blind Grass) 567. 2320 Syraphea spinulosa subsp. Spinulosa 568. 15532 Syraphea spinulosa subsp. Spinulosa 568. 15532 Syraphea spinulosa subsp. Spinulosa 568. 15532 Syraphea spinulosa subsp. Spinulosa 569. 24682 Tachybaptus novaehollandie (Australasian Grabe, Black-throated Grabe) 570. 24682 Tachybaptus novaehollandiea (Substralasian Grabe, Black-throated Grabe) 571. 24782 Tamposis distinguenda 573. 14782 Tamposis distinguenda 574. 24167 Tarispes rostratus (Honey Possum, Noobenger) 575. 1702 Thelymitra campanulota (Sikt Orchid) 576. 1705 Thelymitra campanulota (Sikt Orchid) 577. 11143 Thelymitra campanulota (Sikt Orchid) 578. 2073 Thelymitra campanulota (Sikt Orchid) 579. 20728 Thelymitra variania (Blos Lady Orchid) 579. 20728 Thelymitra variania (Sous Lady Orchid) 579. 20728 Thelymitra variania (Sous Lady Orchid) 579. 20728 Thelymitra campanulota (Sikt Orchid) 579. 20728 Thelymitra variania (Sous Lady Orchid)	556.		Stylidium araeophyllum/neurophyllum			
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	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
595.	1481	Tribonanthes australis			
596.	48141	Tribonyx ventralis (Black-tailed Native-hen)			
597.	25723	Trichoglossus haematodus (Rainbow Lorikeet)			
598.	25521	Trichosurus vulpecula (Common Brushtail Possum)			
599.	24158	Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)			
600.	1361	Tricoryne elatior (Yellow Autumn Lily)			
601.	1363	Tricoryne tenella			
602.	1038	Tricostularia neesii			
603.	17145	Trifolium angustifolium var. angustifolium	Υ		
604.	14738	Trifolium resupinatum var. resupinatum	Υ		
605.	4360	Tropaeolum majus (Garden Nasturtium)	Υ		
606.	39103	Tubifera ferruginosa			
607.		Unknown Annual Grasses			
608.		Urodacus novaehollandiae			
609.	8254	Urospermum picroides (False Hawkbit)	Υ		
610.	8255	Ursinia anthemoides (Ursinia)	Υ		
611.	38388	Ursinia anthemoides subsp. anthemoides	Υ		
612.	25218	Varanus gouldii (Bungarra or Sand Monitor)			
613.		Venatrix pullastra			
614.	7107	Verbascum virgatum (Twiggy Mullein)	Υ		
615.	15432	Verticordia densiflora var. densiflora			
616.	11474	Vicia sativa subsp. nigra	Υ		
617.	24040	Vulpes vulpes (Red Fox)	Υ		
618.	724	Vulpia myuros (Rat's Tail Fescue)	Υ		
619.		Vulpia sp.			
620.	7384	Wahlenbergia capensis (Cape Bluebell)	Υ		
621.	7389	Wahlenbergia preissii			
622.	8282	Waitzia suaveolens (Fragrant Waitzia)			
623.	18118	Watsonia meriana var. meriana	Υ		
624.	12072	Wurmbea dioica subsp. alba			
625.	1256	Xanthorrhoea preissii (Grass tree, Palga)			
626.		Xanthorrhoea sp.			
627.		Xanthosia ?huegelii			Υ
628.	6289	Xanthosia huegelii			
629.	2331	Xylomelum occidentale (Woody Pear, Djandin)			
630.	1049	Zantedeschia aethiopica (Arum Lily)	Υ		
631.		Zebraplatys fractivittata			
632.	25765	Zosterops lateralis (Grey-breasted White-eye, Silvereye)			

- Conservation Codes

 1 Rare or likely to become extinct
 X Presumed extinct
 IA Protected under international agreement
 S Other specially protected fauna
 1 Priority 1
 2 Priority 2
 3 Priority 3
 4 Priority 4
 5 Priority 5





¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX 2 Protected Matters Search Tool Report

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 27/02/18 17:49:55

Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act

Extra Information

Caveat

<u>Acknowledgements</u>



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the <u>Administrative Guidelines on Significance</u>.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	20
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	None
Invasive Species:	36
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Forrestdale and thomsons lakes	Within 10km of Ramsar
Peel-yalgorup system	30 - 40km upstream

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

produce indicative distribution maps.		
Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		, in the second
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii		
Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Other		within area
Westralunio carteri		
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
<u>Diuris micrantha</u>		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
<u>Diuris purdiei</u>		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
<u>Drakaea elastica</u>		
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
<u>Drakaea micrantha</u>		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eleocharis keigheryi		
Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Lepidosperma rostratum		
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on	the EPBC Act - Threatene	
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		Charles or angeles habitet
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
<u>Calidris canutus</u>		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species

Name Threatened Type of Presence habitat likely to occur within Calidris melanotos Pectoral Sandpiper [858] Species or species habitat likely to occur within area Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847] Critically Endangered Species or species habitat may occur within area

Pandion haliaetus

Osprey [952] Species or species habitat

may occur within area

Tringa nebularia

Common Greenshank, Greenshank [832] Species or species habitat

likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name

Commonwealth Land -		
Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on	the EPBC Act - Threatened	Species list.
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Calidris acuminata

Sharp-tailed Sandpiper [874] Species or species habitat

likely to occur within area

Calidris canutus

Red Knot, Knot [855] Endangered Species or species habitat

likely to occur within area

Calidris ferruginea

Curlew Sandpiper [856] Critically Endangered Species or species habitat

likely to occur within area

Calidris melanotos

Pectoral Sandpiper [858] Species or species habitat

likely to occur within area

Haliaeetus leucogaster

White-bellied Sea-Eagle [943] Species or species habitat

known to occur within area

Name	Threatened	Type of Presence
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Harry Waring Marsupial Reserve	WA
Modong	WA
Wandi	WA
Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within

Name	Status	Type of Presence
Ohm mandhamaidea maniitta m		area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilife Boneseed [16905]	ra	Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Fl [2800]	lax Broom	Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana leaf Lantana, Pink Flowered Lantana, Red Flowered Sage, White Sage, W [10892]	owered	Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, W Pine [20780]	/ilding	Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodend Willows except Weeping Willow, Pussy Willow Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermos Weed [13665]	s, Kariba	Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tama Athel Tamarix, Desert Tamarisk, Flowering C Salt Cedar [16018] Reptiles		Species or species habitat likely to occur within area
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Nationally Important Wetlands		[Resource Information]
Name		State
Gibbs Road Swamp System Spectacles Swamp		WA WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.21122 115.86118

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- -Australian Government Australian Antarctic Data Centre
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX 3 Conservation Codes

Conservation Codes for Western Australian Flora and Fauna

Specially protected fauna or flora are species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T Threatened species – Schedules 1-4

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

- *Threatened fauna* is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.
- Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species – Schedule 1

Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN Endangered species – Schedule 2

Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU Vulnerable species - Schedule 3

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX Presumed extinct species - Schedule 4

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act* 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA Migratory birds protected under an international agreement - Schedule 5

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950*, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD Conservation dependent fauna - Schedule 6

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna - Schedule 7

Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

- (a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
- (b) Near Threatened: Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
- (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

A list of the current rankings can be downloaded from the Parks and Wildlife Threatened Species and Communities webpage at http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities

^{*}Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Commonwealth of Australia Conservation Codes

Threatened fauna and flora may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in any one of the following six categories:

Extinct

A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

Extinct in the wild

A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:

- a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
- b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Critically endangered

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

Endangered

A taxon is Endangered when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a very high risk of extinction in the wild.

Vulnerable

A taxon is Vulnerable when the best available evidence indicates that it meets any of the five criteria for the category identified in Part 7.01 of the EPBC Regulations, and it is therefore considered to be facing a high risk of extinction in the wild.

Conservation dependent

A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

- a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered;
- b) the following subparagraphs are satisfied:
 - i. the species is a species of fish;

- ii. the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;
- iii. the plan of management is in force under a law of the Commonwealth or of a State or Territory;
- iv. cessation of the plan of management would adversely affect the conservation status of the species.

The EPBC Act does not provide for listing in a data deficient category. Where sufficient data (evidence) is unavailable to allow assessment by the Threatened Species Scientific Committee against the criteria for listing, the species are found to be ineligible. A recommendation is made to the Minister to not include the species in any category under the EPBC Act. For reasons of transparency and to inform future research, the Threatened Species Scientific Committee publishes the names of those species found to be data deficient. As data deficient is not a listing category under the EPBC Act, this has no statutory implications and the species is not considered to be listed under the EPBC Act.

APPENDIX 4 Significant Trees

Lot 7 Anketell Road, Anketell

Tree	Easting	Northing	Species	Height	DBH1	DBH2	DBH3	Calculated DBH	Condition
1	392731	6435815	Sheoak (Allocasuarina fraseriana)	12	70			70	Good condition
2	392716	6435384	Jarrah (Eucalyptus marginata)	11	63			63	Poor condition, contains small hollows
3	392706	6435415	Jarrah (Eucalyptus marginata)	12	64			64	Very Good condition, no hollows
4	392705	6435377	Jarrah (Eucalyptus marginata)	12	50	20		54	Poor condition, leaning, no hollows, bee hive in neighbouring tree
5	392689	6435429	Jarrah (<i>Eucalyptus</i> marginata)	11	37	33	30	58	Coppiced at base, fair condition
6	392682	6435805	Blackbutt (<i>Eucalyptus todtiana</i>)	8	55			55	Good condition, no hollows

Lot 7 Anketell Road, Anketell

Tree 1



Tree 2



Tree 3



Tree 4



Tree 6



Appendix 2

Acoustic Assessment



LOT 7 ANKETELL ROAD, ANKETELL

RESIDENTIAL SUBDIVISION ACOUSTIC ASSESSMENT

FOR

TERRANOVIS

JANUARY 2019

OUR REFERENCE: 23917-1-19008



DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT

LOT 7 ANKETELL ROAD, ANKETELL

Job No: 19008

Document Reference: 23917-1-19008

FOR

TERRANOVIS

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- B Noise Contour Plot
- C Monitoring Results

EXECUTIVE SUMMARY

Herring Storer Acoustics was commissioned by Terranovis, on behalf of Anketell Developments Pty Ltd to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 7 Anketell Road, Anketell from road traffic noise associated with the future Anketell Road.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

 $L_{Aeq(Day)}$ of 60 dB(A); $L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

 $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Additional to the above, noise received at an outdoor area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

From information provided, we understand that Anketell Road may, in the future, undergo a re-alignment, which would affect noise levels onto the development. Therefore, this report considers noise level associated with the proposed future road alignment.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

The results of the acoustic assessment indicate that without any noise amelioration, noise received at the residences in the future would exceed the "Noise Limit" as outlined in the Western Australian Planning Commission (WAPC) Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning".

For residential developments, the possible noise amelioration options that are normally considered are:

- Noise bunds and / or barriers; and
- "Quiet House" design applied to the first row of residences.

A combination of Noise Wall (1.8m high) between the first row of houses and the POS, and Individual noise control in the form of "Quiet House" design has been developed for lots with the details contain within this report. Alternative construction would be possible if a suitably qualified acoustical consultant assessed the individual building requirements at the time of building licence approval.

Note: The residences effected by noise above 55 dB(A) require Notifications on Titles. These Lots have been detailed further in this report.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Terranovis, on behalf of Anketell Developments Pty Ltd to undertake an acoustical assessment of noise that would be received at the proposed residential development located at Lot 7 Anketell Road, Anketell from road traffic noise associated with the future Anketell Road.

This acoustic study has been undertaken to assess the suitability of residential premises in these lots and provide recommendations in regard to noise amelioration.

As part of the study, the following was carried out:

- Measure existing noise levels at the proposed development site, from noise associated with the current Anketell Road traffic.
- Determine by noise modelling the noise that would be received at proposed residences within this stage of the scheme amendment from vehicles travelling on the roadway (Anketell Road) for the future road alignment.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles.

2. CRITERIA

The WAPC released on 22 September 2009 State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations In Land Use Planning". Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to—

- proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and
- proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations —

- for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and
- for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.

Further information is provided in the guidelines.

Table 1: Outdoor Noise Criteria

Time of day	Noise Target	Noise Limit
Day (6 am–10 pm)	$L_{Aeq(Day)} = 55 \ dB(A)$	$L_{Aeq(Day)} = 60 dB(A)$
Night (10 pm–6 am)	$L_{Aeq(Night)} = 50 dB(A)$	$L_{Aeq(Night)} = 55 dB(A)$

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to the sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and
- a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot¹.

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot¹. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance

¹ For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.

with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms². For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the quidelines."

The Policy, under Section 5.7, also provides the following information regarding "Notifications on Titles":

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- the potential for transport noise impacts; and
- the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the quidelines).

² For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the quidelines.

An example of a standard form of wording for notifications is presented in the quidelines."

3. NOISE MONITORING

Noise monitoring was undertaken at the boundary of the proposed LSP between the 27th June and the 4th July 2016. From these measurements, the noise received at the development from vehicles travelling along Anketell Road was determined.

The results of the noise data logging are summarised in Table 3.1 with the graphical data contained in Appendix D.

TABLE 3.1 – DETERMINATION OF TRANSPORTATION NOISE AT LOGGERS, dB(A)

Location	L _{A10 18hr}	L _{Aeq(day)}	L _{Aeq(night)}
Boundary of Development (7 metres from the road edge)	71.0	69.2	62.2

Based on the noise monitoring, the calculated difference between the $L_{A10,18hour}$ and $L_{Aeq,8hour}$, and the $L_{Aeq,16\,hr}$ is -8.8 and -1.8 dB respectively. Also, as the difference between day and night L_{Aeq} noise levels is greater than 5 dB(A) (i.e. 7 dB(A)), the day period is the critical period for compliance.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows 20 years in the future.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Current Anketell Road	Future Anketell Road
Traffic flows	7,226 vpd	20,000 vpd
Heavy Vehicles (%)	19.6%	19.6%
Speed Limit (km/hr)	80/110	80/110
Road Surface	Chip Seal	Chip Seal
Façade Correction	+2.5 dB(A)	+2.5 dB(A)

Noise modelling was carried out for noise received within the development for current traffic volumes and road alignment to calibrate the noise model.

Advice has been provided by WAPC, MRWA and City of Kwinana that there is to be a major upgrade of Anketell Road in the future. This upgrade will likely align the road closer to the development boundary. Advice was also sought on the projected future traffic volumes, with the values shown in Table 4.1 above.

Based on the above information the following scenarios have been considered:

Scenario 1 – Future road alignment with future traffic volumes, no noise control (Appendix B Figure B1).

Scenario 2 – Future road alignment with future traffic volumes, with 1.8 metre noise wall located at the southern side of the POS, before the first row of houses (Appendix B Figure B2).

Design on the future alignment was provided by MRWA, hence has been used for the above scenarios.

5. TRAFFIC NOISE ASSESSMENT

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

Living and Work Areas $L_{Aeq(Day)}$ of 40 dB(A) Bedrooms $L_{Aeq(Night)}$ of 35 dB(A)

The results of the acoustic assessment indicate that noise received at the ground floor level of the residential lots located oat the development from future Anketell Road traffic, could exceed the above Target, however, would be below the noise Limit provided a barrier (noise wall or like 1.8m high) is constructed at the southern side of the POS, before the first row of houses.

Table 5.1 details the noise level at the building envelop for each proposed development Lot with Figure 1 in Appendix A showing the location map.

TABLE 5.1 – DEVELOPMENT NOISE LEVELS (GROUND FLOOR)

enario 2: Future Traffic Volumes – Future Road Alignment with Noise Wall and Future Residential Bu		
Location / Lot Number	L_{AeqDay}	Requirements
S1	60	A
S2	59	A
S3	58	A
S4	57	N
S5	57	N
S6	54	Nil
S7	55	N
S8	55	N
S9	56	N
S10	57	N
1 to 45	42 - 54	Nil
46	55	N

Note: Nil No Requirements

N Notification on Title

A Package A Quiet House Design

B Package B Quiet House Design

C Package C Quiet House Design

Hence, to comply with the Policy, the following options have been provided:

- Strata Lots 1 to 3 require Package A Quiet House Design and Notification on Titles.
- Strata Lots 4 and 5 and 7 to 10 require Notification on Titles.
- All other Lots do not require any noise considerations.

The modification to Anketell Road would be considered as major upgrade and hence the infrastructure provided is obliged to achieve compliance with the "Noise Limits" at the ground floor. This normally requires the infrastructure provider to construct the barrier walls. However, in this case as, as outlined in the policy under Section 5.3.2 where a major road project is to be constructed in the vicinity of a future noise sensitive land use, the infrastructure provider and developer are both responsible for ensuring that the objectives of this policy are achieved. Similarly, for an upgrade to Anketell Road, the infrastructure provider would be responsible for achieving compliance with the "Noise Limits", which in this case would be the use of a dense graded asphalt road surface. However, once again, discussions should take place between the infrastructure provider and the developer to ensure that a mutually beneficial noise management plan is developed and implemented.

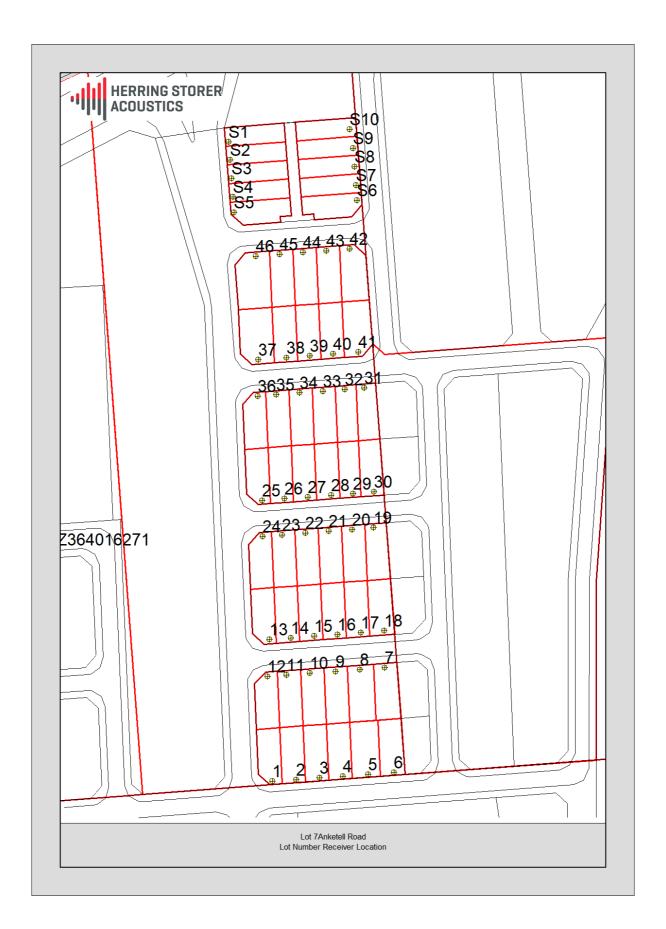
APPENDIX A

FIGURE A1 – SITE LAYOUT
FIGURE A2 – RECEIVER LOCATION MAP

FIGURE A1 – SITE LAYOUT

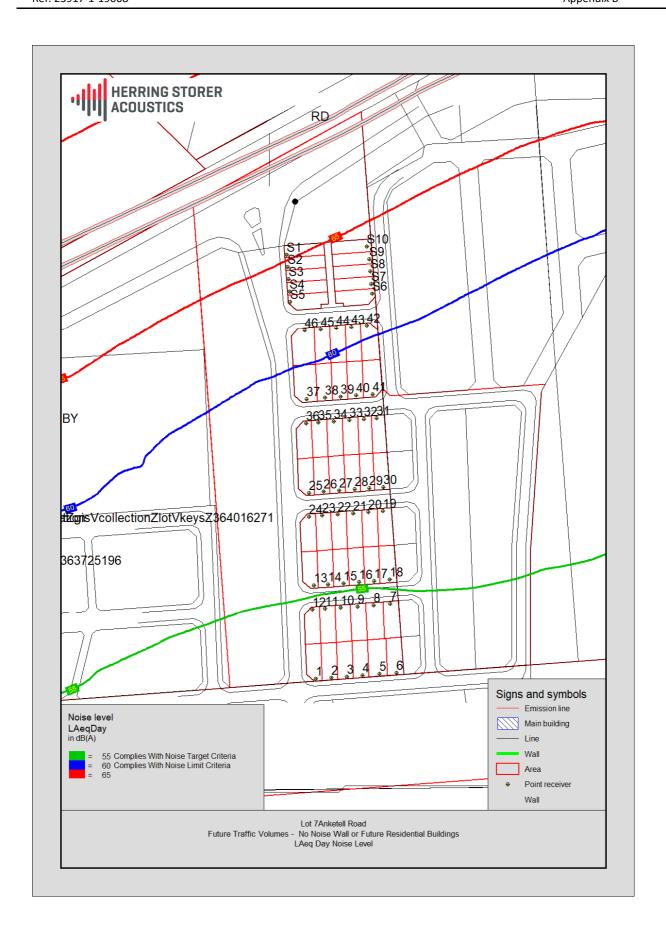


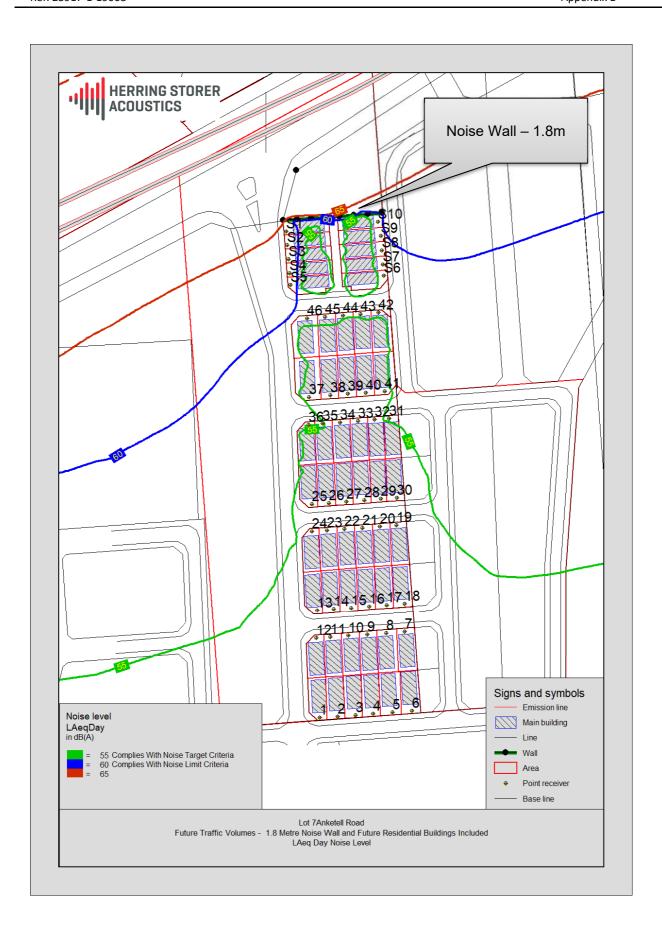
FIGURE A2 - RECEIVER LOCATION MAP



APPENDIX B

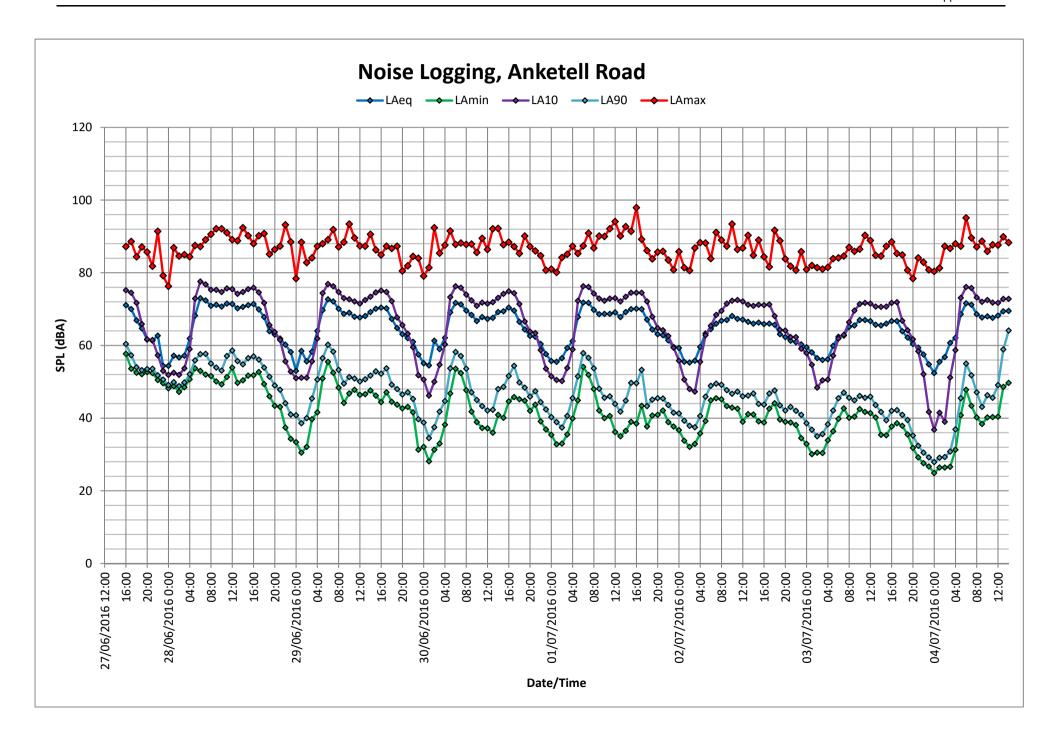
NOISE CONTOURS PLOT





APPENDIX C

NOISE MONITORING RESULTS



Bushfire Management Plan

SMITH CONSULTING

Bushfire Consultants

BUSHFIRE MANAGEMENT PLAN

Lot 7 (No 734) Anketell Road, Anketell, Anketell

City of Kwinana



Prepared by Ralph Smith SMITH CONSULTING BPAD27541 smith.consulting@bigpond.com 0458 292 280

Site visited 11 January 2019; Report completed 30 January 2019

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

	No				
Date of site visit (if applic	cable): Day 11		Month January		Year 2019
Report author: Ralph S	Smith				
VA BPAD accreditation	n level (please circ	cle):			
Not accredited	Level 1 BÂL asse	ssor Level 2 pra	ctitioner 🗸 L	evel 3 practitione	r 🔲
accredited please pr	ovide the followin	g.			
PAD accreditation nu	mber: 27541	Accreditation expiry	: Month August		Year 2019
Bushfire management	plan version numb	per: 1.1			
Bushfire management	plan date: Day	30	Month January		Year 2019
Client/business name:	Terranovis				
					Yes
		ceptable solutions have	essed through the u been used to add		
oushfire protection crit	eria elements)?				Yes
s the proposal any of the	eria elements)? he following (see §	SPP 3.7 for definitions)?			Yes
s the proposal any of the unavoidable developer Strategic planning pro	eria elements)? he following (see § ment (in BAL-40 or posal (including re	BAL-FZ) ezoning applications)			Yes
s the proposal any of the unavoidable developer Strategic planning pro-	eria elements)? he following (see § ment (in BAL-40 or posal (including re	BAL-FZ) ezoning applications)			Yes
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s the proposal any of the strategic planning proposal and the development (in High risk land-use) None of the above [Note: Only if one (or ror the WAPC) results of the given when the proposal and the proposal	he following (see sment (in BAL-40 or posal (including real BAL-40 or BAL-FZ) more) of the above efer the proposal to one of the above	BAL-FZ) ezoning applications) e answers in the tables in DFES for comment. listed classifications (E.g.	s yes should the de	cision maker (e.g.	. local govern

NOTE

This Bushfire Management Plan has been developed by Smith Consulting for the exclusive use of the client, Terranovis, and their agents.

The plan has been compiled using the standard methodologies required by Western Australian government departments and agencies. It is based on the following:

- State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7), December 2015
- Guidelines for Planning in Bushfire Prone Areas, December 2017
- Australian Standard 3959 Construction of buildings in bushfire-prone areas (incorporating amendments 1, 2 and 3), March 2009
- Standard fuel load field data collection methods and conversion to a fuel load applicable for the appropriate fire spread models.

The techniques described in the above publications have been applied in the appropriate areas and circumstances for the development of this document.

Where there was no public access the interpretation is based on photographic and satellite imagery, and a laser distance meter was used to measure distances and effective slope.

It is recommended that this Bushfire Management Plan be revised every five years to ensure that it remains relevant and in-line with current requirements. This will optimise protection. It is proposed that the property owners undertake the review.

DISCLAIMER

This Bushfire Management Plan has been prepared in good faith. It is derived from sources believed to be reliable and accurate at the time of publication. Nevertheless, this plan is distributed on the terms and understanding that the author is not responsible for results of any actions taken based on information in this publication or for any error or omission from this publication.

Smith Consulting has exercised due and customary care in the preparation of this Bushfire Management Plan and has not, unless specifically stated, independently verified information provided by others.

Any recommendations, opinions or findings stated in this report are based on circumstances and facts as they existed at the time Smith Consulting performed the work. Any changes in such circumstances and facts upon which this document is based may adversely affect any recommendations, opinions or findings contained in this plan.

Document control

Report Version	Purpose	Author/reviewer and accreditation details	Date Submitted	
1	Original BMP to support the development	Ralph Smith	24/ 1 /2019	
1.1	Added an addition BAL contour map	Ralph Smith	30/ 1 /2019	

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Section 1: Proposal Details

This development area is a component of the Anketell North Structure Plan. This BMP has been developed specifically for Lot 7 Anketell Road in accordance with the currently applicable Guidelines.



Figure 1. A copy of the site plan as provided with the development application.

This development site is part of the significant development of the expanded area. The area immediately to the north, east and south is banksia woodland. This development site will be cleared ready for the construction of homes and associated infrastructure. The public area spaces (POS) will all be developed as 'low threat vegetation'.

The development site is declared as bushfire prone. Dwellings are required to be constructed to the standards described in AS 3959 as the Standard has been triggered as required through the Building Code of Australia (BCA).

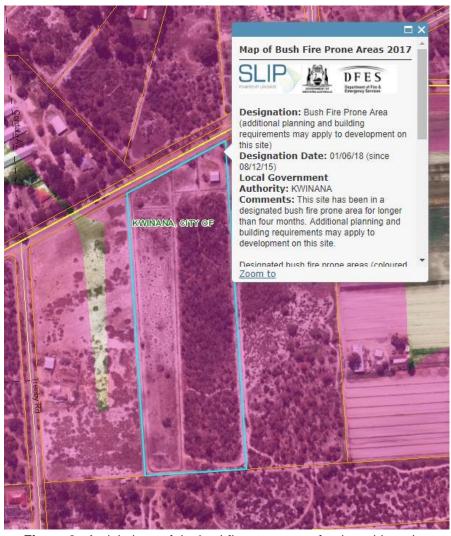


Figure 2. Aerial photo of the bushfire prone area for the subject site.

Section 2: Environmental Considerations

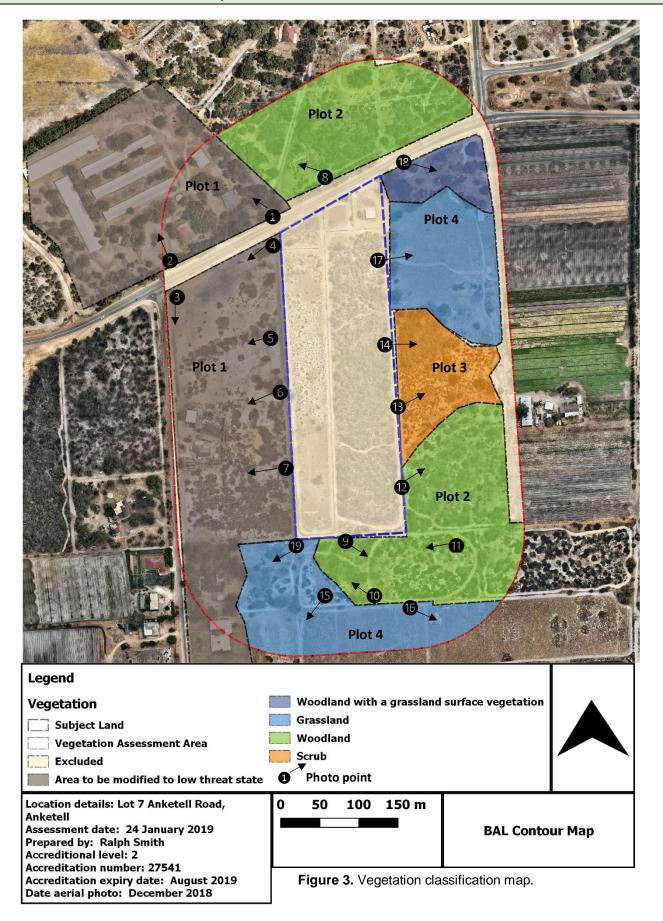
Subsection 2.1: Native Vegetation – modification and clearing

The site will be cleared as a component of this development. There is virtually no native scrub flora on the western side of the development site, which is basically a grassland, and banksia woodland on the eastern side.

Subsection 2.2: Re-vegetation/Landscape Plans

The public area spaces (POS) will all be developed as 'low threat vegetation'. There is a major Western Power line running basically north–south through the development site on the western portion of the subdivision site. This area will be revegetated to 'low threat vegetation'.

Subsection 3.1: Assessment Inputs



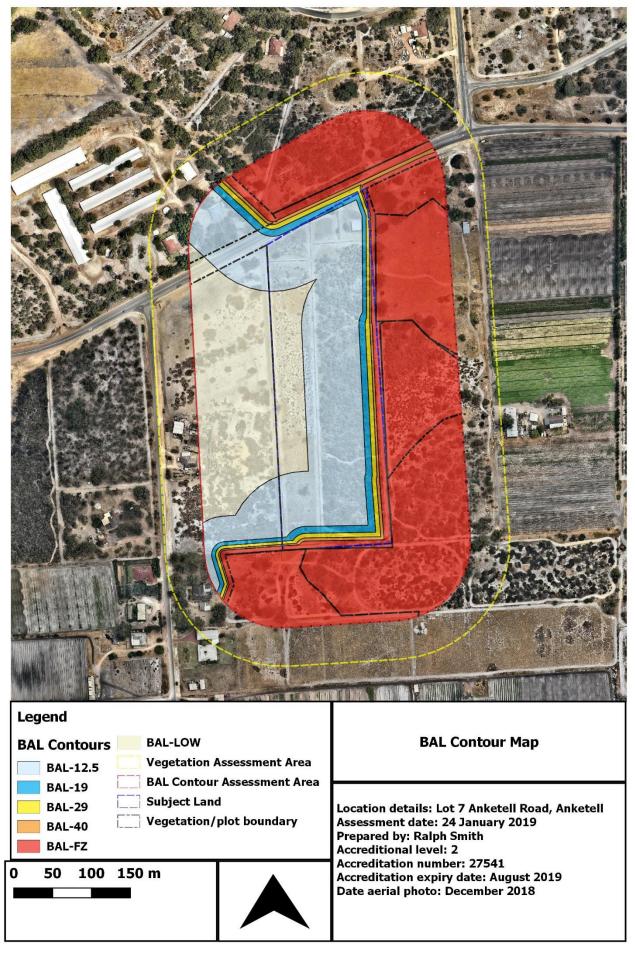


Figure 4. BAL contour map.

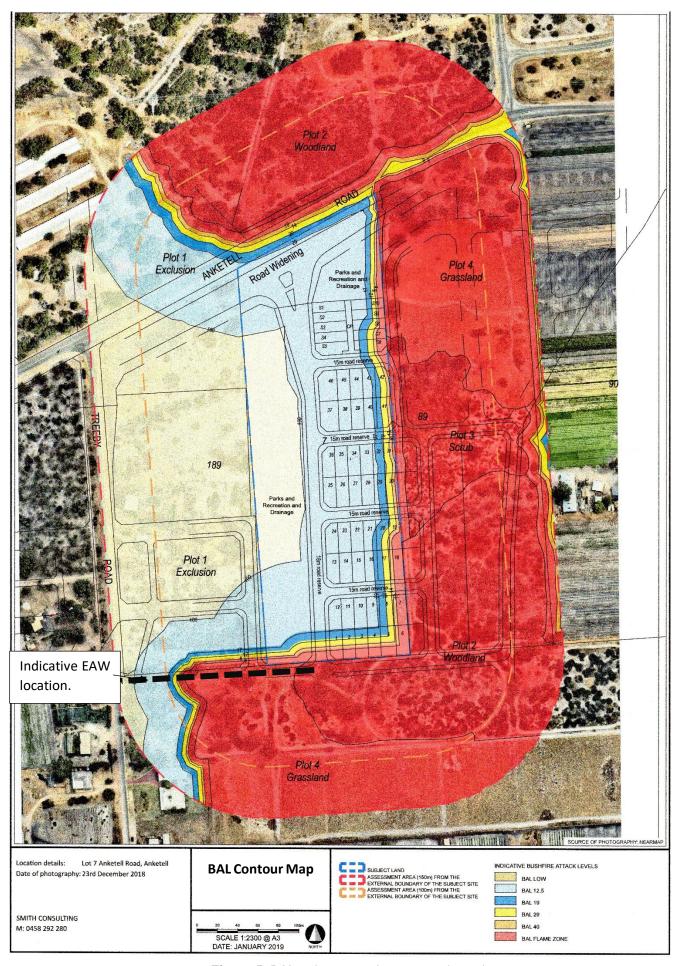


Figure 5. BAL ratings over the proposed new lots.

Plot 1 Exclusion Clause 2.2.3.3 (e) and (f)



Photo ID: Photo 1 The 'low threat vegetation' and APZ north of Anketell Road and the development site.



Photo ID: Photo 2 The 'low threat vegetation' and poultry farm north of Anketell Road.



Photo ID: Photo 3 The cleared land to the west on the the neighbouring property.



Photo ID: Photo 4 The 'low threat vegetation', cleared land and road infrastructure west of the site.



Photo ID: Photo 5 The 'low threat vegetation' and cleared land on the neighbouring property to the west.



Photo ID: Photo 6 The 'low threat vegetation', cleared land and house and infrastructure on the property to the west.



Photo ID: Photo 7 The 'low threat vegetation' and cleared land on the neighbouring property to the west.

Plot 2 Class B – Woodland (AS 3959 vegetation classification B–05)



Photo ID: Photo 8 The woodland vegetation to the north of the site.



11/01/2019 9:12:47 AM (+8.0 hrs) Dir=SSE Lat=-32 21309 Lone-115.86137 All=3ff MSL WGS84 Photo ID: Photo 9 The woodland vegetation to the south of site



Photo ID: Photo 10 The woodland vegetation to the south-east of the site on the neighbouring land.



Photo ID: Photo 11 The woodland vegetation to the south of the site.



Photo ID: Photo 12 The woodland vegetation to the east of the site.

Plot 3 Class D – Scrub (AS 3959 vegetation classification D–13)



Photo ID: Photo 13 The grass surface vegetation under a scrub overstorey. The vegetation structure varies within the scrub species.



Photo ID: Photo 14 The scrub vegetation east of the site.

Plot 4 Class G – Grassland also a sparse overstorey with a grassland surface vegetation (AS 3959 vegetation classification G–21)



Photo ID: Photo 15 The grassland on the neighbouring property to the south.



Photo ID: Photo 16 The grassland vegetation south of the woodland on the adjacent neighbouring property.



Photo ID: Photo 17 The grassland to the east of the site. overstorey.



Photo ID: Photo 18 The grassland under a sparse tree overstorey



Photo ID: Photo 19 The grassland under a sparse tree overstorey and adjacent to an APZ on a neighbouring property.

Notes to Accompany Vegetation Classification

1. Plot 1

Exclusion – Low threat vegetation and non-vegetated areas Clause 2.2.3.2 (e) (f)

This plot comprises the houses, cultivated and reticulated gardens and infrastructure within and adjacent to the subdivision site. It includes the road infrastructure and developed land adjacent to the lot. This site will be cleared and the POS will be developed as 'low threat vegetation'. This plot also includes the areas that are modified to a low threat state.

2. Plot 2

Class B – Woodland (AS 3959 vegetation classification B–05)

This plot comprises the land to the north-east, east and south of the development site. Currently it is intact woodland tree overstorey with a multi-tiered scrub understorey. This plot has a mixture of overstorey tree species, such as jarrah and banksia.

3. Plot 3

Class G – Grassland and also a sparse overstorey with a grassland surface vegetation (AS 3959 vegetation classification G–21)

This plot comprises the land to the east and adjacent to the subdivision site and the grassland south of the woodland which is within 150 metres of the lot. The grassland to the east are previous paddocks. The grassland south of the woodland with a sparse woodland tree overstorey is near but not adjacent to the lot. There is a total absence of a multi-tiered scrub layer beneath the tree overstorey. AS 3959 in the Notes associated with Table 2.3 Classification of Vegetation states that: 2. Overstoreys of open woodland, low open woodland, tall open shrubland and low open shrubland should be classified to the vegetation type on the basis of their understoreys; other to be classified on the basis of their overstoreys. Section 2.1.b of the 'Visual Guide for Bushfire Risk Assessment in Western Australia' states that: The vegetation classification guidance provided in AS 3959 considers foliage cover to be the sole determining factor in the classification of vegetation. However, with respect to assessing the likely contribution to potential fire behaviour, it is often more important to consider vegetation structure rather than canopy cover.

4. Plot 4

Class D – Scrub (AS 3959 vegetation classification D–13)

This plot comprises the scrub that is east of the development site. It is located on the poorer soils and has a very sparse grass surface vegetation mixed between the scrub in the southern portion of the plot. The southern portion principle vegetation is grass trees and *banskia spp*.. The plants in the northern portion of the plot are taller Melaleuca spp. and without the sparse grass surface vegetation.

Other considerations in regard to vegetation

1. The fire spread algorithms applied in AS 3959 consider fine fuels as less than 6 mm diameter for dead material, and less than 3 mm diameter for live material.

Slope

The orange line on the slope aerials shows the surface slope and the blue line the vegetation and buildings above the surface.

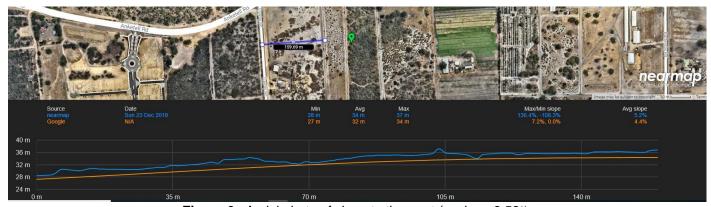


Figure 6. Aerial photo of slope to the west (upslope 2.52°).



Figure 7. Aerial photo of slope under vegetation to the north (0.04°).

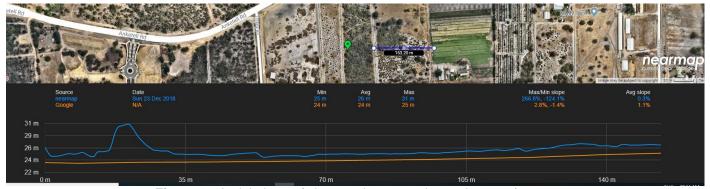


Figure 8. Aerial photo of slope under vegetation to the east (0.63°).



Figure 9. Aerial photo of slope under vegetation to the south (0.34°).

Subsection 3.2: Assessment outputs

Method 1 BAL Determination					
Vegetation Area/Plot	Applied Vegetation Classification	Effective Slope Under the Classified Vegetation (degrees)	Separation Distance to the Classified Vegetation (metres)	Bushfire Attack Level	
1	Exclusion	Not applicable	Not applicable	LOW	
2	Woodland	Upslope – 2.52°	14	29	
3	Scrub	Upslope – 0.4°	13	29	
4	Grassland	Upslope – 0.4°	8	29	
Determined Bushfire Attack Level				29	

The above information in the table is based on the lots rated as BAL-40 or BAL-FZ being retained by the developer, and therefore providing the appropriate separation between the future dwellings and the threat vegetation for the new lots being offered for sale. The retained new lots will be cleared.

In the future, the new lots currently rated as BAL-40 or BAL-FZ will require a BAL reassessment, prior to being able to be offered for sale.

Section 4: Identification of bushfire hazard issues

The principle bushfire hazard is the native vegetation to the north-east, east and south of the development site. By requiring the future dwellings to be constructed to the appropriate standard will further enhance the protection of the community. The development of the public open spaces to 'low threat vegetation' status will also not contribute to any potential bushfire threat.

Section 5: Assessment against the Bushfire Protection Criteria

Subsection 5.1: Compliance

Bushfire	Method of Compliance	Proposed bushfire management strategies			
protection criteria	Acceptable solutions				
Element 1: Location	A1.1 Development location	s development will be developed in such a manner that on completion the lots offered for sale be at BAL–29 or lower. The western lots that are currently rated at BAL–40 or BAL–FZ will be			
Element 2: Siting and design	A2.1 Asset Protection Zone (APZ)	retained by the developer and not offered for sale until they can be BAL rated at BAL-29 or less. There will be no APZs required on these lots.			
Element 3: Vehicular	A3.1 Two access routes.	There are multiple access options that facilitate movement to a range of alternative locations and directions of travel.			
access	A3.2 Public road	All public roads will be constructed to the appropriate standards as required in the Guidelines.			
	A3.3 Cul-de-sac (including a dead-end-road)	There will be no dead-end roads in the subdivision that exceed the requirements in the Guidelines.			
	A3.4 Battle-axe	There will be no battle-axe access in the subdivision that exceed the requirements in the Guidelines.			
	A3.5 Private driveway longer than 50 m	Not applicable.			
	A3.6 Emergency access way (EAW)	A temporary EAW will be stablished at the southern end of the development that links to the Treeby Road. The EAW will be developed in accordance with the Guidelines requirements.			
	A3.7 Fire service access routes (perimeter roads)	Not applicable.			
	A3.8 Firebreak width	Firebreaks will be established and maintained in accordance with the City's firebreak and fuel load notice.			
Element 4: Water	A4.1 Reticulated areas	The site will be serviced with reticulated mains water in accordance with the State Government requirements.			
	A4.2 Non-reticulated areas	Not applicable.			
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	Not applicable.			

Subsection 5.2: Additional management strategies



Legend

- 1. Subject land
- 2. Roads
- 3. Temporary emergency access way location

Notes

- 1. AS 3959 construction standards apply to the areas within the declared bushfire prone areas and where a lot is BAL rated at BAL–12.5 or above.
- 2. The site will have reticulated mains water supply.
- 3. Woodland and scrub to the north-east, east and south are the primary vegetation plots that provide an ongoing bushfire threat.
- 4. The site will be cleared during the development.
- 5. The POS will all be developed as 'low threat vegetation'.
- 6. The neigbouring property to the west is effectively cleared of vegetation with only scattered pockets of pig face.
- 7. This area is a low threat vegetation poultry farm.
- 8. The BAL–40 and BAL–FZ lots will be retained by the developer. These are located on the eastern boundary of the development site.

Location details: 734 Anketell Road, Anketell Local government area: City of Kwinana Assessment date: 24 January 2019

Prepared by: Ralph Smith

Accreditation level: 2 Accreditation number: 27541

Accreditation Expiry Date: August 2019 Date of Aerial photo: December 2018

Version No: 1

Figure 10. Spatial representation of bushfire management strategies.

Section 6: Responsibilities for Implementation and Management of the Bushfire Measures

DEVELOPER/LANDOWNER - PRIOR TO SALE OR OCCUPANCY			
No.	Implementation Action		
1	Install the access ways, and associated signs to the standards stated in the Guidelines.		
2	Install the temporary emergency access way in accordance with the standards required in the Guidelines.		
2	Install the required water supply that meets State Government's specifications.		
3	The developer will inform landowners of affected lots regarding bushfire threat, via notifications on titles advising of the potential higher construction standards.		
4	The developer is to inform the purchaser of the BMP and the requirements to comply where appropriate.		

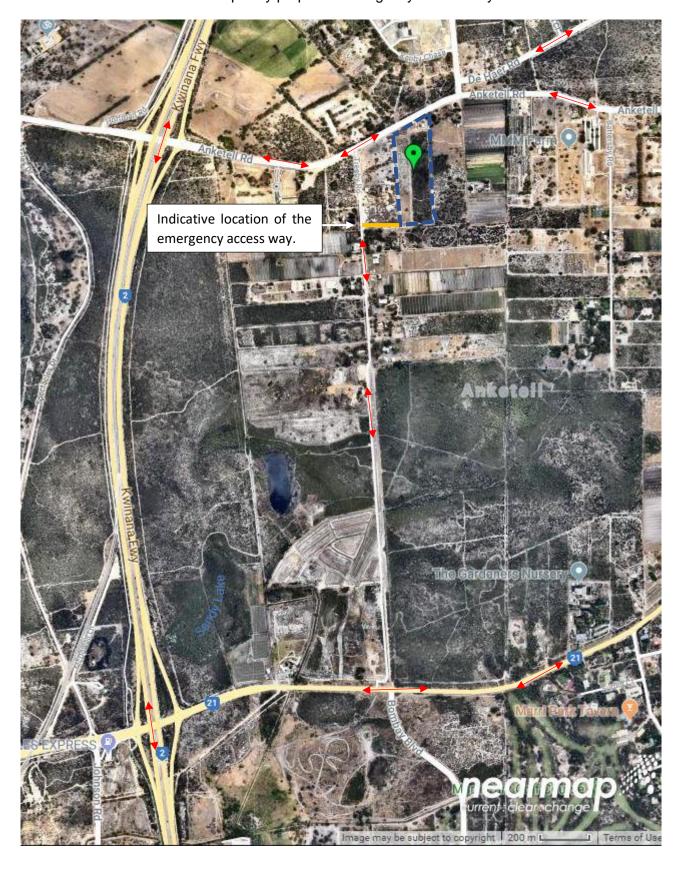
LAN	LANDOWNER/OCCUPIER - ONGOING MANAGEMENT			
No.	Management Action			
1	Comply with the relevant local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.			
2	Owners of properties with increased construction standards must maintain on an ongoing basis so that those dwelling are compliant with the increased construction standards.			

CITY'	CITY'S RESPONSIBILITY - ONGOING MANAGEMENT			
No.	Management Action			
1	The ongoing management of the POS is the responsibility of the City in accordance with the agreement established between the developer and the City. The City will be required to reduce the fine fuel to maintain the available fuel load to a maximum of 2t/ha.			

Vehicle technical requirements extracted from the Guidelines (page 68).

TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

Access external to the development site that shows there are numerous alternative access options to alternative destinations once the temporary proposed emergency access way is constructed.



Landscaping Concept Plan







NTS @ A1 15m

LOT 7 - ANKETELL ROAD LWMS DRAINAGE CATCHMENT

SK01-A

Local Water Management Plan

REPORT

TERRANOVIS PTY LTD LOT 7 ANKETELL ROAD, ANKETELL

LOCAL WATER MANAGEMENT STRATEGY

MARCH 2019



Revision History:

Revision	Description	Checked	Approved	Date
0	Original Issue	DMN	SRA	5 th March 2019



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LOT 7 ANKETELL ROAD, ANKETELL

LOCAL WATER MANAGEMENT STRATEGY (LWMS)

Executive Summary

Estate Scale

- An overall drainage design has been considered over Lot 7 and neighbouring lots as part of the Local Water Management Strategy (LWMS) for the Anketell Urban North Cell which was prepared by Bioscience in March 2014⁵. The subject site of this LWMS affects a few of these catchments.
 - The entirety of catchment 7.1.2 is included in the northern portion of the site.
 - Portions of catchments 7.1.3 and 7.1.5 are included in the subject site area.
- Swales will be constructed in POS to cater for the major and minor storms.
 Swale areas will be designed to ensure all events up to the major storm is infiltrated on site.
- Bio retention areas for treatment of the 63.2% AEP 1 hour storm runoff will be installed to a maximum depth of storage of 0.5m.
- Beyond the 63.2% AEP storm and up to the 1% AEP storm will surcharge the bio-retention areas into the upper tiers of the basins which will have 1 in 6 slopes.
- Given the depth of the groundwater beneath the site, no future groundwater monitoring is proposed, although an investigation will be carried out as part of the UWMP to ascertain the quality of groundwater for irrigation purposes.
- Information Packages will be provided to all lot purchasers to: (a) Fully inform lot owners of the requirement to install the equivalent of two by 1500mm diameter by 1200 deep soakwells prior to an outflow connection to the drainage system; (b) To encourage the use of rainwater tanks; (c) To utilise water efficient devices & appliances throughout their homes; and (d) To maximise the use Water & Nutrient-wise plants, and minimise the use of lawns.

Access Street Scale

- All piped drainage systems will be designed to accommodate the 20% AEP event.
- Where possible piped drainage will be excluded in preference of swale drains and overland flow.

Allotment Scale

- All lot owners will be encouraged to install rainwater tanks plumbed into their homes for household use in order to assist to contain the 1 year - 1 hour ARI event on-site in lieu of soakwells.
- All lots are required to install the equivalent of 2 by 1500mm by 1200mm deep soakwells which will hold a 20% AEP (1 in 5 year storm) without outflow.



Public Open Space Areas

• All swale basins constructed within a POS area will be designed to infiltrate all storms up to and including the 1% AEP (100 year ARI).



1 Introduction

This LWMS report has been prepared as a stand-alone document to support the Local Structure Plan for Lot 7 Anketell Road, Anketell and will be used to guide the design and construction of the proposed drainage solutions for subdivision within the area.

The location of the site is shown in Appendix A, together with an aerial photograph of the existing site.

The site is located on the southern side of Anketell Road some 150m east of the intersection between Anketell Road and Treeby Road.

1.1 Drainage / Water Management Principles and Design Objectives

The following water sensitive design criteria, principles & objectives are to be pursued &/or implemented as part of the proposed development:

Water Conservation & Water Efficiency

<u>Objective</u>: To maximise the reuse of stormwater and minimise the use of scheme water outside of the home and to use water as efficiently as possible - both within & outside of the home.

<u>Deliverable</u>: All lot purchasers will be encouraged to install rain water tanks plumbed into their home; to use water efficient devices & appliances throughout their homes and to plant "Water-wise" & "Nutrient-wise" gardens.

<u>Deliverable</u>: All water will be infiltrated on site, mimicking the pre-development conditions.

Water Quantity Management and Protection of Property

<u>Objective</u>: To maintain the total water cycle balance within development areas relative to the predevelopment conditions.

Deliverable: To ensure that post-development discharge is retained on site.

Objective: To protect the built environment from flooding or water logging.

<u>Deliverable</u>: All allotments to be a minimum of 0.3m above the 1% AEP (1 in 100 year) flood level.

<u>Deliverable</u>: Retention basins to be provided to ensure that 1% AEP (1 in 100 year) storm is disposed on site via infiltration.

Water Quality Management

<u>Objective</u>: To improve the overall surface & groundwater quality of the water leaving the estate and if possible improve the quality of water leaving the development.

<u>Deliverable</u>: Ensure that surface water is routed to swale basins and retained on site.

1.2 Planning Background

The subject land is currently zoned "Urban deferred" and is proposed to be amended to "Urban" under the Local Town Planning Scheme.

The proposed structure plan is detailed in Appendix A.



2 Proposed Development

2.1 Key Elements of the Local Structure Plan (LSP)

The site is located within the suburb of Anketell within the City of Kwinana and covers an area of approximately 6.46ha of undeveloped land. The site is located on the southern side of Anketell Road some 150m east of the intersection between Anketell Road and Treeby Road.

The development proposal consists of approximately 56 single residential allotments averaging around 375 square metres in area.

A large easement traverses the land along the western boundary for the high voltage overhead power lines for Western Power. The affected area is approximately 52m wide along the western portion of the site and is proposed to be incorporated within an area of POS.

2.2 Previous Land Use

The land was previously a farm and is currently undeveloped and generally uncleared except for within the Western Power easement. An existing shed is located near Anketell Road.

2.3 Finished Lot Levels

Finished Lot levels will be set using on the basis that they are a minimum of 0.3m above 1% AEP TWL of drainage basins and they are proposed to be set such that major storms will flood the POS in lieu of flooding the lots.

Further criterion is that Lots are to be at least 1.2m above AAMGL, although the existing groundwater is well below surface levels.

3 Design Criteria

The drainage requirements for developments within this area are controlled by the requirements of the City of Kwinana, which are outlined below.

Item	Description	Requirement	Source / Comment
1	AEP for pipe design	20% AEP	Standard Council requirement for subdivision developments
2	AEP for soakage facilities	1% AEP	As per Council Requirements.
4	Min. lot freeboard	0.3m (above (1% AEP level)	Standard Council &/or DoW requirement developments and consistent with Australian Rainfall and Runoff 2016.
5	Run-off coefficients C _{1%}	0.70 – Road Reserves	Per Pre Development Allowances and as calculated by first principles.
		C _{1%} - 0.18 – Residential Lots	Based on "at-lot calculations" in Appendix D.

4 Pre-development Environment

4.1 Topography and Landform

The site grades moderately from around RL32.00mAHD at the south-western corner of the site to around RL23.00mAHD near Anketell Road. There is a small valley line



that runs along the eastern boundary of the site towards Anketell Road. The average grade of the land is around 2.5%.

4.2 Soil Characteristics

The Perth Environmental Geology Mapping (Gozzard JR 1986 Fremantle Part Sheets 2033 I and 2133 IV)¹ indicates that part of the site area consists of Sand "S₈" which is defined as Bassendean Sand of eolian origin. It is noted to be a good groundwater recharge area and the soils are recognized as being well drained and suited to drainage disposal except in areas with high groundwater.

In essence the site is suitable for urbanisation, consisting of well graded sands of high permeability meaning that soakage will be effective on the site

Information from the Landgate Shared Location Information Platform (SLIP)⁶ shows the site to have a low to medium risk of Acid Sulphate Soils (ASS) occurring within 3m of the natural surface.

The proposed works and finished lot levels are well above groundwater levels, so there is little risk of encountering ASS on site.

4.3 Geotechnical

At this stage no geotechnical investigation has been carried out over the land. Works have been undertaken along Anketell Road and in areas west of Treeby Road which indicate that the area consists of deep free draining sand.

As part of adjacent development works, it has been noted that the area consists of deep free draining sand of homogeneous appearance. Given the homogeneous nature of soil conditions and the evidence from adjoining excavations which are consistent of the regional mapping; this is considered sufficient to provide certainty for the LWMS. It is proposed that further investigations will be undertaken as part of the Urban Water Management Plan for the area to further confirm the soil profile of the area and provide further soil properties necessary to facilitate development works.

4.4 Groundwater Aspects

Groundwater flow directions and levels were determined as part of the LWMS through the assessment of data available from multiple sources, including the 1997 Perth Groundwater Atlas⁴, monitoring bores installed on the site by JDA Consultant Hydrologists (JDA) in 2005, and existing Department of Water monitoring bores in the vicinity of the site.

According to the 2004 Groundwater Atlas, which generally designates AAMGL levels as measured from the relevant bores, the groundwater levels across the site are at around RL19.5mAHD along the eastern boundary of the site, grading down to around RL18.20mAHD along the western boundary of the site, being a minimum of around 6.0m below existing surface levels.

The monitoring bores installed by JDA recorded maximum groundwater levels (GWLs) in 2005. The LWMS took into account the 20 most recent years of records (1994-2014) from the DoW monitoring bore JE22C located approximately 1km south-west of Lot 7, and calculated the AAMGL at the bore site to be RL17.965mAHD. Comparing this to the maximum groundwater levels in 2005, it



was found that the 2005 levels were 293mm above the AAMGL. Using this information, the 2005 levels recorded were then adjusted to match the AAMGL levels as shown in Table 3.1 below.

Table 4.1 – Groundwater Levels – Bioscience – Anketell North Urban Cell – Lots 30-41, 100, 188, 189 & Part of Lot 13 Treeby Road & Lots 2-4, 7, 89 & 652 Anketell Road, Anketell, Western Australia – Local Water Management Strategy

	WAM6	WAM7	WAM11	WAM13	
Recorded MGL 2005	21.15	19.04	13.86	14.13	_
Level adjusted to AAMGL	20.857	18.747	13.567	13.837	

The bore locations and the AAMGL groundwater contours as derived for the LWMS are shown in Appendix F and in Drawing L05 in Appendix B.

The calculated AAMGLs rise from a level of around RL18.20mAHD in the north western corner of the site to around RL19.30mAHD along the eastern boundary. The lowest natural surface level of the site is located in the south western area of the site and is at around RL2.0mAHD at the bottom of the lower basin, meaning that at its shallowest; the AAMGL is approximately 2.7m below the existing site levels. The lowest proposed lot levels are around RL24.30mAHD, achieving a clearance of some 5.0 m from the AAMGL. The groundwater contours ascertained from this investigation are shown on Drawings L03 and L04 in Appendix B, and the information used to determine them, including JDA monitoring bore locations and DoW bore records, is shown in Appendix F.

The groundwater levels are sufficiently lower than existing or proposed development levels; therefore no further investigation is required for the purposes of drainage disposal and water management.

4.5 Surface Water Aspects

4.5.1 General

As shown in Appendix B, the current site is divided into two major catchments being Catchment 1, being the northern portion of the site abutting Anketell Road and catchment 2, the remainder of the southern portion of the site. The catchments have been split to facilitate the maximum portion of the catchment being able to be accommodated within the power easement area thereby minimising the area of restricted POS...

4.5.2 Predevelopment Ground Water Monitoring

Given the significant depth between the site surface levels and the existing groundwater levels and the low risk predevelopment land use, no predevelopment monitoring has been undertaken on the site or is required for the purposes of drainage disposal and water management.



It is noted that due to the upstream land uses of market gardening, it would be appropriate to undertake some testing to prove up groundwater quality for irrigation purposes and this will be undertaken as part of the Urban Water Management plan (UWMP).

4.6 Environmental Assets and Water-Dependent Ecosystems

According to the Shared Land Information Platform (SLIP)⁶, there are no existing wetlands over the site. The nearest wetland is a Multiple Use Wetland located approximately 240m north-west of the site which will not be affected as the groundwater contours do not grade towards this wetland from Lot 7.

The nearest downstream conservation category wetland is located at The Spectacles, some 1.4km to the west of Lot 7. The depth to groundwater from the site together with the potential of the bio-retention basin soils to attenuate nutrients means that provided the nutrient loading from any proposed development is managed to low levels, any development is unlikely to affect The Spectacles.

4.7 Existing Infrastructure and Design Constraints

The whole of the site is proposed to be sewered into existing infrastructure along Anketell Road just west of the site. The sewer levels will determine the minimum levels of some of the lots in the northern and central portions of the site. The lots in the southern portion of the site will not be limited by the sewer or drainage levels due to the relatively steep grade of the site.

5 Water Sustainability Initiatives

5.1 General

The current state government requirement to increase the efficiency of water use in new developments to a target of less than 100kl per person per year is proposed to be implemented within the development.

This is proposed to be achieved by:

- Increased water efficiency in the household by encouraging the use of waterwise appliances through regulation and financial incentives.
- Encouragement of the use of rainwater tanks to supplement scheme water for irrigation.
- The use of low water requirement plants and minimizing turf areas for gardens and POS areas

5.2 Individual Lot Owner Initiatives

Water conservation will be encouraged by the developer through the promotion of native, water-wise gardens and water efficient household devices & appliances. All requirements for the purchaser will be outlined in their purchase contract and associated information handouts.

The information will also outline the case for all lot owners to use rainwater tanks plumbed into their homes to assist with the retention of the 63.2% AEP event.



5.3 Estate Public Open Space (POS) Initiatives

5.3.1 Aims

The drainage impacts of the POS will be managed to ensure that:

- The maximum depth of water within drainage basins during a 1% AEP storm is limited to 1.2m.
- Inlets to basins will be directed to bio retention basins as requested by the City of Kwinana, which will facilitate infiltration and treatment of the smaller (high AEP) storms prior to overflow to below ground storage, which will maximise the useability of POS.
- Flush kerbs may be constructed abutting POS areas with either direct run-off for infiltration in lower areas or with swales for infiltration/conveyance to drainage basin areas.

Any proposed landscaping development of the POS areas will address the following objectives:

- Minimising irrigation & fertiliser demands via appropriate species selection
- Managing fertiliser application to minimise impacts on water quality.
- Weed Management
- Fauna Protection

5.3.2 General POS initiatives

The treatment of the POS areas will typically consist of grassed areas with designated areas of native planting and mulching. All areas will be designed to minimise irrigation requirements with predominantly native plantings incorporated into the landscape design and the use of low water requirement grasses such as kikuyu.

Full landscape plans will be prepared at the time of subdivision in accordance with agreed requirements with the City of Rockingham which will address the objectives outlines in Section 5.3.1.

5.3.3 Irrigation

1) Water Sources and required Allocations:

For the POS irrigation the overall water use is limited to a maximum of 7500kl per hectare per annum in accord with the Department of Water requirements. The total area to be irrigated over the total development is approximately 2.048ha which will require an annual bore yield of some 15,360kL per annum. An application for this allocation has been made and approval has not yet been provided. A Copy of the application is included in Appendix E.

Standard conditions require irrigation usage to be metered monthly and submitted annually in accord with DoW requirements.

Although street trees are typically not included in the allocation, these will be irrigated using hand watering or from an individual's internal irrigation system.



2) Programming and Irrigation Minimisation.

Establishment irrigation for trees and native POS planting areas is expected to be used for a period of between 2 and 3 years after planting then disconnected.

Typically, watering will start with 10mm three times / day for initial establishment over a period of around 1 month, depending on the weather and the time of the year. This should then be reduced to 10mm once/day for a period of around 2 months - dependent on the time of year. The watering is then reduced to 10mm applied 2 to 3 times a week.

Irrigation should be programmed and maintained to minimise the water used across the site, with the following mechanisms to minimise water use.

- The system should be checked regularly to detect faults and ensure water is being used effectively and efficiently.
- In general the system should be checked at a frequency of
 - o November to April Once per fortnight.
 - o May to October Once a month.
- All sprinklers should be checked to fully pop-up and retract, bubblers and that
 nozzles are free of blockages and sprinklers are providing adequate coverage.
 Particular attention should be paid to irrigation of transplanted mature trees
 and street trees to ensure they are receiving adequate water.
- The watering regime for planted areas should reflect the plants needs in accordance with the plant type and natural rainfall, in accordance with the Water Corporation's "Water-wise" guidelines. Watering should be monitored throughout the year and adjusted accordingly to ensure appropriate watering. Watering should only take place within the hours stipulated by the Water Corporation (Currently 6.00pm to 9.00am).

The Irrigation Schedule is expected to be as follows (based on landscape hydrozones):

- Turf should be separated from shrubbery and turf and shrubbery should be supplied by different stations of irrigation and scheduled separately.
- Areas of turf subject to lower wear in sheltered environments &/or are not in visually prominent positions should be scheduled to receive a lesser amount of irrigation than areas of turf that are subject to high levels of wear, in exposed environments &/or in visually prominent locations;
- Low Water use plants should be scheduled to receive a lesser amount of water than areas of higher water use; and,
- Irrigation should be progressively withdrawn from areas of native shrubbery.

As part of the landscape works, the topsoil in the landscaped areas will be improved to ensure free drainage and nutrient retention properties prior to planting.



6 Stormwater Management Strategy

6.1 Pre-Development Hydrology

6.1.1 General

As outlined in Section 4, the site consists of sand with excellent soakage characteristics with a moderate grade with most portions of the site grading at around 2.5%.

On review of the site and anecdotal evidence, it is clear that little or no run-off occurs from the site and all rainfall is infiltrated. As a result, it has been assumed that there is no predevelopment flow from the site. A plan detailing the predevelopment catchment boundaries is shown in L03 in Appendix B.

The land grades from south to north, with a valley line down the eastern boundary of the site that runs down to a low point around RL23.00mAHD at the northern point of the site alongside Anketell Road.

As outlined above, despite the topography indicating these flow paths, the permeability of the surface means that infiltration occurs at a greater rate than run-off meaning that little or no runoff leaves the site. In the unlikely event that runoff reached the isolated low point, the water infiltrates in that area.

6.1.2 Comparison to the Previous LWMS

1) Comparison of Run-off Parameters

The LWMS was prepared by Bioscience and approved by the DoW in 2014¹ entitled "Local Water Management Strategy (LWMS) for the Anketell North Urban Cell" and in that report the drainage basins were sized based on weighted coefficients over the total catchment areas. These coefficients were used to determine the overall effective runoff draining into the basins for each catchment.

Upon more detailed design in preparation of this LWMS, the required parameters for the run-off were amended to better reflect the proposed land use. In general, the amount of runoff from the catchments and the detention volume were about the same, although the methodology in calculation was different.

There was somewhat limited information in the LWMS in regard to land use data, but from the text it indicated that the 63.2% AEP storm was proposed to be retained on site, within lots in soakwells and in rain gardens for road drainage. Subsequent storms were proposed to be contained within the end of line detention basin. The original LWMS estimated some 65 cubic metres per hectare of storage required in terms of soakwells and basins for the 63.2% AEP storm.

Given the more detailed planning parameters currently available, this LWMS has been prepared in a more detailed manner allowing for the lot soakwell volumes in "at lot detention calculations". This means that rather than accounting for the volume in a theoretical end of line basin, they would be accommodated by assuming a slightly lower outflow from individual lots for various storms depending on the available storage of soakwells, thereby better reflecting reality. For comparison purposes, the



LWMS has allowed a total of around 84 cubic metres per hectare (65 cubic metres in soakwells on lots and 18 cubic metres in basins) thereby resulting in a more conservative outcome.

Apart from the on-site soakage, the drainage areas were similar and volumes were similar over the same area despite the UWMP catchment being adjusted to be slightly greater. This mainly related to the LWMS using a slightly greater outflow soakage rate. The LWMS assumed that no 63.2% AEP storm would reach the end of line basin, but based on the configuration of the final plan and the normal arrangements for site soakage some storage will be required to be contained in the end of line basin.

2) Catchment Boundary Changes

Drawing U-05 in Appendix B indicates the catchments used within the Bioscience report in comparison to the area used in this LWMS. As can be seen, the majority of LWMS catchment 7.1.2 and parts of 7.1.5 and 7.1.3 cover the subject site.

The fragmented nature of land ownership makes the original proposed catchments very difficult to implement and as a result, it is proposed that each land owner cater for their separate drainage.

6.2 Pre- & Post- Development Hydrology

The drainage strategy is proposed to infiltrate all stormwater on site as close to the source as possible. The underlying soils, consisting of a deep sand layer are deemed to be appropriate for uptake of nutrients meaning that the soakage of the water will provide sufficient opportunities for nutrient uptake.

The site is proposed to be divided into two major catchments to suit the distribution of Public Open Space. A plan detailing the catchment boundaries and proposed drainage basins is shown in Drawing U-04 Appendix B.

Due to the moderately steep slopes on the site, the benefit and logistics of installing small retention basins across the site are marginal and difficult. Soakage at source will be employed for all allotments without outflow for all storms up to the 63.2% AEP storm. Beyond that, water will surcharge and run overland to the street drainage system and be conveyed to the drainage basins.

Infiltration has been conservatively calculated on the assumption that the permeability of the insitu soils is 1.7m/day and this will need to be reaffirmed at the time of the UWMP.

Basins will generally be constructed as swales within POS areas. The basin arrangements are generally constructed as a two tiered arrangement as follows:

- Where bio-retention areas are provided, water will drain into a bio-retention area surrounded by a either rock-pitching or some other form of boundary to prevent grass spreading into the bio-retention area.
- Beyond the 63.2% AEP 1 hour storm, the water will surcharge above the bioretention area into a grassed swale which will contain up to the 1% AEP storm.



The areas required to contain flows from the post development catchments areas are summarised in Table 6.1 - Refer also to Appendices B and C for the catchment plan and detailed calculations:

Table 6.1 - Drainage Basin Areas/Catchments and Areas affected by Drainage

Basin Description	Basin 1 (Front POS)	Basin 2 (Power Easement)	TOTAL
Impervious Catchment (Ha) (C _{1%})	0.72	1.30	2.02
Storage provided (m³) (1%)	443	845	1288
Storage provided (m ³) (20%)	187	236	423
Storage provided (m ³) (63.2%)	120	167	287
Site Area Required (1%)(m²)	653	1,224	1,877
Site Area Required (20%) (m ²)	381	468	849
Site Area Required (63.2%) (m ²)	240	419	659
TWL _{1%} (mAHD)	23.20	23.80	
Critical Tc (63.2%) (hours)	3	2.5	
Critical Tc (20%) (hours)	2.5	2.5	
Critical Tc (1%) (hours)	8	8	

6.3 63.2% AEP event

6.3.1 General

The 63.2% AEP event is typically seen as the storm where most nutrients and particulate matter is generated from.

The separation distance between all of the development and the groundwater is greater than 5.0m and generally no groundwater control measures are required. The greater separation distance between the surface and groundwater levels together with the greater distance of potentially affected receiving environments means that this area does not require bio-retention in higher areas of the catchment.

It is proposed that the 63.2% AEP 1 hour storm will be retained on site without outflow in accordance with DoW requirements. This is proposed to be undertaken at the various levels as outlined in the following sections.

6.3.2 Lots:

Lots will either retain water on site in rainwater tanks in conjunction with soakwells or install soakwells to infiltrate water to ensure no outflow into the street drainage system. All Lots are required be fitted with the equivalent 2 by 1.5m diameter by 1.2m deep soakwells to achieve full retention of all storms up to the 63.2% AEP storm without outflow.



Beyond this storm, stormwater will surcharge from the soakwells and run overland to the street drainage system and some infiltration will occur, particularly in back yards.

6.3.3 Streets:

The 63.2% AEP 1 hour storm for roadways, will be contained within swales in POS and in the end of line swales/soakage basins and below ground storage.

Drainage pits will be laid with open bases to permit soakage for small rainfall events thereby encouraging further soakage "at source". The baseless pits will cater for around 1.5-2.0mm of rainfall.

Overland flow will be employed in lieu of piped drains where possible. Where roads are constructed adjacent to open space and opportunities for soakage are available, flush kerbs may be used in conjunction with swale drainage in lieu of a piped drainage system. This is subject to final landscape design details and agreement from the Local Authority at detailed design stage.

The remainder of the 63.2% AEP 1 hour event will be contained within the soakage basin without overflow to any surrounding POS areas.

Where required, the 63.2% AEP bio-retention area will be defined using rock-pitching or similar separator from the grass area, thereby ensuring that stormwater will be constricted to cause minimal inundation for higher AEP rainfall events, thereby maximizing the usability of the POS area and associated swales. Bio-retention areas will be installed in accordance with the *Adoption Guidelines for Stormwater Biofiltration Systems (CRCWSC*, 2015).

6.3.4 Detention Basins

Beyond the measures employed in baseless pits and lineal swales, the remainder of the 63.2% AEP 1 hour storm will be retained within the retention basin areas. The drainage basins will retain the water until it infiltrates.

Details of the proposed retention basins are included in Appendix D.

6.3.5 Non structural measures

Non structural measures will also be employed to reduce the sources of nutrients. These measures involve providing advice to lot purchasers and stakeholders to reduce nutrient sources from the application of garden fertilisers and eroded particulate matter particularly from the new urban areas during the housing construction phase and in establishment of gardens.

Minimisation of nutrient loading can obviously be achieved through:

- Education of local residents and Council maintenance personnel; and
- By implementing frequent street and storm water maintenance programs particularly during housing construction.
- By planting and using appropriate native species.



6.4 20% AEP event

All piped drainage systems will be designed to accommodate the 20% AEP event, without any inundation of roadways.

6.5 1% AEP event

For the major event, lot drainage flows in excess of the 20% AEP storm will surcharge and run overland. All roads within the estate will be designed to accommodate and direct extreme event flows towards each POS and compensating basin. The land will be divided into the same catchment areas as detailed in the post development plan as Appendix B.

6.6 Finished Lot Levels (Relative to the 1% AEP flood levels)

As outlined in Section 2.3, the land is proposed to be filled a minimum of 500mm above the top water level of drainage basins. In all cases, lots will be set to ensure conveyance for major storms will be along the roadways without flooding homes.

6.7 POS Credits

As outlined in the LSP document all POS credit calculations have been based upon current "Liveable Neighbourhood" policy guidelines - where 100% of the area covered by the 1 in 1 year event of each compensating basin is typically not included as a "usable" POS area. The 20% AEP event is designated as a restricted area normally attracting a 100% credit for the area between the 63.2% and the 20% AEP levels provided this comprises less than 20% of the total POS allocation.

The affected areas of the drainage basins are detailed in Table 6.1.

6.8 Best Management Practices Water Quality Targets

The DoW's Stormwater Manual provides guidelines and information on best management practices that may be applied at land development and construction sites to improve stormwater management and environmental performance.

Poorly managed land development sites can often be a major source of stormwater pollution. Certain construction activities can allow pollutants to be transported (via existing stormwater systems or over-land flow) to adjoining receiving water bodies.

The major source of pollutants from construction activities in this instance will potentially be from:

- Eroded materials in the interim period between opening up the surface of the site and implementing the drainage management measures.
- Litter & waste storage areas- that allow materials to be blown by wind or washed away by rainfall into existing stormwater systems.
- Wash-down areas—poor practices can allow materials to enter stormwater systems.
- Placement & storage of delivered products- particularly sand and soil stockpiles where such materials may be tracked by vehicles onto roads, or blown, or washed on to roads which then get into existing stormwater systems.
- Dewatering activities— which can cause sedimentation of downstream water bodies.



Consequently no construction activities will commence on the site until an appropriate approved Environmental Management Plan (EMP) is prepared that fully addresses:

- litter and waste management practices (non-hazardous & hazardous materials);
- vehicle & equipment washing-down practices;
- water conservation practices;
- product placement & storage practices;
- dewatering activities (if applicable); and
- Any other practices that may adversely impact upon receiving water bodies.

This will be prepared by the contractor undertaking the civil works on the subdivision together with the engineering consultant.

The Best Management measures proposed for this area are proposed to be:

- Non Structural Measures to be implemented reduce applied nutrient loading.
- On Site Retention of 1 in 1 year 1 hour ARI Storm.

Research has indicated that this approach will achieve reductions of at least 80% of total suspended solids; 60% of total phosphorus; 45% of total nitrogen & 70% of gross pollutants compared to a conventional drainage system.

7 Groundwater Management Strategy

7.1 Groundwater Level Management

Groundwater levels for the site location are plotted on the site plan in Appendix B. In general the levels are many metres below the site levels with the exception of the eastern side of the site. Development levels in that location are set at around RL9.50 minimum which is well above the maximum likely groundwater level of around RL3.0mAHD.

There is no further need for controls of groundwater levels and all drainage pipework will be laid well above the controlled groundwater levels.

7.2 Actions to Address Acid Sulphate Soils or Contamination

The ASS mapping for the area indicates that there is no known of ASS soils occurring within 3.0m of natural soil surface (or deeper).

Therefore there is little or no risk of the development proposal encountering any ASS soils.

8 The next stage – Subdivisions and Urban Water management Plans

The structure plan area is under the ownership of four separate land owners which are not professional developers, which depending on the ultimate agreements forged in regard to a development strategy, may mean that the full drainage strategy as proposed cannot be implemented immediately. As a result, the staging of the development and any temporary facilities as required will be addressed in the Urban Water Management Plan (UWMP) which will be required for the subdivision proposal. It is anticipated that the ultimate drainage strategy will generally fit within the framework of this Local Water Management Strategy.



The UWMP will build on the concepts of this report providing ongoing monitoring results and addressing the following major points:

- Further detail in the design of the detention basins.
- Detailed geotechnical investigations including testing of the PRI and permeability of the existing soils both at the surface and at the depth of drainage cells.
- Further detail in landscape proposals.
- Testing of groundwater quality for irrigation purposes.

Once this data is received, the approach outlined herein will be reviewed with detailed work required to:

- Finalise the design of the swales in the POS.
- Detail the Drainage basins including the various inlet configurations and edge treatments to ensure the overall functional and aesthetic outcomes are satisfactory.
- Review the drainage calculations relative to final planning proposals for the site to ensure that the land use assumptions within the drainage calculations herein are consistent.

9 Monitoring

9.1 General

Given the height of the site above the water table, empirical information indicating the benefits of infiltration of stormwater through Safety Bay sand to ameliorate nutrient levels and the significant distance of the site from any environmental assets of any note it is not proposed to undertake further monitoring.

10 Implementation

10.1 Commitments

The developers are committed to

- 1) Physical Outcomes To be undertaken at the time of construction.
- Ensuring that all storm water drainage from the estate is infiltrated on site.
 - 2) Non Structural To be undertaken as part of sales documentation, by providing Information Packages to all lot purchasers to:
- Fully inform lot owners of the requirement to install the equivalent of two 1500mm diameter by 1200mm deep soakwell prior to outflow into the drainage system in the event a rainwater tank is not installed or reduced storage equivalent to the storage of a rainwater tank in the event that one is used.
- To encourage the use of rainwater tanks (plumbed into their homes); and
- To utilise water efficient devices & appliances throughout their homes, and to encourage all purchasers to install Water & Nutrient-wise plants.



- 3) Further investigation and reporting:
- Prepare Urban Water Management plans to support further detailed subdivision planning.
- Undertake geotechnical investigations.

10.2 Maintenance Schedules (Incl. Roles & Responsibilities)

Maintenance schedules and arrangements will be resolved as part of the Urban Water Management planning and will be dependent on the detailed design and operation of the mechanisms required. As a brief summary, Table 10.1 has been included to provide guidelines for likely maintenance responsibilities.

Table 10.1 – Proposed Maintenance Programme for the development

#	Drainage Element:	Possible Maintenance and Inspection Frequency:	Responsibility:
1	Rainwater tank(s); trapped underground soakage / connection pit(s)	Annually inspection & clean-out (as necessary) – just prior to winter rains	Lot Owner
2	Swale Areas, table drains and detention basins	<u>During developer maintenance period</u> (2 year in conjunction with Landscaping)	Developer
		Inspect, clean-out & maintain plants ~fortnightly intervals (depending on loading) – as part of POS maintenance works	Council
		After developer maintenance period:	
		Inspect, clean-out & maintain plants (as required) as part of standard Council POS maintenance program	
3	Drainage culverts, standard table drains, pipes and pits	<u>During developer maintenance period</u> : (12 month Defects liability period)	Developer
		Inspect, clean-out & maintain structures annually – just prior to winter (& then again in Aug / Sept if necessary)	Council
		After developer maintenance period:	
		Inspect, clean-out & maintain structures at least annually – just prior to winter – but inspection frequency will need to be higher during home construction phase	
4	Trapped Pits,	<u>During developer maintenance period</u> : (12 month Defects liability period)	Developer
		Inspect, clean-out & maintain pits tri-annually – just prior to winter & then around June / July & again in Oct / Nov for the first two years	
		After developer maintenance period:	
		Inspect, clean-out & maintain pits tri-annually – just prior to winter & then around June / Aug – but inspection frequency will need to be higher during home construction phase.	
5	Base of compensating basins	Initial formal inspection & assessment of performance of bases (say) at around year 3 & then every $5-10$ years.	Council

10.3 Funding

The cost for the implementation of the capital water management measures will be borne by the developers. Maintenance and monitoring costs will be borne by the developers for the periods as outlined in the maintenance schedule table in section 10.2 above.

10.4 Review

Following the approval of this document, it is not expected that the LWMS for this development will need to be reviewed as this forms the broad structure of the approach for the drainage in the area.



In general minor amendments can be made, provided they meet the outcomes sought within this report. In the event that the management measures used within the state have significantly changed or the first subdivision application following the expiration of 4 years from the first subdivision approval whichever is the later, the measures used for management of stormwater should be reviewed.

11 References:

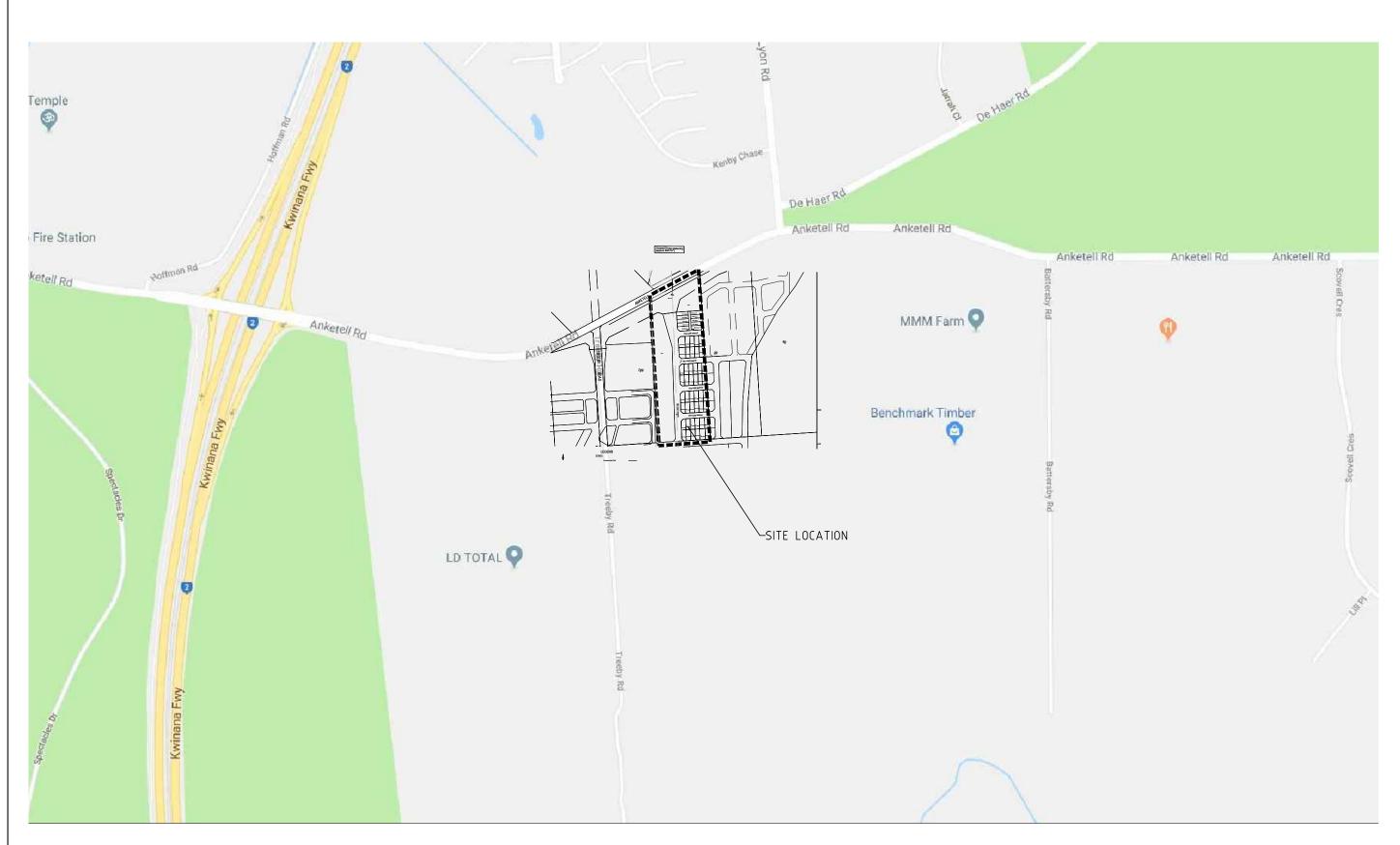
- Environmental Geology Mapping Part Sheets 2033 II and 2133 III, Gozzard JR 1983
- 2. Australian Rainfall and Run-off A Guide to Flood Estimation Volume 1, Institute of Engineers, 1987
- 3. Perth Groundwater Atlas, Waters and Rivers Commission, October 1997.
- 4. Perth Groundwater Atlas (Edition 4), Department of Environment, 2004.
- 5. Anketell North Urban Cell Local Water Management Strategy Issue No 3, Bioscience, March 2014
- 6. Acid Sulphate Soil Risk Map, Swan Coastal Plain, 2016, Government of Western Australia: Department of Environment Regulation, Shared Location Information Platform Landgate.



APPENDIX A -

- L- 01 Locality Plan
- L- 02 Aerial Photo with Development Superimposed Thereon
- Whelans Subdivision/Structure Plan Concept Plan

SITE BOUNDARY



Copyright

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A 16/01/19 BVS INITIAL ISSUE

SR

DEVELOPMENT
ENGINEERING
CONSULTANTS

TERRANOVIS PTY LTD

SUITE 3, 123A COLIN ST, WEST PERTH, 6005 WESTERN AUSTRALIA Ph: (08) 9481 1900 Fax: (08) 9481 1700

LOT 7 ANKETELL ROAD, ANKETELL LOCAL WATER MANAGEMENT
PLAN - LOCALITY





TERRANOVIS PTY LTD

LOT 7 ANKETELL ROAD, ANKETELL

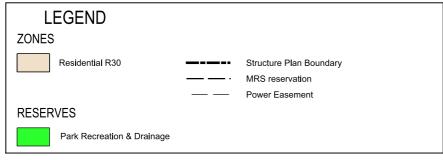
DRAWING:

LOCAL WATER MANAGEMENT PLAN - AERIAL PHOTO

SCALE	DRAWN	CHECK	REV No.
1:1000	BVS	SRA	_
DATE	DESIGNED	APPROVED	A
17/01/19	BVS	SRA	
PROJECT NUMBER		DRAWING NUM	1BER
ANK		20 LC	_







DATE DRAWN: 24/08/2018 DRAWN BY: CMA CHECKED BY: JP

FILE: 181105 Subdivision Concept Plan - amended V DATUM: AHD H DATUM: MGA94 (50)





APPENDIX B – DRAINAGE CATCHMENT PLANS

- L- 03 Pre-development catchment plan
- L- 04 Post development catchment plan with flow directions and proposed drainage basins
- L- 05 Bioscience LWMS Catchment Boundaries



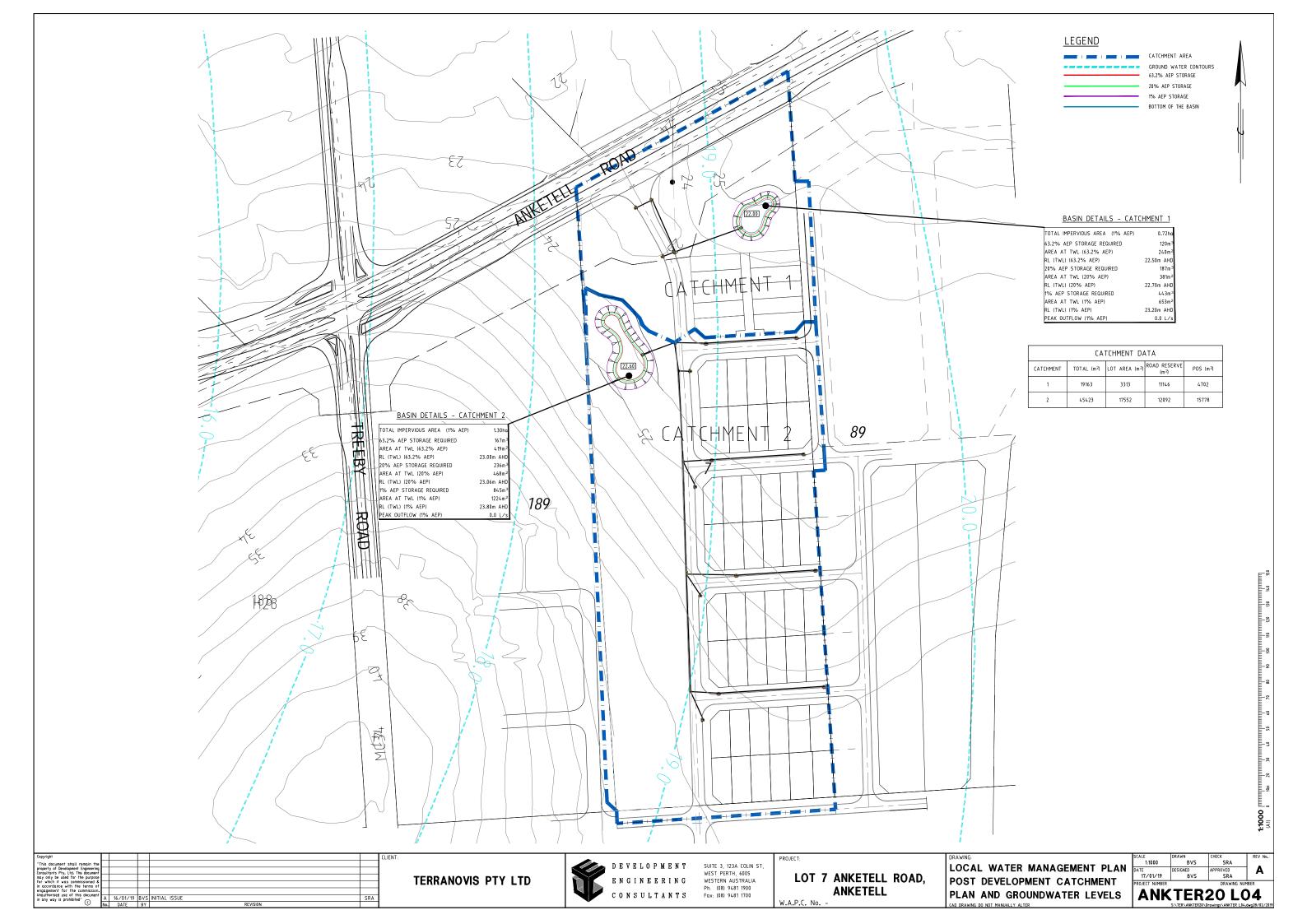
<u>LEGEND</u> CATCHMENT BOUNDARY IMPLIED NATURAL RIDGE FLOW ARROWS

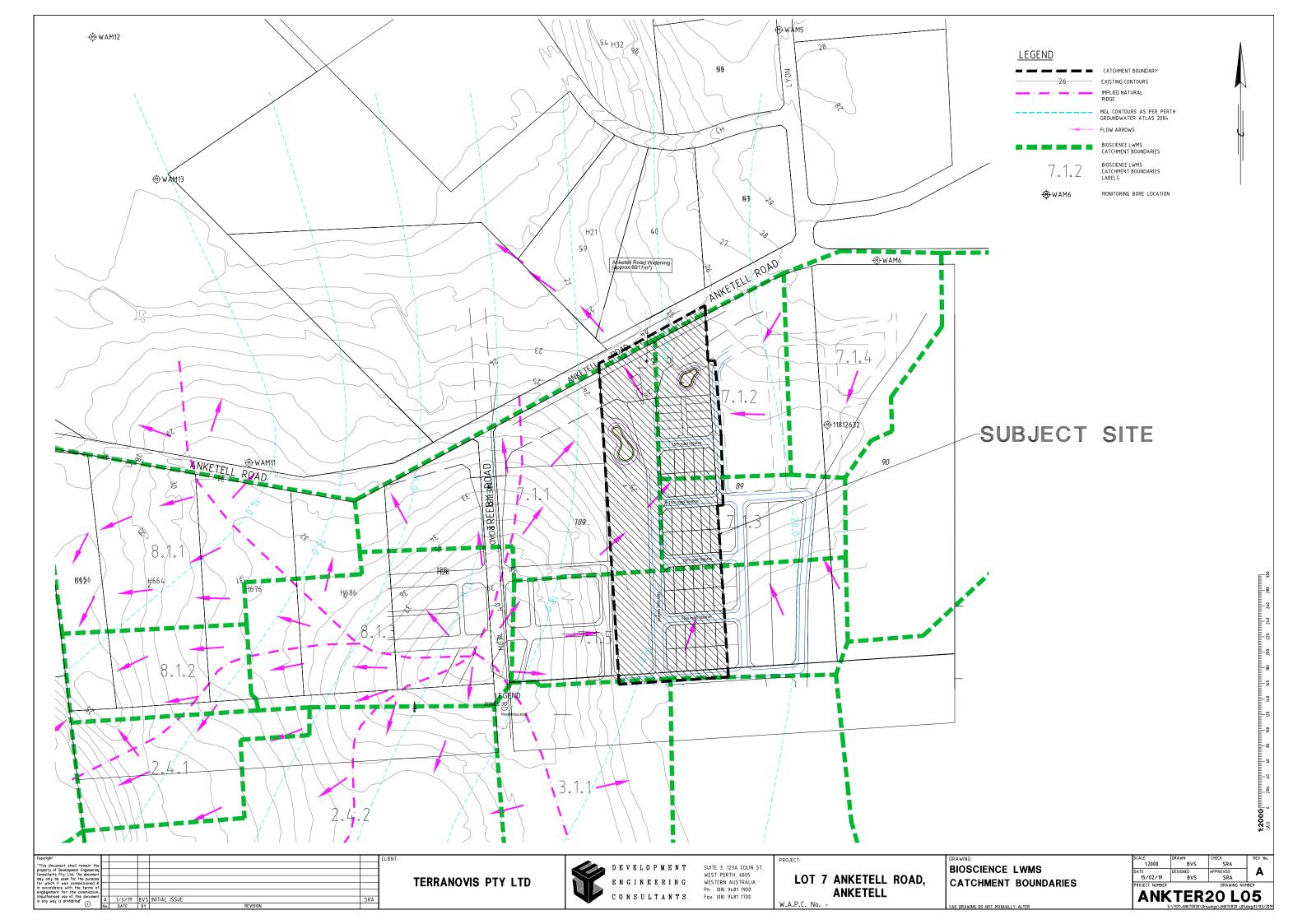
DEVELOPMENT SUITE 3, 123A COLIN ST, WEST PERTH, 6005

ENGINEERING WESTERN AUSTRALIA
Ph: (08) 9481 1900
Fax: (08) 9481 1700

TERRANOVIS PTY LTD

LOT 7 ANKETELL ROAD, **ANKETELL**







APPENDIX C – DRAINAGE CALCULATIONS

- End of Line Drainage Basin size calculations
- At Lot calculation to Establish Run-off

Project: Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd)

Client: Terranovis

Location: Basin in Front POS - Catchment 1

Designer: SRA

Anketell Road

Location: Anketell

Nearest grid
cell: Latitude 32.2125(S) Longitude 115.8625(E)



Data to be input

Rainfall AEP (percentage)	1	ARI	v Descriptor v
63.2% AEP - 1hr impervious catchment (Ha)	0.66	100	Infrequent
Required bio-retention area (2%) (m ²)	111		
Required storage (63.2% - 1hr) (m ³)	99		
Available storage (m ³)	443		
Soakage outflow (L/s/m²)	0.02		

Catchment details	Roads	Community centre/ commercial	Standard lots (unconnected)	School/POS	Drainage basin	Total
Gross area (Ha)	1.11	0	0.3315	0.3680	0.1030	1.91
Runoff coefficient (C ₁₀)	0.50	0.01	0.05	0	1.00	
ARI multiplier	1.00	30.00	3.60	0.62	1.00	
Runoff coefficient (C _y)	0.50	0.30	0.18	0.00	1.00	
Impervious area (Ha)	0.56	0.00	0.06	0.00	0.10	0.72

0.38 Effective C

						Q_{OUT}		Net storage		V out	
					Preliminary	(soakage)	\mathbf{V}_{OUT}	(after	Time of water	required	
T _c (min)	T _c (hr)	l (mm/hr)	Q _{IN} (L/s)	V_{IN} (m^3)	height (m)	(L/s)	(soakage) (m³)	soakage) (m ³)	in basin (hr)	(m³)	Q _{OUT} (L/s)
10	0.17	131.00	261	157	0.50	10.0	6	151	4.3	0	0.0
15	0.25	105.00	209	188	0.50	10.0	9	179	5.2	0	0.0
20	0.33	89.00	177	213	0.50	10.0	12	201	5.9	0	0.0
30	0.50	69.20	138	248	0.50	10.0	18	230	6.9	0	0.0

ENGINEERING

Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd) Project:

Terranovis Client:

Rasin in Front POS - Catchment 1

Designer:	SRA
45	

Location:	Basin in F	ront POS -	Catchment	: 1							
Designer:	SRA								CONSU	LTANTS	
45	0.75	53.50	107	288	0.50	10.0	27	261	8.0	0	0.0
60	1.00	44.60	89	320	0.50	10.0	36	284	8.8	0	0.0
90	1.50	34.60	69	372	0.50	10.0	54	318	10.3	0	0.0
120	2.00	29.10	58	418	0.50	10.0	72	345	11.5	0	0.0
150	2.50	25.40	51	456	0.50	10.0	90	365	12.6	0	0.0
180	3.00	22.80	45	491	0.50	10.0	109	382	13.6	0	0.0
240	4.00	19.30	38	554	0.50	10.0	145	409	15.3	0	0.0
300	5.00	16.90	34	606	0.50	10.0	181	426	16.8	0	0.0
360	6.00	15.20	30	655	0.50	10.0	217	437	18.1	0	0.0
480	8.00	12.70	25	729	0.50	10.0	289	440	20.2	0	0.0
720	12.00	9.78	19	842	0.50	10.0	434	408	23.3	0	0.0
960	16.00	8.49	17	975	0.50	10.0	579	396	27.0	0	0.0
1440	24.00	5.92	12	1020	0.50	10.0	868	151	28.2	0	0.0
2880	48.00	3.33	7	1147	0.50	10.0	1737	-589	31.7	0	0.0
4320	72.00	2.35	5	1214	0.50	10.0	2605	-1390	33.6	0	0.0

Calculation of storage in above ground basin

5 Year Basin Dimensions

22

Breadth (m) Side slopes 1: Length (m) 0 12.00 20.00

RL (Base)

TWL (mAHD)	Height (m)	Area at TWL (m²)	Average area	Volume (m ³)	Treatment storage above LWL (m³)	The designated height allows storage for
22	0	240	960	0	0	Static water level
22.5	0.5	240	960	120	120	First 15mm
22.5	0.5	240	960	120	120	63.2% AEP
22.5	0.5	240	960	120	120	Top of Wall

120

Middle Tier Drainage Basin Dimensions:

Side Slopes 1: Length (m) Breadth (m) 20 14.6

RL (Base) 22.5

TOTAL STORAGE TO TOP OF LOWER TIER

 m^3

DEVELOPMENT

CONSULTANTS

Project: Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd)

Client: Terranovis

Location: Basin in Front POS - Catchment 1

Designer: SRA

						l otal storage	
TWL (mAHD)	Height (m)	Total depth to TWL (m)	Area at TWL (m²)	Average area	Volume (m ³)	above LWL (m³)	The Designated Height allows Storage for
22.5	0	0.5	292	1168	0	120	Bottom of Middle Tier
22.7	0.2	0.7	381	1340	67	187	20% AEP
22.8	0.3	0.8	430	1430	108	228	10% AEP
23.2	0.7	1.2	653	1820	323	443	1% AEP
TOTAL STORA	GE TO TOP O	F MIDDLE TIER		443	m^3		

Project: Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd)

Client: Terranovis

Location: Basin in Power Easement - Catchment 2

Designer: SRA

Anketell Road

Location: Anketell

Nearest grid
cell: Latitude 32.2125(S) Longitude 115.8625(E)



Data to be input

Rainfall AEP (percentage)	1	ARI	v Descriptor v		
63.2% AEP - 1hr impervious catchment (Ha)	0.98	100	Infrequent		
Required bio-retention area (2%) (m ²)	176		•		
Required storage (63.2% - 1hr) (m ³)	147				
Available storage (m ³)	845				
Soakage outflow (L/s/m²)	0.02				

Catchment details	Roads	Community centre/ commercial	Standard lots (unconnected)	School/POS	Drainage basin	Total
Gross area (Ha) Runoff coefficient (C ₁₀)	1.26 0.70	0 0.01	1.7564 0.05	1.3919 0	0.1030 1.00	4.51
ARI multiplier Runoff coefficient (C _y)	1.00 0.70	30.00 0.30	3.60 0.18	0.62 0.00	1.00 1.00	
Impervious area (Ha)	0.88	0.00	0.32	0.00	0.10	1.30

0.29 Effective C

						\mathbf{Q}_{OUT}		Net storage		V_{OUT}	
					Preliminary	(soakage)	V_{out}	(after	Time of water	required	
T _c (min)	T _c (hr)	l (mm/hr)	Q _{IN} (L/s)	V_{IN} (m ³)	height (m)	(L/s)	(soakage) (m ³)	soakage) (m ³)	in basin (hr)	(m³)	Q _{OUT} (L/s)
10	0.17	131.00	472	283	0.50	16.5	10	274	4.8	0	0.0
15	0.25	105.00	379	341	0.50	16.5	15	326	5.8	0	0.0
20	0.33	89.00	321	385	0.50	16.5	20	365	6.5	0	0.0
30	0.50	69.20	249	449	0.50	16.5	30	419	7.6	0	0.0

Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd) Project:

Terranovis Client:

Basin in Power Fasement - Catchment 2 Location:

Des

ocation.		asiii iii i	OWCI Lasci	iiciit - Oate	militarit Z			
esigner:	S	RA						
45		0.75	53.50	193	521	0.50	16.5	44
60		1.00	44.60	161	579	0.50	16.5	59
90		1.50	34.60	125	674	0.50	16.5	89
120		2.00	29.10	105	755	0.50	16.5	118
150		2.50	25.40	92	824	0.50	16.5	148
180		3.00	22.80	82	888	0.50	16.5	178
240		4.00	19.30	70	1002	0.50	16.5	237
300		5.00	16.90	61	1097	0.50	16.5	296
360		6.00	15.20	55	1184	0.50	16.5	355
480		8.00	12.70	46	1319	0.50	16.5	474
720		12.00	9.78	35	1523	0.50	16.5	711
960		16.00	8.49	31	1764	0.50	16.5	948
1440		24.00	5.92	21	1844	0.50	16.5	1421
2880		48.00	3.33	12	2075	0.50	16.5	2843
4320		72.00	2.35	8	2196	0.50	16.5	4264

	ENGIN	O P M E N T E E R I N G J L T A N T S	
470			
476	8.8	0	0.0
520	9.8	0	0.0
585	11.4	0	0.0
637	12.8	0	0.0
676	13.9	0	0.0
710	15.0	0	0.0
765	16.9	0	0.0
801	18.5	0	0.0
828	20.0	0	0.0
845	22.3	0	0.0
813	25.7	0	0.0
816	29.8	0	0.0
423	31.1	0	0.0
-768	35.0	0	0.0
-2068	37.1	0	0.0

Calculation of storage in above ground basin

5 Year Basin Dimensions

Breadth (m) Side slopes 1: Length (m) 0 10.60 39.50

RL (Base) 22.6

					Treatment	
TWL (mAHD)	Height (m)	Area at TWL (m²)	Average area	Volume (m ³)	storage above LWL (m³)	The designated height allows storage for
22.6	0	419	1675	0	0	Static water level
23	0.4	419	1675	167	167	First 15mm
23	0.4	419	1675	167	167	63.2% AEP
23.1	0.5	419	1675	209	209	Top of Wall

209

Middle Tier Drainage Basin Dimensions:

TOTAL STORAGE TO TOP OF LOWER TIER

Side Slopes 1: Length (m) Breadth (m) 8 39.5 10.6

RL (Base) 23 m^3

Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd) Project:

Terranovis Client:

Basin in Power Easement - Catchment 2 Location:

SRA Designer:

						l otal storage	
TWL (mAHD)	Height (m)	Total depth to TWL (m)	Area at TWL (m²)	Average area	Volume (m ³)	above LWL (m³)	The Designated Height allows Storage for
23	0	0.4	419	1675	0	209	Bottom of Middle Tier
23.06	0.06	0.46	468	1772	27	236	20% AEP
23.2	0.2	0.6	589	2006	100	310	10% AEP
23.8	0.8	1.2	1224	3121	635	845	1% AEP
TOTAL STORA	GE TO TOP O	F MIDDLE TIER		236	m^3		

Client: Terranovis

Project: Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd)

Location: At Lot Detention Calculations to Establish Run-off Coefficient (R40 Lots approx 250 sqm)

Designer: SRA

Location: Anketell Road Anketell

Nearest

grid cell: Latitude 32.2125(S) Longitude 115.8625(E)



Data to be Input

Rainfall AEP (Percentage) 20 63.2% AEP Impervious Catchment (Ha) 0.024 Required Storage (63.2% AEP - 1hr) (m³) 3.638 ARI 4.48 v Descriptor v
Frequent

Catchment Details	Paved Area Unpaved area		Total
Lot Area (SQM)			375.00
Proportion Paved	70%	30%	100%
Area Paved (Ha)	0.026	0.011	0.038
Run-Off Co-efficient(C10)	0.90	0.00	
ARI Multiplier	1.00	1.00	
Run-Off Co-efficient(Cy)	0.90	0.00	
Impervious Area(Ha)	0.024	0.000	0.024

Effective C 0.63

0.50

AEP	ARI	Effective C	Multiplier
63.2	1	0	-
50	1.44	0	-
20	4.48	0.05	1.00
10	9.49	0.05	1.00
5	20	0.05	1.00
2	50	0.13	2.60
1	100	0.18	3.60

Volume and Dimensions of Available Storage

Area above ground inundated to 0.03m deep	
(backyard and front yard) (m ²)	25.00
Storage provided manholes/pipe (m³)	-
Number of Soakwells	2.00
Diameter of soakwells (m)	1.50
Depth of each soakwell (m)	1.20
Storage required soakwells (m ³)	4.24
Strorage provided (m ³)	4.74
Soakage rate (l/s/m²)	0.02

NOTE: All water is retained in soakwells up to and including 63.2% AEP without surcharge. For greater AEP storms water will surcharge soakwells and soak over an area of 20m² to a maximum depth of 20mm within the lot, and then enter the road drainage system.

Volume of storage required is 1m³ per

79.09 m²

0.02

of total lot area

Project: Lots 7 Anketell Road, Anketell (Terranovis Pty Ltd)

Location: At Lot Detention Calculations to Establish Run-off Coefficient (R40 Lots approx 250 sqm)

					Q _{OUT} (soakage)	V _{OUT} (soakage)	Net storage (after	V _{OUT} required		Effective
T _c (mins)	T _c (hrs)	l (mm/hr)	Q _{IN} (I/s)	Total V _{IN} (m ³)	(l/s)	(m³)	soakage) (m ³)	(m³)	Q _{OUT} (I/s)	runoff C
6	0.10	97.46	6.4	2.30	0.76	0.27	2.03	0.00	0.00	0.00
10	0.17	75.30	4.9	2.96	0.76	0.46	2.51	0.00	0.00	0.00
15	0.25	60.60	4.0	3.58	0.76	0.69	2.89	0.00	0.00	0.00
20	0.33	51.20	3.4	4.03	0.76	0.91	3.12	0.00	0.00	0.00
25	0.42	45.60	3.0	4.49	0.76	1.14	3.35	0.00	0.00	0.00
30	0.50	40.00	2.6	4.73	0.76	1.37	3.35	0.00	0.00	0.00
40	0.67	33.93	2.2	5.34	0.76	1.83	3.52	0.00	0.00	0.00
50	0.83	29.13	1.9	5.74	0.76	2.28	3.45	0.00	0.00	0.00
60	1.00	25.60	1.7	6.05	0.76	2.74	3.31	0.00	0.00	0.00
80	1.33	21.67	1.4	6.83	0.76	3.66	3.17	0.00	0.00	0.00
90	1.50	19.70	1.3	6.98	0.76	4.11	2.87	0.00	0.00	0.00
120	2.00	16.40	1.1	7.75	0.76	5.48	2.27	0.00	0.00	0.00
240	4.00	10.50	0.7	9.92	0.76	10.97	0.00	0.00	0.00	0.00
480	8.00	6.70	0.4	12.66	0.76	21.93	0.00	0.00	0.00	0.00
720	12.00	5.13	0.3	14.54	0.76	32.90	0.00	0.00	0.00	0.00
960	16.00	4.48	0.3	16.92	0.76	43.86	0.00	0.00	0.00	0.00
1440	24.00	3.17	0.2	17.97	0.76	65.80	0.00	0.00	0.00	0.00
2880	48.00	1.91	0.1	21.66	0.76	131.59	0.00	0.00	0.00	0.00
4320	72.00	1.42	0.1	24.15	0.76	197.39	0.00	0.00	0.00	0.00



APPENDIX D – DETAILS OF DRAINAGE BASINS - Landscape Concept Plans



 Existing low native vegetation to be retained where possible

- Retention Basin 2 196m2 with reeds/acuatic species.

1 to 100 Year Stormwater level 1400mm Depath

1 to 5 Year Stormwater level 900mm Depth

1 to 1 Year Stormwater level 400mm Depth



1 Lawn Area/Picnic Area

2 Native vegetation plant to be retained where possible

3 Buffer planting. Mix of native low maintenance shrubs.

4 Entry statement with turf, low shrub and native groundcover mix.

Seating area with timber bench on concrete pad with exposed aggregate finish.

Mix of native planting to provide buffer to adjacent property.

Informal crushed limestone foot path

8 Low native revegetation

Native shrub revegetation

10 2m wide concrete foot path







APPENDIX E – Application for Groundwater Licence for POS Irrigation

Office use only

Form 1

Application for a licence under section 26D of the *Rights in Water and Irrigation Act 1914*(Water Agencies (Powers) Act 1984)

Please note:

- All information is to be written clearly in block letters.
- If there is insufficient room please use a separate piece of paper.
- Submission of this form is an application only and is subject to assessment by a licensing officer.
- Incomplete applications will be returned.
- 'Form 1' is to apply for a 26D licence to construct or alter well(s) only. Completion of a 'Form 3G' is required if you wish to apply for a 5C licence to take groundwater.

Part 1: <i>i</i>	Appl	licant(s	s) c	letail	S
------------------	------	----------	------	--------	---

The applicant's full name is the name that will appear on the licence. Do not use initials unless they form part of the legal entity's name. Include all names to appear on the licence.

Provide the legal name registered under the ABN or ACN.

Provide at a minimum your primary contact number.

Applicant(s) full name	Anketell Property Investments (WA) Pty Ltd					
Contact name						
(if different from above)	Terranovis Pty Ltd					
ABN/ACN (if applicable)	29 605 474 539					
Postal address	PO Box 1320 Canning Bridge, Applecross 6153					
Property address						
(if different from above)	Lot 7 Anketell Road, Ankete	ll				
Telephone	08	9435 3903				
Mobile	0403 463 552	Fax 08 9336 4672				
Email	warren@t	terranovis.com.au				
Are you a water service provider?	yes no 🔽	If yes, provide the licence number				
Water service provider name	е					

Part 2: Application detail

Most soaks/excavations will be excavated below ground level, intercepting shallow groundwater.

The proposed well construction specifications must be submitted with the application.

Your driller can provide you with a provisional well construction procedure which provides the construction specifications. Please see important information attached for more detail.

26D licences associated with mining and public water supply purposes are subject to fees.

Which of the following categories match your application (tick all relevant categories)					
✓ Construct or alter well/ bore/excavation/soak ☐ Production ☐ Monitoring					
Exploratory drilling	drilling Other (please specify)				
How many 1 Required licence duration (m.	7		Is the source:	Artesian Non-Artesian	
Proposed water use:		✓ Non commerci	aı 		
Please specify Future POS	S areas				
Estimated duration of water u	use (if applicable)				
Associated ground water lice	ence	GWL			
Estimated volume of water to be used (if applicable)	15 360/annum				
If there is another section 26	D licence on this land,	please provide the	e licence number		
Is this application related to mining or public water supply purposes?				✓ Yes No	
Details of petroleum or geothermal title(s) (if applicable)					
Petroleum pipeline licence number (if applicable)					

Part 3: Property description of where the well is located

OR

Legal land description(s) for properties should be provided as they appear on the Certificate of Title (e.g., Lot 75 on Plan 14797).

Logal land descriptions for mining tenements should be provided as they appear on TENGRAPH.

Property

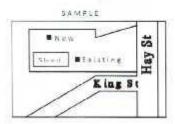
Area of property GPS Coordinates Mina name Mining tenement

numbers

Mining field

Lot 7 6.46 Hu Zone Easting 32.210427 Northing 116.861170

Pert 4: Location plan



In the adjacent box, please complete a sketch of the property including the following

- location of all wetlands/watercourses etc.
- any major improvements (house, sheds etc).
- proposed and existing crop areas/areas of irrigation

For mining leases, please include a tenement map showing location within W.A. and MGA co-ordinates of drawpoints.

Part 5: Signature or seal of applicants

All persons to be named on the licence must provide their signature.

By signing this form you are declaring that the statements on this form are true and correct

Date 18/02/2019

Anketell Property Investments (WA) Pty Ltd

(name of applicant/s in block letters)

apply for a licence under 250 of the Pights in Water and Imigation Act 1914;

DIRECTOR

Common seal or company sca-

was hereby affixed in the presence of

Signature of applicant or person duty authorised to sign on behalf of the apolicant

Signature of applicant or person duly authorised to sign on behalf of the applicant

Position/title

Name

Important information

An application for a licence will not be accepted by the department unless all applicable information in this form has been completed. Please use the attached checklists to ensure you meet this requirement. This includes signatures of all persons to be named on the licence.

On application for a 5C licence to take water, the applicant will be required to demonstrate appropriate legal access to the land that will allow for the proposed use of the water.

An amendment to a licence must be consistent with Regulation 40 of the Rights in Water and Irrigation Regulations 2000 which asks that an application to amend must include the existing licence, any fee and a statement to the department outlining the reasons why the amendment is required and what the amendment is.

Under Regulation 33(2)(b) of the Rights in Water and Irrigation Regulations the applicant must submit the proposed construction details of the well. It is advised that applicants seek a local driller with knowledge of the area, upon meeting the driller specifying the intended purpose of the well will enable the driller to design a well suitable for your purposes. A provisional well construction procedure should be available to you upon receipt of a quote for the well.

Checklist

Part 1: Applicant(s) details Name of individual, company or water service provider must be indicated. If a company/association, the ABN or ACN number and contact person is to be supplied. Postal address field must be completed.	\ \ \
Part 2: Detail Proposed well construction details must be attached.	V
Part 3: Property description of where the well is located Property details, mining tenement details or other property tenure details where water is to be taken, must be supplied.	V
Does the applicant own the land? If the applicant does not own the land, describe the interest that would entitle the applicant to hold a licence in respect of the land.	V
Part 4: Location plan A detailed location plan as described on the form is to be drawn in the box provided or attached. For mining tenements a map showing tenement numbers be provided.	V
Part 5: Signature or seal of applicant The name(s) and signature(s) of each applicant, or signature of a person duly authorised to act on behalf of each applicant is mandatory. or	V
Common Seal or Company Seal accompanied by the signature of an authorised person.	V

This form can be submitted by fax, post or in person to the appropriate Department of Water and Environmental Regulation regional office. For assistance in completing this form contact your regional office.

Swan Avon region

Victoria Park regional office

7 Ellam Street Victoria Park WA 6100 Ph: 08 6250 8000 Fax: 08 6250 8050

Email: ellamreception@dwer.wa.gov.au

Kwinana Peel region

Kwinana Peel regional office

107 Breakwater Parade Mandurah Ocean Marina PO Box 332

Mandurah WA 6210 Ph: 08 9550 4222 Fax: 08 9581 4560

Email: peel@dwer.wa.gov.au

South West region

Bunbury regional office

35-39 McCombe Road Bunbury WA 6230 PO Box 261 Bunbury WA 6231 Ph: 08 9726 4111

Fax: 08 9726 4111

Email: bunbury.admin@dwer.wa.gov.au

Geographe Capes district office

Suite 1A/72 Duchess Street Busselton WA 6280 PO Box 269 Busselton WA 6280 Ph: 08 9781 0111

Fax: 08 9754 4335

Email: busselton.admin@dwer.wa.gov.au

Warren Blackwood district office

52 Bath Street Manjimup WA 6258 PO Box 261 Bunbury WA 6231 Ph: 08 9726 4111 Fax: 08 9726 4100

Email: bunbury.admin@dwer.wa.gov.au

Mid West Gascoyne region

Geraldton regional office

20 Gregory Street Geraldton WA 6530 PO Box 73 Geraldton WA 6531 Ph: 08 9965 7400 Fax: 08 9964 5983

Email: midwest@dwer.wa.gov.au

Carnarvon regional office

211 Robinson Street Carnarvon WA 6701 PO Box 81 Carnarvon WA 6701

Ph: 08 9941 6100 Fax: 08 9941 4931

Email: gascoyne@dwer.wa.gov.au

North West region

Karratha regional office

The Quarter Level 2, 20 Sharpe Avenue Karratha WA 6714 Locked Bag 33 Cloisters Square Perth WA 6850 Ph: 08 9144 0200

Email: northwest@dwer.wa.gov.au

Kununurra regional office

27 Victoria Highway PO Box 625 Kununurra WA 6743 Ph: 08 9166 4100 Fax: 08 9168 3174

Email: kunadmin@dwer.wa.gov.au

South Coast region

Albany regional office

5 Bevan Street Albany WA 6330 PO Box 525 Albany WA 6331 Ph: 08 9841 0100 Fax: 08 9842 1204

Email: southcoast@dwer.wa.gov.au

Office use only

Form 3G

Application for a 5C licence to take groundwater

Application for a licence under Section 5C of the Rights in Water and Irrigation Act 1914

Please note

- This is a paper application. Alternatively, applications can be completed and submitted online at https://online.water.gov.au
- All fields applicable to your application type must be completed and are to be written clearly in block letters.
- If there is insufficient room please use a separate piece of paper.
- · Appendix 1 is attached if the usages include urban dewatering for infrastructure construction e.g. pipeline, sewerage infill and subdivision development etc.
- Submission of this form is an application only and is subject to assessment by a licensing officer.
- In complete applications will be returned.
- Refer to the checklist located at the rear of the form when completing the application
- If more than one name is on licence, all persons must sign this and future forms

Part 1: Application		
Renewals A renewal of an existing licence is where there are no changes to allocation, usage, properties or conditions.	New licence to take	
Amendment If changes are required to the existing usage, allocation, properties or conditions select the 'amend an existing licence' option.		icence to take groundwater icence to take groundwater GWL
Part 2: Applicant(s) Details		
The applicant's full name is the name that will appear on the licence. Do not use initials unless they form part of the legal entity's name. Include all names to appear on the licence. Provide the legal name registered under the ABN or ACN. Provide at a minimum your primary contact number. A water service provider is any person providing water, sewerage, drainage or	Applicant(s) full name Contact name (if different from above) ABN/ACN (if applicable) Postal address (PO Box if applicable) Property address (if different from above) Telephone Mobile	Anketell Property Investments (WA) Pty Ltd Terranovis Pty Ltd 29 605 474 539 PO Box 1320 Canning Bridge, Applecross 6153 Lot 7 Anketell Road, Anketell 08 9435 3903 Fax 08 9336 4672
irrigation services in Western Australia. You only need to complete this section if you are a water service provider.	Mobile Email	0403 463 552 warren@terranovis.com.au
	Are you a water service provider? Water service provider name	yes no lf yes, provide the licence number
Part 3: Application details		
Other (please specify) Dam type: For new applications only fill out details below: Is the well, soak, excavation, open Existing (please		vation
required) Is this application related to mining or public water Licences associated with mining and public water	supply purposes?	Yes V No
Details of petroleum or geothermal title(s) (if applications)	, , , , , , , , , , , , , , , , , , , ,	. 10 1000.
Petroleum pipeline licence number (if applicable)		

Part 4: Property from which water is to be taken

OR

Applicants amending an existing Section 5C licence are required to complete this section only if the property details have changed. Legal land description(s) for properties should be provided as they appear on the Certificate of Title (e.g. Lot 75 on plan 14797). Legal land descriptions for mining tenements should be provided as they appear on TENGRAPH.

If the property where the water is to be used is different from above, please provide detail:

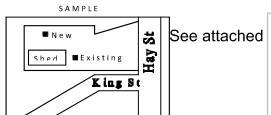
Property description (lot number, street and suburb/locality)	Lot 7 Anketell Road, Anketell	
Total area of property (if known)	6.46 h	na
GPS coordinates Easting	-32.210427 Northing 115.8611Zone	
Mine name		
Mining tenement numbers		
Mining field		
Property description (lot number, street and suburb/locality)	Lot 7 Anketell Road, Anketell	
Total area of property (if known)	6.46 h	na
GPS coordinates Easting	-32.210427 Northing 115.861 Zone	
Mine name		
Mining tenement numbers		
Mining field		

Part 5: Legal access

Applications to amend an existing Section 5C licence are only required to complete this section if the property details have changed.

Own the land	☐ Mining tenement	n which the water is located? Lease the land from the Coandholder's written approval and the		lease)
☐ Negotiating to purchanticipated date of com	4	le copy of contract of sale / lease o	r owner's	name and
Name			Date	
Other (please specify	<i>(</i>)			

Part 6: Location plan



In the adjacent box, please complete a sketch

- irrigation

For mining leases, please include a tenement map showing location within W.A. and MGA

of the property including the following features; - location of all wetlands/watercourses etc - any major improvements (house, sheds etc) - proposed and existing crop areas/areas of co-ordinates of drawpoints

Part 7: Details of water use

applying to amend a S	e only those sections relevant to yo Section 5C licence are only required In dewatering activities only, you will	I to co	omplete this section v	vhere t	he usage details	on the	existing licence ha	
			House		Garden/lawn	Г	Fire fighting	
	Where is the water to		Industrial		Horticultural		Stock waterin	q
	be used?		Mining		Aquaculture	L		3
	Tick all that apply	~	Other Future P	_ S 20	ıreas			
1 coro io oqual to	0.4 bo							
1 acre is equal to 1 kL = 1000 litres			Area (for garden / la	wn or o	other use)			
1 KE = 1000 III 00			, 3		′ 2	2.05		ha
Irrigation use: Planting density (number of plants per hectare e.g. for orchards, tree farms etc.)	Irrigation use - specify eac crop type (ie carrots, apple		Planting density (per ha) if applicable	Irrig	ation method	Us	age area (ha)	Estimated annual quantity (kL) if known
Irrigation method (e.g. sprinkler, trickle, butterfly sprinkler).								
							Total	
Stock use:								
Stock type (e.g. sheep, horses) Describe operation (e.g. meat production, breeders, agistment).	Specify each description (e.g. sheep, cattle, fee	of op	eration		Average N stock (Y		Intensive operation (Y/N)	Estimated annual quantity (kL) if known
Intensive means								
conditions in which the cattle or stock								
are confined to an area smaller than								
that required for grazing under normal conditions and are usually fed by hand or by mechanical means.							Total	
Aquaculture use:	A ev va ev illuvira v				Diam of ones	ention .	No of times	Fatiments of appropri
Aquaculture type (e.g. yabbies, marron, fish etc).	Aquaculture of each type of				Plan of oper details attac (Y/N)		ponds emptied per year	Estimated annual quantity (kL) if known
Details of pond dimensions,								
holding facilities, evaporation, seepage and								
discharge must be supplied.							Total	
Other water use: Other water usages include firefighting, road verge watering, bottling, public			ge – specify individ	ual usa	age		Usage area (ha)	Estimated annual quantity (kL) if known
water supply, road construction,		Futu	ire POS areas				2.05	15,360
ablutions, public open spaces, recreations								

Do you have the resources (including financial) to uncertake the proposed relates?	activities to which the tearies		No Yes
If no, what steps are you taking to address this?			
Please indicate time frame:			
Part 9: Other approvals			
Haya you applied or do you intend to apply for approvals under the <i>Environ</i>	nmental Protection Act 1986?	占	No Yes
This includes			
Registration of premises. Works approval,			
License to discharge to the environment, or Permit to clear native vegetation			
Please give details:			
Part 10: Signature or seal of applicant All persons to be carned on the licence must provide their signature.			
	true and correct	lurs!	
All persons to be named on the licence must provide their signature. By signing this form you are declaring that the statements on this form are Date.		turs)	
All persons to be named on the licence must provide their signature. By signing the form you are declaring that the statements on this form are Date. Anketell Property Investments (WA) Pty Ltd.	true and correct	tursi	
All persons to be named on the licence must provide their signature. By signing the form you are declaring that the statements on this form are Date. Anketell Property Investments (WA) Pty Ltd.	a true, and correct (name of applicant/s in block let	Turs	
All persons to be named on the licence must provide their signature. By signing the form you are declaring that the statements on this form are Date. Anketell Property Investments (WA) Pty Ltd. apply for a licence under the Fights in Water and Imagation Act 1914.	a true, and correct (name of applicant/s in block let	scal	
All persons to be named on the floence must provide their signature. By signing the form you are declaring that the statements on this form are Date. Anketell Property Investments (WA) Pty Ltd. Apply for a licence under the Fights in Water and Imagation Act 1914. Co. Signature of applicant or person duly authorised to sign on behalf.	name of applicant/s in block let Common seal or company awas hereby affixed in the pro-	scal eserco oʻ	7TI - RANI
All persons to be named on the licence must provide their signature. By signing the form you are declaring that the statements on this form are better. 18/02/2019 Anketell Property Investments (WA) Pty Ltd. apply for a licence under the Fights in Water and Imagetion Act 1914. Co. Signature of applicant or person duly authorised to sign on behalf of the applicant.	name of applicant/s in block let Common seal or company s was hereby affixed in the sw	scal eserco oʻ	

Important information

An application for a licence will not be accepted unless all applicable information in this form has been completed. Please use the attached checklists to ensure you meet this requirement. This includes signatures of all persons to be named on the licence.

Delays caused by the return of an applications may result in water not being available when the completed application is re-submitted.

Checklist	
Part 1: Application At least one of the three boxes at the top of the form must be ticked.	V
Part 2: Applicant details Name of individual(s), company or water service provider must be indicated. If a company/association, the ABN or ACN number and contact person must be supplied. Postal address must be completed.	\ \ \
Part 3: Application details Categories that match your application (at least one box must be ticked).	V
Part 4: Property from where water is to be taken Property details or mining tenement details where water is to be taken, must be supplied.	V
Part 5: Legal access Must be completed if property details are different from Part 2. See over page for details of required attachments.	V
Part 6: Location Plan A detailed location plan as described on the form, must be drawn in the box provided or attached. For mining tenements a map showing tenement numbers must be provided.	V
Part 7: Location Plan All non-commercial use, commercial use, mining/industrial use and other water uses must be described with as much detail as possible. At least one of the water use options must be completed for 5C licence applications	\ \ \
If water use is for urban dewatering the Appendix 1 for dewatering must be completed. Part 8: Resources At least one of the boxes in Part 8 must be ticked. If the answer is 'No', outline the steps which are being taken to address this.	\ \ \
Part 9: Other approvals One of the boxes in Part 9 must be ticked.	V
Part 10: Signature or seal of applicant The name(s) and signature(s) of each applicant, or signature of a person duly authorised to act on behalf of each applicant is mandatory.	V
OR Common Seal or Company Seal accompanied by the signature of an authorised person.	V
Attachments to support application	
Demonstrate legal access to the land where water is to be taken	
Applicant owns the land	
In the instance when an applicant owns the land the Department of Water and Environmental Regulation will confirm your Title to the land.	
Applicant does not own the land (e.g. crown land, road reserve, mining tenement)	
Applicant leases land from the Crown Copy of lease document registered under Transfer of Land Act where the crown land has been leased (e.g. pastoral lease) must be attached.	
Applicant uses reserved crown land A crown reserve register extract OR	
A copy of management order. Please note: it must be clear from each of these two documents that the reserve has been vested in the agency that is applying for a licence and that the purpose of the reserve is compatible with a licence, e.g. a reserve for conservation is not compatible with an application for irrigation on the reserve.	

The applicant must provide both of the following: Letter granting access to road reserve for the purposes of the licence. and Letter from local government authority granting access to road reserve for the purposes of the licence.	Ц
Please note: Permission from Department of Planning Lands and Heritage should refer to the road reserve number and the plan on which the road reserve is drawn. Where the road reserve is very long and only a specific portion is relevant to the licence should be described by reference to the land adjacent to that section of the road reserve.	e, this portior
 Applicant has the approval of the land holder to use the land to which the licence relates A lease contract or the land owner's written agreement to land use arrangement or other relevant documentation. The lease contract or agreement must: include permission to be on land. include permission to do the things authorised by the licence. be likely to have effect for a sufficient period to enable the licence concerned to operate 	
Other documentation required if applicable	
A detailed development timetable must be attached for commercial developments. Submission of a Form 1 may be required if a new well is being constructed.	
Submission of a Form 2 bore log is required for new 5C applications (required 1 month after completion of a well).	
For commercial aquaculture operations, details of pond dimensions, holding facilities, evaporation, see page and discharge details must be attached if insufficient room on form.	
For mining leases, a tenement map showing the location within Western Australia and the MGA co-ordinates must be attached.	
For mining applications involving dewatering and discharging water to the environment, a copy of environmental protection approval must be attached.	
Dewatering management plan (if application is for urban dewatering only)	
Details continued on separate sheets must be attached.	
Proof of agents authority (if applicable).	

Where and how to submit this form

Applicant uses road reserves on crown land

This form can be submitted by fax, post or in person to the appropriate Department of Water and Environmental Regulation regional office. For assistance in completing this form contact your regional office.

Swan Avon region

Victoria Park regional office

7 Ellam Street Victoria Park WA 6100

Ph: 08 6250 8000 Fax: 08 6250 8050 Email: ellamreception@dwer.wa.gov.au

Kwinana Peel region

Kwinana Peel regional office

107 Breakwater Parade Mandurah Ocean Marina PO Box 332

Mandurah WA 6210

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Email: peel@dwer.wa.gov.au

South West region

Bunbury regional office

35-39 McCombe Road Bunbury WA 6230 PO Box 261

Bunbury WA 6231

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Geographe Capes district office

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Warren Blackwood district office

52 Bath Street Manjimup WA 6258 PO Box 261 Bunbury WA 6231

Ph: 08 9726 4111 Fax: 08 9726 4100

Email: bunbury.admin@dwer.wa.gov.au

Mid West Gascoyne region

Geraldton regional office

20 Gregory Street Geraldton WA 6530 PO Box 73 Geraldton WA 6531 Ph: 08 9965 7400 Fax: 08 9964 5983 Email: midwest@dwer.wa.gov.au

Carnarvon regional office

211 Robinson Street Carnarvon WA 6701 PO Box 81 Carnarvon WA 6701

Ph: 08 9941 6100 Fax: 08 9941 4931 Email: gascoyne@dwer.wa.gov.au

North West region

Karratha regional office

The Quarter Level 2, 20 Sharpe Avenue Karratha WA 6714 Locked Bag 33 Cloisters Square Perth WA 6850 Ph: 08 9144 0200

Email: northwest@dwer.wa.gov.au

Kununurra regional office

27 Victoria Highway PO Box 625 Kununurra WA 6743

Ph: 08 9166 4100 Fax: 08 9168 3174 Email: kunadmin@dwer.wa.gov.au

South Coast region

Albany regional office

5 Bevan Street Albany WA 6330 PO Box 525 Albany WA 6331

Ph: 08 9841 0100 Fax: 08 9842 1204 Email: southcoast@dwer.wa.gov.au

Appendix 1 Dewatering (URBAN) - this is not required for mine dewatering

When is dewatering scheduled to commence? (dd/mm/yyyy)
What is the duration of pumping?
Proposed pumping rates, frequency of pumping and total quantity/volume of water to be pumped
How was the above information derived?
What is the purpose of dewatering (e.g. sewer installation, pump station etc.)?
Miles in the plantation and tracker?
Who is the dewatering contractor?
Proposed dewatering method (e.g. spears/well point systems, open pumping)
Additional techniques (e.g. horizontal boring, sheet piling etc.)
Production to the space (or green to the space of the spa
Will water be discharged to the environment?
Marian and anther forces which (and an arrangement for the lands at a)
Maximum depth of excavation (e.g. maximum sewer invert levels etc.)
Maximum depth of dewatering (depth water table is to be lowered to)
Have any acid sulphate soils been identified at the site? If Yes, has an acid sulphate soils management plan been submitted?
Dewatering effluent treatment (e.g. nil, lime neutralisation, sediment filtration/settlement, contaminant removal)
Discharge point (e.g. infiltration/recharge to local aquifer, dust suppression/irrigation, sewer, aquatic ecosystem/surface water)
Identify any potentially sensitive receptors (e.g. wetlands, water bodies, other users)



APPENDIX F – Groundwater Monitoring Bores and Bore Data



Appendix A: Water Monitoring Data

Groundwater Bore Data

	Location (GDA	Coordinates)	Top of	Total
Monitoring Bore	Easting	Northing	Casing (mAHD)	Depth (mBNS)
WAM5s	392819	6436201	29.26	12.00
WAM5d	392819	6436200	29.25	15.00
WAM6s	392948	6435906	29.14	12.00
WAM6d	392946	6435906	29.10	15.00
WAM7s	392498	6435094	34.57	18.00
WAM7d	392498	6435095	34.57	21.00
WAM8s	392718	6434838	21.51	5.00
WAM8d	392718	6434838	21.48	8.00
WAM9s	392002	6434770	18.58	5.00
WAM9d	392001	6434769	18.79	9.50
WAM10s	392545	6433942	19.37	5.00
WAM10d	392546	6433942	19.32	9.50
WAM11	392144	6435637	30.88	22.0
WAM12(s)	391937	6436182	14.79	4.00
WAM12(d)	391938	6436181	14.81	10.00
WAM13(s)	392021	6436000	15.60	4.00
WAM13(d)	392022	6436000	15.51	9.00
WAM14	392597	6433559	18.61	5.30
WAM15s	392571	6433790	18.19	4.30
WAM15d	392570	6433791	18.18	10.30
WAM16s	392117	6433764	16.66	4.30
WAM16d	392117	6433763	16.71	12.80
SP1-2B	391329	6435252	14.90	17.50
JE22C	392520	6434584	20.33	6.15
JM42	393325	6437618	25.80	16.70
11812632	392887	6435694	24.44	9.00

JDA Lot 13 & 100 Treeby Road (April 2008)

Bore ID		Water Level (m AHD)													
Bore ID	30-May-05	5-Jul-05	27-Jul-05	9-Sep-05	26-Sep-05	21-Oct-05	23-Nov-05	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	Min.	M	
WAM9(s)	14.43	14.96	15.12	15.4	15.46	15.51	15.34	15.01	14.85	14.62	14.44	14.3	14.3	15	
WAM9(d)	14.76	15.33	15.47	15.75	15.8	15.86	15.66	15.36	15.19	14.97	14.78	14.65	14.65	15	
WAM10(s)	16.58	17.06	17.17	17.35	17.35	17.4	17.24	16.94	16.81	16.57	16.33	16.26	16.26	1	
WAM10(d)	16.56	17.05	17.16	17.34	17.37	17.4	17.23	16.94	16.79	16.58	16.39	16.26	16.26	1	
SP1-2B	-	-	-	-	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.37	1.	
JE22C	-	17.84	17.98	18.18	18.24	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.81	18	

Bore ID							Wate	r Level (m A	HD)				•	
Borein	29-May-06	28-Jun-06	2-Aug-06	30-Aug-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	22-Mar-07	23-Apr-07	28-Jun-07	Min.	Ma
WAM9(s)	14.27	14.15	14.35	14.54	14.46	14.37	14.32	14.13	14.06	13.98	13.9	14.04	13.9	14
WAM9(d)	14.59	14.53	14.69	14.86	14.88	14.72	14.62	14.53	14.41	14.33	14.27	14.39	14.27	14
WAM10(s)	16	16.17	16.47	16.65	16.42	16.3	16.21	16.13	16.07	16.01	15.97	16.26	15.97	16
WAM10(d)	16.23	16.21	16.4	16.62	16.46	16.29	16.22	16.15	16.07	16.01	15.97	16.26	15.97	16
SP1-2B	11.36	11.32	11.5	11.52	11.44	11.32	11.26	11.28	11.06	11	10.98	11.07	10.98	11
JE22C	16.8	16.77	-	17.37	17.27	16.86	16.83	16.56	16.61	16.53	16.68	16.7	16.53	17

JDA Wandi/Anketell South (April 2008)

Bore ID							Wate	er Level (m Al	HD)					
Bore ID	27-Sep-05	21-Oct-05	23-Nov-06	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	29-May-06	28-Jun-06	2-Aug-06	30-Aug-06	Min.	М
WAM5(s)	20.07	20.08	19.99	19.85	19.82	19.65	19.54	19.53	19.47	19.46	19.62	19.58	19.46	20
WAM5(d)	20.06	20.08	20.01	19.83	19.77	19.64	19.55	19.51	19.45	19.46	19.59	19.57	19.45	20
WAM6(s)	20.97	21	20.98	20.87	20.69	20.59	20.46	20.36	20.5	20.67	20.32	20.4	20.32	2
WAM6(d)	21.08	21.15	21.12	20.97	20.88	20.72	20.6	20.52	20.27	20.37	20.45	20.45	20.27	21
WAM7(s)	19.52	19.62	19.54	19.09	18.89	18.66	18.63	18.51	18.4	18.09	18.23	18.12	18.09	19
WAM7(d)	18.97	19.04	18.64	18.07	18.82	17.49	17.35	17.55	17.7	17.82	18.01	18.01	17.35	19
WAM8(s)	20.15	20.15	19.96	19.6	19.44	19.23	19.13	19.05	18.99	19.11	19.2	19.35	18.99	20
WAM8(d)	20.06	20.05	19.87	19.53	19.4	19.21	19.09	19	18.97	18.93	19.2	19.26	18.93	20
SP1-2B	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.36	-	11.5	11.52	11.36	1:
JE22C	-	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.8	-	17.04	17.37	16.8	18
JM42	22.09	22.22	22.17	22.01	21.95	21.82	21.67	21.62	21.58	21.48	-	21.07	21.07	22

Barra ID							Wate	r Level (m A	HD)					
Bore ID	6-Oct-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	23-Mar-07	23-Apr-07	22-May-07	28-Jun-07	26-Jul-07	30-Aug-07	Min.	М
WAM5(s)	19.55	19.52	19.42	19.28	19.18	19.09	19.02	18.98	19.04	19.07	19.17	19.38	18.98	19
WAM5(d)	19.52	19.52	19.42	19.31	19.18	19.09	19.03	18.99	19.02	19.08	19.18	19.4	18.99	19
WAM6(s)	20.34	20.32	20.31	20.1	19.97	19.87	19.79	19.76	19.74	19.74	19.87	20.16	19.74	20
WAM6(d)	20.47	20.37	20.15	20.23	20.07	20	19.9	19.82	19.84	19.85	19.96	20.22	19.82	20
WAM7(s)	17.98	17.84	17.55	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	18.35	17.55	18
WAM7(d)	17.7	17.7	17.36	17.16	16.94	16.79	16.64	16.81	17.04	17.27	17.48	17.73	16.64	17
WAM8(s)	19.5	19.19	19.08	18.92	18.84	18.72	18.68	18.55	18.58	18.79	-	19.31	18.55	19
WAM8(d)	19.3	19.11	19	18.89	18.85	18.74	18.69	18.61	18.59	18.73	-	19.25	18.59	19
SP1-2B	-	11.44	11.32	11.26	11.3	11.06	-	10.98	-	-	11.26	-	10.98	11
JE22C	17.24	16.27	16.86	16.83	16.56	16.61	-	16.68	16.47	16.7	17	17.57	16.27	17
JM42	21.02	-	-	-	-	-	-	-	-	-	-	-	-	

JDA Lots 1, 2, 3 & 17 Thomas Road

							Wate	r Level (m A	HD)					
Bore ID								'						
	4-Apr-07	23-May-07	28-Jun-07	26-Jul-07	30-Aug-07	18-Sep-07	11-Oct-07	7-Nov-07	18-Dec-07	15-Jan-08	12-Feb-08	11-Mar-08	Min.	M
WAM14	15.43	15.33	15.58	15.87	16.34	16.43	16.5	16.34	16.13	15.92	16.02	15.79	15.33	16
WAM15(s)	15.74	15.66	15.96	16.25	16.74	16.7	16.86	16.67	16.43	16	16.3	16.04	15.66	16
WAM15(d)	15.24	15.22	15.44	15.75	16.25	16.34	16.43	16.24	16.02	15.75	15.81	15.61	15.22	16
WAM16(s)	13.82	13.9	14.08	14.39	14.97	15.09	15.12	15.02	14.99	14.73	14.88	14.62	13.82	15
WAM16(d)	13.64	13.7	13.93	14.28	14.8	14.91	14.94	14.84	14.74	14.48	14.67	14.41	13.64	14
SP1-2B	10.97	10.99	11.07	11.26	11.39	11.46	11.46	11.38	11.26	11.15	11.19	11.09	10.97	11
JE22C	-	16.47	16.7	17	17.57	17.85	17.92	20.33	17.76	20.33	17.36	16.74	16.47	20

Bore ID							Wate	r Level (m A	HD)				
Boreib	9-Apr-08	16-May-08	10-Jun-08	11-Jul-08	11-Aug-08	11-Sep-08	23-Oct-08	17-Nov-08	16-Dec-08	13-Jan-09		Min.	Ma
WAM14	15.85	15.74	15.99	16.41	17.01	16.81	16.73	16.66	16.56	16.39		15.74	17
WAM15(s)	16.08	15.97	16.24	16.69	17.24	17.08	16.99	16.91	16.82	16.82		15.97	17
WAM15(d)	15.7	15.65	15.87	16.29	16.88	16.71	16.58	16.5	16.4	16.69		15.65	16
WAM16(s)	14.66	14.56	14.84	15.17	15.5	15.32	15.21	15.14	15.05	14.9		14.56	15
WAM16(d)	14.42	14.42	14.72	15.01	15.3	15.19	15.11	15.01	14.94	14.8		14.42	15
SP1-2B	11.13	11.12	11.08	11.4	11.69	11.58	11.58	11.56	11.53	11.43		11.08	11
JE22C	-	-	16.87	17.2	18.02	17.82	17.7	17.7	17.49	17.2		16.87	18

Anketell North DWMS

Bore ID							Wate	r Level (m A	HD)					
Bore ID	27-Jul-05	9-Sep-05	27-Sep-05	21-Oct-05	23-Nov-05	10-Jan-06	31-Jan-06	3-Mar-06	4-Apr-06	4-May-06	29-May-06	28-Jun-06	Min.	M
WAM11	13.42	13.63	13.72	13.86	13.86	13.76	13.71	13.65	13.57	13.49	13.46	13.3	13.3	13
WAM12(s)	14.15	14.18	14.04	13.76	13.31	13.47	13.46	13.12	13.17	13.34	13.01	12.98	12.98	14
WAM12(d)	14.12	14.15	14.08	13.91	13.55	13.49	13.47	13.01	13.12	13.26	13.14	13.12	13.01	14
WAM13(s)	14.15	14.2	14.03	14.03	13.75	13.74	13.73	13.43	13.5	13.64	13.44	13.45	13.43	14
WAM13(d)	14.08	14.13	14.08	13.91	13.68	13.64	13.62	13.31	13.36	13.47	13.33	13.33	13.31	14
SP1-2B	-	-	-	11.9	11.8	11.66	11.6	11.48	11.39	11.37	11.36	11.32	11.32	11
JE22C	17.98	18.18	18.24	18.2	18.03	17.65	17.4	17.11	16.95	16.81	16.8	16.77	16.77	18

Bore ID							Wate	r Level (m A	HD)					
Boie ib	2-Aug-06	30-Aug-06	24-Oct-06	27-Nov-06	19-Dec-06	23-Jan-07	20-Feb-07	23-Mar-07	23-Apr-07	22-May-07	28-Jun-07	26-Jul-07	Min.	Ma
WAM11	13.3	13.22	13.27	13.23	13.17	13.08	13.02	12.93	12.85	12.82	12.68	12.68	12.68	13
WAM12(s)	13.47	13.67	13.06	12.85	12.89	12.45	12.26	12.1	12.22	12.7	13.17	13.61	12.1	13
WAM12(d)	13.5	13.7	13.23	12.82	12.89	12.5	12.33	12.23	12.39	12.62	13.08	13.52	12.23	13
WAM13(s)	13.93	13.92	13.42	13.08	13.06	12.85	12.74	12.66	12.7	12.86	13.12	13.67	12.66	13
WAM13(d)	13.75	13.76	13.31	13	12.89	12.77	12.66	12.57	12.61	12.76	13.05	13.5	12.57	13
SP1-2B	11.5	11.52	11.44	11.32	11.26	11.3	11.06	11	10.98	10.99	11.07	11.26	10.98	11
JE22C	17.04	17.34	16.27	16.86	16.83	16.56	16.61	16.53	16.68	16.47	16.7	17	16.27	17

Adjusted AAM GL Calculations

Department of Water long-term bore JE22CMGL: 1994 = 18.768mAHD Department of Water long-term bore JE22CAAMGL: = 17.965mAHD

Bores across Anketell North Ste:

JDA WAM11, WAM6, WAM7, WAM9, WAM8

DoW 11812632, JE22C VDM VDM 1-6, 12, 13, 14

Closest bore to JE22Cis WAM8

Highest recorded groundwater level in WAM8: 20.06mHDD in September 2005 JE22C groundwater level in September 2005: 18.258mAHD which is above the AAMGL by 293mm

2005 recorded groundwater levels adjusted to AAMGL

WAM11 = 13.72 - 0.293 = 13.427 mAHD
WAM6 = 21.15 - 0.293 = 20.857 mAHD
WAM7 = 19.04 - 0.293 = 18.747 mAHD
WAM9 = 15.86 - 0.293 = 15.567 mAHD
WAM8 = 20.06 - 0.293 = 19.767 mAHD
WAM15 = 20.08 - 0.293 = 19.787 mAHD
WAM10 = 17.40 - 0.293 = 17.107 mAHD
WAM12 = 14.15 - 0.293 = 13.857 mAHD
WAM13 = 14.13 - 0.293 = 13.855 mAHD

WAM14 = No 2005 recorded WAM15 = No 2005 recorded

To 2007 recorded levels

2007 MGL in JE22C: 17.78

17.965 - 17.78 = 0.185m

WAM14 = 16.5 + 0.185 = 16.685 mAHD WAM15 = 16.43 + 0.185 = 16.615 mAHD





BIOSCIENCE PTY LTD

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Calculated Maximum Groundwater Level (MGL) mAHD

Bioscience Pty Ltd Anketell North Urban Cell, City of Kwinana, Perth, WA

Local Water Management Strategy 27/02/2014

 $\hbox{ Data Source: JDA \& DoW Groundwater } \ Figure \ 9: AAMGL \ Contours \ (mAHD) \\$ Monitoring Data

Appendix 6

Anketell North Structure Plan 2015 (Original Approved)

LOCAL STRUCTURE PLAN

ANKETELL NORTH



▲DOCUMENT CONTROL

Printed 07 December 2015 4583_15oct01R_kk

Version	File Name	Prepared by	Approved by	Date
1	4583_ 14Feb01R PF - LSP (FINAL).docx	Sam Jeleric	Peter Fitzgerald	10/04/2014
2	4583_14nov01R_kk	Kim Kyle	George Hajigabriel	19/11/14
3	4583_14dec01R_kk	Reyne Dial	Kim Kyle	18/12/14
4	4583_15jan01R_kk	Reyne Dial	Kim Kyle	23/01/15
5	4583_15oct01R_kk	Patrick Bryce	Kim Kyle	18/10/15
6	4583_15dec01R_kk	Patrick Bryce	Kim Kyle	01/12/15

This report has been authorised by;

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RECORD OF ENDORSEMENT

This structure plan is prepared under the provisions of the City of Kwinana Local Planning Scheme No.2

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE

WESTERN AUSTRALIAN PLANNING COMMISSION ON:

M Decembor 2025 Date of Expiry

17 December 2015	
Signed for and on behalf of the Western Australian Planning Commission:	
an officer of the Commission duly authorised by the Commission pursuant t	to section 16 of the Planning
and Development Act 2005 for that purpose, in the presence of:	
Andrew Treas	_ Witness
18-12-15	_ Date

	TABLE (OF AMENDMENTS		
	Amendment No.	Summary of the Amendment	Amendment Type	Date Approved by the WAPC
11111111111111				

EXECUTIVE SUMMARY

This Local Structure Plan (LSP) addresses an area of 97.8 hectares identified as 'Development Zone' within the Anketell locality approximately 5 kilometres north east of the Kwinana Town Centre. The site referred to as the 'Anketell North LSP area' is bound by Anketell Road to the north, Jandakot Underground Water Pollution Control Area to the east, Bush Forever Site 270 to the south and the west.

The majority of the LSP area was transferred to the Urban zone on the 1 December, 2009. The balance directly adjacent to Anketell Road was transferred on 27 May, 2104 following design resolution of the final extent of the future Anketell Road reserve.

The purpose of this LSP is to facilitate the development of the subject site for predominantly residential purposes.

The preparation of this Local Structure Plan has been undertaken in liaison with the City of Kwinana and government authorities.

Bush Forever Site 270 Part C whilst external to the LSP area has been given due consideration through the local structure planning process. Whilst zoned 'Rural' its hydrological relationship as well as its interface with the urban area has guided the design approach for the LSP area and is therefore detailed in the supporting reports to this LSP.

Local Structure Plan Summary	1	
	<i>-</i>	T
Item	Data	Section number referenced in report
Total area covered by the Structure Plan	98.4 hectares	1.2.2
Area of each land use proposed		
<u>Zones</u>		
Residential	45.1 hectares	4.1
<u>Reserves</u>		
Road Reserve	20.12 hectares	
Park Recreation and Drainage	15.03 hectares	
(Inclusion of WP Easement 4.3ha)		
Public Purpose – Community	1.67 hectares	
Public Purpose – Primary School	4 hectares	
Excluded Area ^{1.}	12.48 hectares	
Estimated lot yield ^{2.}	1180 lots	4.3
Estimated number of dwellings ^{2.}	1180 dwellings	4.3
Estimated residential site density ^{2.}		
Dwellings Per Gross Urban hectare	12 dwellings	4.3
Dwellings Per Site hectare	26 dwellings per site hectare	
Estimated population ^{2.}	3304 people	4.3
	@2.8 people per household	
Number of high schools	0 high schools	4.6
Number of primary schools	1 primary schools	4.6
Estimated area and % of public open space ^{2.}		
Total Public Open Space	12.4 hectares, (14.8%)	4.2
	* Community Purpose Site included in Total Public Open Space.	
Unrestricted Public Open Space	10.7 hectares (12.7%)	
Restricted Public Open Space	0.5 hectares (0.6%)	
Composition of Public Open Space:		
Anketell Playing Fields	4.97 hectares, 1 oval	
Neighbourhood Parks	5.3 hectares, 8 parks	4.2
Local Parks	0.79 hectares, 3 parks	

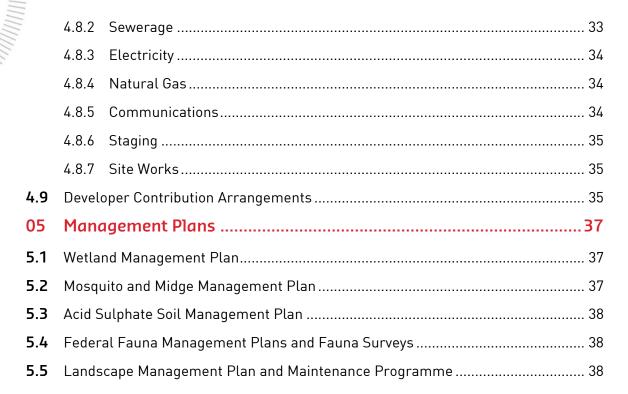
^{1.} The portion of LSP area which is most likely affected by noise is excluded from the LSP area until matters raised by the WAPC have $been \ addressed \ to \ the \ satisfaction \ of \ the \ WAPC, including \ addressing \ the \ requirements \ of \ \textit{SPP 5.4 Road and Rail Transport Noise and}$ Freight Considerations in Land Use Planning, inclusive of the appropriate land uses and the necessary noise mitigation strategy via a noise management plan.

^{2.} Figures based on total LSP area including the development potential of the 'Excluded Area' subject to note 1.

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- 7. Jandakot Structure Plan
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IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Appendix Number	Document Title	Nature of Document	Referral/Approval Agency	Summary of Document Modifications
	1.	Certificates of Title	Informational	N/A	
	2.	Environmental Assessment	Environmental	DPaW	
	3.	Flora and Vegetation Survey	Environmental	DPaW/ City of Kwinana	
	4.	Wetland Management Strategy	Environmental	DPaW / City of Kwinana	
	5.	Fire Management Plan	Fire	City of Kwinana	
	6.	Indigenous Heritage Survey	Heritage	N/A	
	7.	Landscape Masterplan and Cross Sections	Landscape	City of Kwinana	
	8.	Transport Assessment	Transport	City of Kwinana	
	9.	Local Water Management Strategy	Hydrology	DoW	
	10.	Servicing Report	Engineering	WP, WC, City of Kwinana	

Part One IMPLEMENTATION



1. Structure Plan Area

This Structure Plan shall apply to the land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan Map.

2. Operation

This Structure Plan comes into effect on the day it is approved by the Western Australian Planning Commission.

3. Staging

Figure 19 of Part Two depicts indicative staging for the subdivision of the structure plan area.

4. Subdivision and Development Requirements

- a) Residential densities for the structure plan area are the residential densities shown on the Local Structure Plan Map.
- b) Public open space is to be provided in accordance with the Local Structure Plan Map.
- c) Land use permissibility within the structure plan area shall accord with the corresponding land use classification in the City of Kwinana Town Planning Scheme No.2.
- d) This Structure Plan is supported by a Bushfire Management Plan (BMP), Fire Management Plan Anketell North Local Structure Plan (March 2015) as amended. Any land falling within 100 metres of a bushfire hazard identified in the BMP is designated as a Bushfire Prone Area for the purpose of the Building Code of Australia.
- e) Notifications on Title

The Council shall recommend to the Western Australian Planning Commission that a condition be imposed on the grant of subdivision approval for a notification to be placed on the Certificate of Title to suitably respond to the following:

- The Fire Management Plan for lots with a bushfire attack level (BAL) rating of 12.5 or higher;
- Transport noise for lots that are the subject of noise levels exceeding the noise target as per State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning.

f) Management Plans

The Council shall recommend to the Western Australian Planning Commission that a condition be imposed on the grant of subdivision approval to respond to the following as identified by the structure plan:

- The preparation, approval and implementation of a wetland interface management plan providing for the protection of the adjoining wetland located in Bush Forever Site 470
 Part C; and
- A mosquito and midge management plan.

5. Local Development Plans

Local Development Plan(s) are to be prepared for lots with one or more of the following attributes:

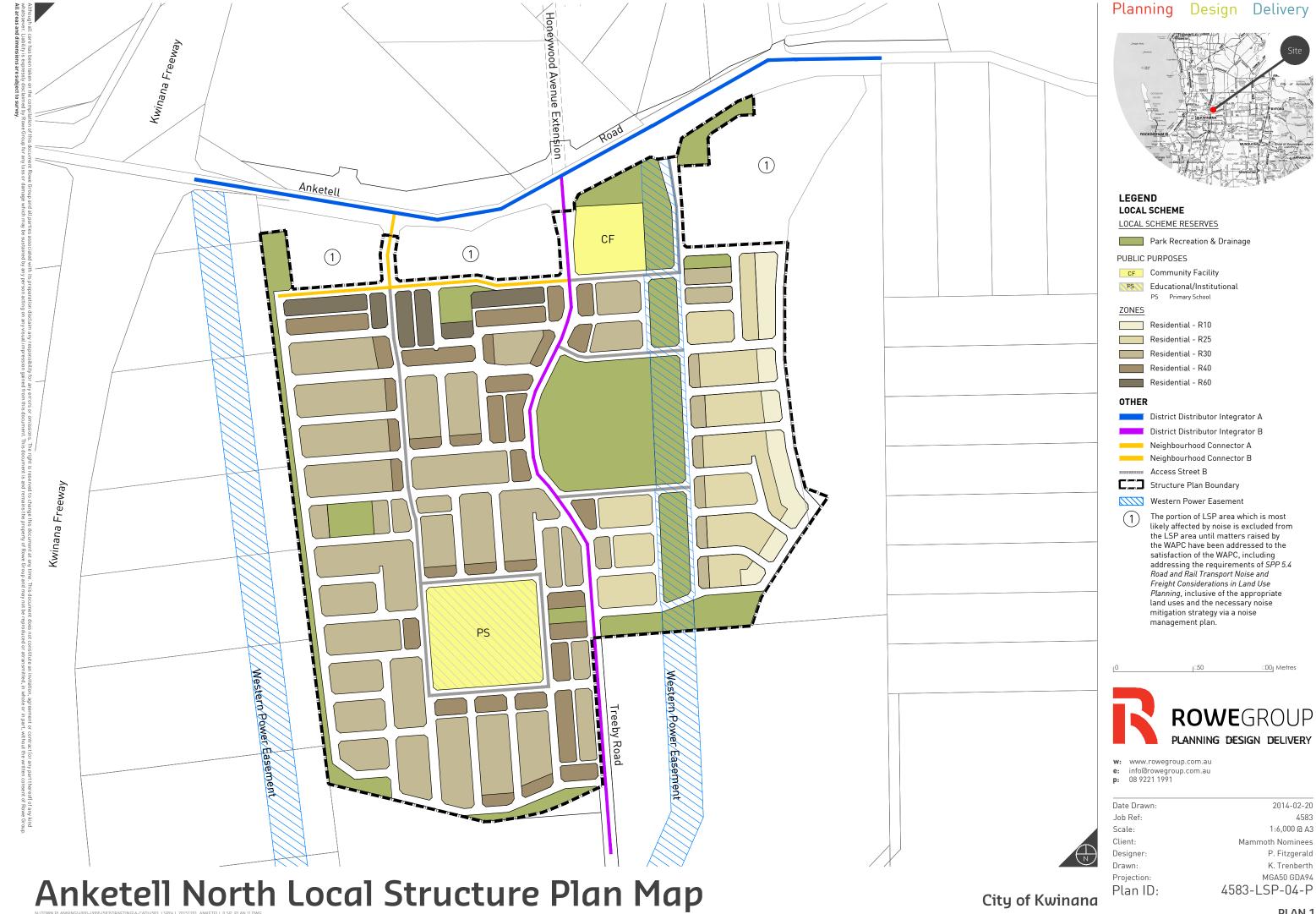
- a) Rear-loaded vehicle access;
- b) Having the potential for grouped and/or multiple dwellings;
- c) Frontages of less than 12 metres;
- d) The subject of a notification on title; and
- e) Having an R10 density coding.

6. Other Requirements

a) Development Contribution Arrangements

Under the City of Kwinana Town Planning Scheme No. 2, the following development contribution arrangements apply and/or are contemplated:

- Development Contribution Area 9 for the funding of community infrastructure; and
- Development Contribution Area 4 for 'hard' infrastructure.



PLAN 1

Part Two EXPLANATORY SECTION



O1 Planning Background 1.1 Introduct

This Local Structure Plan (LSP) has been prepared by Mammoth Nominees Pty Ltd and Well Holdings Pty Ltd as a precursor to subdivision for land zoned 'Development Zone' under the provisions of the City of Kwinana TPS2.

The purpose of the LSP is to refine the provisions under the district framework and ensure a comprehensive approach to planning and development is undertaken, with input from the local community, landowners, government agencies and other key stakeholders.

The LSP will guide future land use and development within the Anketell North LSP area, and provide a framework for more detailed planning at subdivision. This Part 2 of the Structure Plan provides explanation for the Statutory Part 1 provisions.

1.2 Land Description

1.2.1 Location

The LSP area is located within the metropolitan south west corridor, within the municipality of the City of Kwinana. The site is situated approximately 28 km south of Perth Central Area, and is accessible via the Kwinana Freeway. The Kwinana Town Centre is located approximately 8 km south and the Spectacle Regional Reserve approximately 1 km from the subject site.

The subject site is generally bounded by Anketell Road to the north, the Jandakot Groundwater Mound to the east and Bush Forever Site 270 to the south and west.

Refer to Figure 1 - Regional Location.

Refer to Figure 2 – Locality Plan.

1.2.2 Area and Land Use

The LSP area comprises approximately 98.4 hectares currently accessed by Treeby Road, which runs parallel to the Kwinana Freeway and connects to Anketell Road along the northern boundary of the Anketell North LSP area.

The LSP area comprises rural properties ranging in size from approximately 3 hectares through to 6 hectares, which are currently being utilised for agricultural purposes such as grazing, market gardening and horse agistment. A number of existing dwellings are also located within the LSP area, with associated outbuildings, fences and other structures. These are intended to be demolished and removed as part of the development of the site.

Part C of Bush Forever Site 270 forms part of Lot 13 Treeby Road within the Anketell North LSP area. As such, the northern portion of Lot 13 zoned 'Development' zone is included within the LSP area. Notwithstanding, whilst the southern portion of the site located outside of the LSP area, its interface with the urban cell requires specific management and therefore is given due consideration through the design response.

Western Power easements traverse the eastern portion of the site and externally to the site, along the western boundary.



Refer Figure 3 – Local Structure Plan Area.

Refer Figure 4 – Aerial, Contours and Cadastral (Site Plan).

1.2.3 Legal Description and Ownership

The LSP comprises twenty three (23) allotments, being:

Lot Number	Address	Plan/ Diagram No.	Land Ownership
652	652 Anketell Road	P3475	Filton Pty Ltd
2	664 Anketell Road	P4746	James
3	676 Anketell Road	P4746	Bazzo
4	686 Anketell Road	P4746	Marevich and Musulin
7	734 Anketell Road	P4746	Hill
89	748 Anketell Road	D92985	Ting
90	758 Anketell Road	D92984	Mincha Pty Ltd
189	19 Treeby Road	P25097	Grillo
188	28 Treeby Road	P25096	Abrahams
36	35 Treeby Road	D32446	Carsettai
30	36 Treeby Road	D32446	Gucce Holdings Pty Ltd
31	48 Treeby Road	D32446	Lu and Ju
37	49 Treeby Road	D32446	White
38	55 Treeby Road	D32446	Su
32	56 Treeby Road	D32446	Sanpoint Pty Ltd
39	63 Treeby Road	D32446	D'orsogna and Spring Park Pty Ltd
33	64 Treeby Road	D32446	Narrah Pty Ltd and Vacation Investments Pty Ltd
34	74 Treeby Road	D32446	Comley
40	73 Treeby Road	D32446	Dorn
35	82 Treeby Road	D32446	Bazzo
41	83 Treeby Road	D32446	Comley
100	96 Treeby Road	D89861	Well Holdings Ltd & Trevalley Investments Pty Ltd
13	140 Treeby Road	P4746	Well Holdings Pty Ltd

Mammoth Nominees and Well Holdings represent the landowners of Lots 13, 30, 35 and 100 Treeby Road and Lot 3 Anketell Road.

Refer to Appendix 1 - Certificates of Title.

O2 Planning Framework 2.1.1 Zoning and P

Land within the LSP boundary is zoned 'Urban' under the Metropolitan Region Scheme (MRS), and 'Development' under the City of Kwinana Town Planning Scheme No. 2 (TPS 2).

The land was transferred to the 'Urban' zone under the MRS on December 2009, by notice in the Government Gazette (notice reference PL403). Upon Gazettal of the urban zone, the site was concurrently zoned 'Development' under TPS 2, by resolution of the WAPC and notice in the Government Gazette.

To the east the LSP area abuts 'Rural Water Protection' zoned land.

Bush Forever Site 270 Parts A and B to the west and south east of the LSP area, are zoned 'Parks and Recreation', whilst Part C remains within the 'Rural' zone.

The lots abutting Anketell Road are also subject to an 'Urban Deferred' zoning under the MRS. This zoning is consistent with the extent of the ultimate Anketell Road reservation required to serve as an Other Regional Road and will be subject to reservation by the Western Australian Planning Commission (WAPC) in the future.

The Treeby Road reservation runs parallel to the Kwinana Freeway within the LSP area and provides access to the site from Anketell Road. Anketell Road itself is identified as a future freight route and as such will be subject to significant works to facilitate commercial traffic in the future.

Refer Figure 5 - Metropolitan Region Scheme Zoning.

Refer Figure 6 - City of Kwinana Local Planning Scheme No.2 Zoning.

2.1.2 Regional and Sub-Regional Structure Plan

2.1.2.1 Jandakot Structure Plan

The LSP is situated within the Jandakot Structure Plan area.

The Jandakot Structure Plan was finalised in August 2007 and provides a strategic direction to coordinate the development of the region while ensuring environmental, social and economic objectives are met.

Previously, the major constraint to urban development within this corridor was the resolution of groundwater and stormwater management. With the preparation of the Jandakot District Water Management Plan (JDWMP) however, these issues have now been resolved and have been accommodated in current planning for the cell under this LSP and the associated Local Water Management Strategy.

The district level requirements of the Jandakot Structure Plan, such as the identification and preservation of natural areas, the allocation of public open space and public purpose areas, road network and hierarchy, and the allocation of school sites have been further refined through the preparation of this LSP.

The Jandakot Structure Plan identifies the LSP area for urban development.

The proposed LSP is considered to be consistent with the intent and requirements of the Jandakot Structure Plan.

Refer Figure 7 – Jandakot Structure Plan.

2.1.2.2 Eastern Residential Intensification Concept (ERIC)

The City of Kwinana's draft District Structure Plan, referred to as the 'Eastern Residential Intensification Concept' (ERIC) was prepared by the City of Kwinana in 2005 to provided strategic direction and refinement of the future urban areas identified under the Jandakot Structure Plan. Whilst ERIC has yet to be finally adopted by Council, it provides a framework to the preparation of LSP's within the urban corridor.

The ERIC identifies the following land uses within the LSP area:

- ✓ Residential R20;
- Residential R25 and Higher;
- ▲ Local Open Space;
- Primary School, and

The LSP has been prepared giving due consideration to the provisions of ERIC, albeit updated to respond to current planning principles and objectives.

Refer Figure 8 – Eastern Residential Intensification Concept.

2.1.3 Policies

2.1.3.1 Liveable Neighbourhoods

Liveable Neighbourhoods (LN) represents the WAPC's primary policy to guide the design and assessment of structure plans and subdivision for new urban development of residential communities in Western Australia. The underlying objective is to create quality neighbourhoods with site responsive identity supportive of local community that reduce dependency on private vehicles, and are more energy and land efficient. As such, LN focuses on an urban structure based on walkable mixed-use neighbourhoods with interconnected street patterns. It functions by drawing together key policy aspects into a single 'integrated planning and assessment policy' to provide for a performance based approach to planning assessment.

It does so according to a range of considerations including:

- Community;
- Movement;
- ▲ Lot Layout;
- Urban Water Management;
- Public Open Space; and
- ✓ Schools.

Liveable Neighbourhoods identifies a series of Objectives and Requirements for Local Structure Plans that, when met, demonstrate compliance with the overall outcomes sought by LN. These objectives and

requirements relate to items such as road layout, relationship of housing to open space and schools, school location/distribution, POS layout and location and housing densities.

The LSP has been prepared to satisfy the various objectives and requirements of LN to ensure that more detailed proposals at subdivision stage are also capable of satisfying the relevant criteria.

2.1.3.2 Bush Forever

Bush Forever, prepared by the WAPC (2000), is a ten year strategic plan for the retention and protection of regionally significant bushland within the Perth Metropolitan region. Bush Forever presents a 'whole of government approach' to the protection of bushland (and associated wetlands), with the Bush Forever policy endorsed by the Government of Western Australia, WAPC, the EPA, and other key environmental agencies.

One of the principle aims of Bush Forever is to provide a guide to site implementation for landowners, developers and the community, by clearly distinguishing each Bush Forever site and associated site implementation recommendations.

Bush Forever Site 270, Part C, traverses Lots 13 and 100 in the southern portion of the Anketell North. Site 270 comprises three parts, being Part 'A' and Part 'B' – currently reserved 'Parks and Recreation' under the MRS, and Part 'C' – which encompasses both Lots 13 and 100, providing a bushland 'link' between Part A and B. We confirm Part C is not identified to be reserved under the MRS, however is identified as a 'Strategic Negotiated Planning Solution' (NPS) under the Bush Forever document.

The objectives of a Strategic NPS are defined as follows:

'To optimise conservation and planning objectives for sites with multiple ownership. To provide a fair and equitable distribution of open space (including Bush Forever Sites) when coordinating future development in areas of multiple ownership, while seeking to protect the Bush Forever Sites in their entirety where possible, and a reasonable outcome.'

The mechanism for reviewing and negotiating outcomes for a Strategic NPS site generally occurs at local structure planning stage, however may also be initiated through regional or district structure plans and rezoning under the MRS or TPS.

The current landowner entered into negotiations regarding Part C during the advertising of the (then) Bushplan (1998). As a result of submissions, this policy was revised and superseded with the publication of Bush Forever in 2000. It was through this process the need for a balanced approach to urban development and conservation was recognised, and the nominal boundary for the link within Part C was formally recognised. The revised link boundaries were formalised through the establishment of a Special Control Area (SCA) in the MRS addressing the delineation and management of Bush Forever sites and as outlined in State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region. This Structure Plan reflects this SCA via its satisfaction of SPP 2.8 requirements outlined below

2.1.3.3 State Planning Policy (SPP 2.8) Bushland Policy for the Perth Metropolitan Region State Planning Policy 2.8 (SPP 2.8) was gazetted in June 2010. The aim of SPP 2.8 is to provide a policy and implementation framework that will ensure bushland protection and management issues in the Perth Metropolitan Region are appropriately addressed and integrated with broader land use planning to secure long-term protection of biodiversity and associated environmental values.

The policy applies to the metropolitan region and addressed two distinct aspects of bushland management being, Bush Forever sites and local bushland.

The policy recognised the protection and management of significant bushland areas as a fundamental consideration in the planning process, while also seeking to integrate and balance wider environmental, social and economic considerations. Generally, the policy does not prevent development where it is consistent with policy measures.

Under the provisions of SPP 2.8, the site reflects the revised boundaries of Part C, as identified under the SCA and therefore only impacts Lot 13. Part C is also identified as an 'Urban, Industrial or Resource Development' site and further detailed as 'where negotiated planning solutions are at an advanced stage, the Bush Forever protection area now reflects the proposed conservation area.'

'Urban, Industrial or Resource Development' generally includes land zoned for Urban, Urban Deferred or Industrial purposes in the MRS or committed for future development through planning and environmental processes.

2.1.3.4 State Planning Policy (SPP 4.2) Activity Centres for Perth and Peel

State of Planning Policy 4.2 Activity Centre for Perth and Peel (SPP 4.2) provides a framework for the planning and development of new activity centres and the redevelopment and renewal of existing centres in Perth and Peel.

SPP 4.2 identifies the Wandi District Centre, as the key centre serving the ERIC Urban Corridor. The Wandi District Centre as identified within SPP 4.2, is proposed under ERIC to be predominantly located to the northern boundary of Anketell Road within the Wandi Urban Cell.

The LSP is therefore considered consistent with the provisions of SPP 4.2.

2.1.3.5 State Planning Policy (SPP 5.4) Road and Rail Transport Noise and Freight Considerations in Land Use Planning

In accordance with State Planning Policy 5.4 (SPP 5.4) future residential development within the LSP is considered a 'noise sensitive development', given the proximity of the LSP area to Anketell Road and the Kwinana Freeway.

Whilst the LSP area is within proximity to both roads, the location of Bush Forever Site Part A provides separation to the Kwinana Freeway ranging from 150m-470m.

Anketell Road, however, presents potential noise impacts to nearby development. As such, as part of a modification to the LSP an area approximately 150 metres distance away from Anketell Road has been excluded from the LSP. Its inclusion into the LSP area would be considered as part of a future amendment addressing a number of matters including the provision of a noise management plan for the LSP area that addresses SPP 5.4 and the response to it in terms of appropriate land uses and a noise mitigation strategy.

2.1.3.6 Planning for Bush Fire Protection (Edition 2)

The WAPC's Planning for Bush Fire Protection (Edition 2), provides a framework for considering bush fire hazard and mitigation requirements through the planning approvals process.

Given the LSP area is located adjacent to areas of vegetation (predominantly within the adjacent Bush Forever site), the LSP has been prepared in accordance with the requirements of Planning for Bushfire Protection and is supported by a Fire Management Plan.

2.1.4 Local Planning Policies

Development within the LSP area shall be in accordance with the following City of Kwinana Local Planning Policies, except where otherwise varied by this LSP, an approved Detailed Area Plan (DAP), or by the City of Kwinana.

- Design Guidelines for Medium Density Development;
- ▲ Conservation of Remnant Vegetation;
- ▲ Footpaths;
- Planning for Bushfire Protection Guidelines;
- ✓ Public Open Space;
- Residential Development;
- Residential Subdivision Development Guidelines;
- Residential Subdivision Road Standards;
- ▲ Retaining Wall Levels;
- ✓ Street Lighting;
- ✓ Street Naming; and

Site Conditions and Constraints 3.1 Biodiversity and N

The following provides a summary of the environmental site conditions and constraints. For further information the Environmental Assessment Report is provided in Appendix 2.

3.1.1 Flora and Vegetation

A Level 2 Flora Survey was undertaken across the LSP area during spring 2009.

The survey identified the LSP area as being a mixture of predominantly cleared farmland with patches of eucalypts. A total of six vegetation types were mapped across the site, comprising of:

- Banksia attenuata Low Woodland, with Eucalyptus marginata, Dasypogon bromeliifolius, Phlebocarya ciliate, local Melaleuca preissiana, Pultenaea reticulata and Hypocalymma angustifolium, some other natives and, commonly, weeds.
- Banksia attenuata Low Woodland with Eucalyptus marginata, Allocasuarina fraseriana and understoreys of Xanthorrhoea preissii, Adenanthos cygnorum, Acacia pulchella, Stirlingia latifolia and other natives, and of weeds; much of it regenerating after 2004 fire.
- Banksia attenuata Low Woodland, with thickets of Adenanthos cygnorum.
- Eucalyptus rudis very healthy Open Forest in soak/spring, with Melaleuca preissiana and M. Rhaphiophylla tall trees, over Pteridium esculentum – Cyathochaeta teretifolia – Baumea articulata Closed Herb-Sedgeland; with Lepidosperma longitudanale, Hemarthria uncinata, Hibbertia perfoliata, Dielsia stenostachya, Baumea vaginalis, Poa serpentum; few aliens.
- Eucalyptus rudis (largely leafless) Woodland (to Open Forest) over Kunzea glaberescens and Astartea sp. Closed Tall Scrubs, dense Pteridium esculentum and weeds; locally with healthy Eucalyptus marginata and Melaleuca preissinana trees.
- Kunzea glabrescens Closed Tall to Tall Open Scrub; with, in more open sites, Dasypogon bromeliifolius, Phlebocarya ciliate, Euchilopsis linearis and other natives; some weedy degraded areas and many dead shrubs over 1 metre tall.

The condition of vegetation ranges in quality across the site from Excellent to Completely Degraded, with most remnant vegetation being in Very Good to Degraded condition. Weeds are common in the majority of the bushland existing across the site.

3.1.1.1 Protected Flora

A search of the DER's Declared Rare Flora (DRF) and Priority Flora database (2009) was undertake to identify the potential for DRF or priority species to exist on the site. The results indicated there is evidence of one Priority Flora species being Jacksonia gracillima. Further survey work undertaken on Lot 100 in 2007, identified the Priority 3 species Cyathochaeta teretifolia. Both of these species being associated with wetlands.

A search of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Protected Matters Search Tool (2009) was undertaken which identified three significant species of flora that have the potential to occur within the area, being:



- Caladenia heugelii (King Spider-orchid, Grand Spider- orchid, Rusty Spider orchid);
- Drakaea elastic (Glossy-leaved Hammer-orchid, Praying Virgin); and
- Lepidosperma rostratum (Beaked Lepidosperma).

The Level 2 spring survey confirmed no DRF were recorded as occurring on the site. Jacksonia gracillima was recorded from two quadrants, one within the site and one to the south of the site.

Although a DRF has previously been recorded for Lot 35, and an extensive search was undertaken, it was not able to be located.

> The vegetation type and condition varied across the survey area with variations in the soil depth and distance from the lake.

3.1.1.2 Threatened Ecological Communities

A search of the DEC's Threatened Ecological Community (TEC) database (2009) indicates there are no TEC's known to exist on site.

In addition, there are two Priority Ecological Community (PEC) located to the south of the site, described by the DPaW as:

- Banksia illicifolia woodlands; and
- Low lying Banksia attenuata woodlands or shrublands.

Both of these PEC's are listed with a nominal 800m buffer which intersects the southern portion of the site.

A Level 3 PEC (low lying Banksia atteneata woodlands or shrublands) was confirmed as occurring on the site through a PATN analysis undertaken on the results of the flora and vegetation survey. The EAR advises with respect to vegetation that 'DEWHA recommends that proposed urban developments, for either housing or industry, in an area which contains nationally listed Threatened Species or Ecological Communities is likely to be significant under the EPBC Act and should be referred to the Minister ... the Spring 2009 flora and vegetation survey did not locate on site any flora or ecological communities listed under the EPBC Act.'

Potential retention of the above vegetation species is depicted in Figure 9.

Refer to Appendix 3 - Flora and Vegetation Survey

3.1.2 Remnant Vegetation

The City's Biodiversity Policy suggests areas for vegetation retention should comprise large consolidated areas (at least 4 ha in size) with 75% of their area in good or better condition. Vegetation within the site which ranges from good to very good is predominantly located in the southern portion of the Anketell North LSP area, within the Part C Bush Forever link area. Other areas which have been identified as retaining good to very good vegetation, have also been identified for possible retention through areas of public open space – this is illustrated at the Landscape Masterplan referred to in the Public Open Space section of this report.

It should be noted, the existing topography will likely result in substantial earthworks across the site, retaining individual stands of vegetation and/or individual trees will therefore prove to be problematic with cut to fill requirements.

On the basis of the above, the Bush Forever Part C area was considered the most appropriate way in which to provide a large consolidated area of vegetation, of good to very good condition and which is unconstrained by earthworks requirements. Notwithstanding, a significant tree survey will be undertaken for those areas of vegetation located within proposed areas of open space within the LSP area prior to construction to determine those trees which can be retained through the detailed design process.

3.1.3 Fauna

A search of the DEC's Threatened and Priority Fauna database has indicated that the following threatened and priority fauna have been recorded within a 5km radius of the site and have the potential to occur on the site:

- ✓ Forest Red-tailed Black-Cockatoo;
- ▲ Lined Skink;
- Quenda; and
- Western Brush Wallaby.

A search of the DEWHA's Protected Matters Search Tool was undertaken and identified three vulnerable and endangered species listed under the EPBC Act as potentially occurring on the site:

- Carnaby's Black Cockatoo;
- Baudin's Black Cockatoo;
- Quokka;
- Red-tailed Phascogale; and
- Chuditch or Western Quoll.

A Fauna Management Plan will be prepared as a condition of subdivision approval that details the protection measures applicable to the site.

3.1.4 Wetlands

There are no Ramsar wetlands or *Directory of Important Wetlands* within the LSP area (Environment Australia, 2001). The nearest *Directory of Important Wetlands* site is located approximately 1.2 km to the west of the Structure Plan area, known as 'Spectacles Swamp' (DEWHA, 2009), and forms part of the Spectacles Wetlands.

The DPaW's Geomorphic Database of Wetlands of the Swan Coastal Plan depicts the following wetlands within the LSP area:

- ✓ UFI 14148 Conservation Category Sumpland, extending across the north eastern corner of Lot 13 and centre to south east of Lot 100.
- UFI 15290 Conservation Category Sumpland, extending across the majority of Lot 13 and west to centre of Lot 100, which incorporated the Treeby Road Lake (sumpland)
- ✓ UFI 6666 Conservation Category Sumpland, located centrally within Lot 13 and bisected by the Peel Sub P Drain.

23/01/2015

The portions of the above wetlands which extend into the LSP area will be subject to development. The proposed boundaries of the wetlands are however consistent with the boundaries agreed as part of the Bush Forever process which proposes a consolidation of the wetland area to coincide with the ecological link created by Part C. The Wetland Management Strategy provided in Appendix 4 includes correspondence confirming the outcomes of the wetlands through the definition of the Part C area.

A Wetland Management Plan will be required as a condition of subdivision approval.

Refer Figure 10 - Wetland Location.

3.2 Landform and Soils

The subject site is situated near the interface of the Bassendean and Spearwood Dune systems, but is located wholly within the Bassendean Sands system (Gozzard, 1983). There are two geological units featured on the site, including:

- ▲ North West: Pale yellowish, brown, medium to course grained quartz sand derived from Tamala limestone. This area is likely to facilitate groundwater recharge. The soils in this area have no clay content (Gozzard, 1983).
- ✓ South and East: Very light grey at surface and yellow at depth Bassendean Sands. This area is likely to facilitate groundwater recharge (Gozzard, 1983).

The site is sloped radially around a high point to the north along Treeby Road, which measures approximately 41m AHD at the highest point. The lowest point on the site is located to the southwest and measures approximately 17m AHD (Department of Water, 2009).

3.2.1.1 Acid Sulphate Soils

The Department of Environmental Regulation (DER) Acid Sulphate Soil Risk Mapping identifies the north western portion of the LSP as having no known risk of acid sulphate spoils (ASS). There is however two incidences of high risk ASS mapped adjacent to the wetland area in the south west and south east of the site. The balance of the LSP area is mapped as having a moderate risk of Acid Sulphate Soils (ASS) occurring within three metres of natural soil surface.

In this regard, an ASS Management Plan will be required to be prepared and implemented as a condition of subdivision approval.

Refer to Figure 11 – Acid Sulphate Soil Risk Plan.

3.2.1.2 Contamination

As previously noted, land within the Anketell locality has historically been utilised for rural pursuits and as such, a number of lots within the subject site have and are currently being utilised for grazing, market gardening and horse agistment.

In regard to the market garden sites, organochlorine based pesticides and trace metals associated with fertilisers can persist in soils for many years.

Whilst no properties within the site are listed as contaminated on the DER (previously DEC) *Contaminated Sites Database* (DEC, 2009), further investigation will be undertaken to determine the extent of any contamination and, if required, the remedial measures required across the area. All investigations and potential remedial works required will be undertaken in accordance with the *Contaminated Sites Act 2003* and verified by an independent auditor prior to approval by the DER.

Market gardening is recognised by the DER as a potentially contaminating activity (DoE, 2004). Accordingly a series of Preliminary Site Investigations (PSI) for contamination will be undertaken throughout the LSP by the various landowners as they develop, focusing on lots which have been used for market gardening both currently and in the past. All investigations and potential remedial works required will be undertaken in accordance with the *Contaminated Sites Act 2003* prior to subdivision, and verified by an independent auditor prior to approval by the DER.

Table 3: Potential Contaminated Site Tasks

Action	Responsibility	Timing
Initial review, examine Contaminated Sites Database	Proponent of Structure Plan	Structure Plan Adoption
Preliminary Site Investigations – individual lots	Individual landowners	Subdivision
Site remediation	Individual landowners	Prior to subdivision/development

3.3 Groundwater and Surface Water

3.3.1.1 Surface Water

The Jandakot District Water Management Plan (Jandakot DWMP) identifies the Anketell North LSP area comprising three sub-catchments based on topographical features, with runoff either flowing to the northern or southern discharge points, as well an area of soakage within the north west. The predevelopment surface water conditions as identified under the Jandakot DWMP and LWMS comprise:

- The Peel Sub R drain located north of the LSP area within the Wandi comprises the
 discharge point for the Wandi South LSP area, the Wandi District Centre site and the
 northern portion of the Anketell North LSP area.
- The Peel Sub P drain originates to the east of the study area and runs parallel to the southern boundary before heading south to the Peel Main Drain. The southern catchments of the LSP area drain via the Peel Sub P Drain with overflow discharge from Treeby Lake contributing to the open drain flows.
- ✓ The north eastern sub-catchments are fully integrated in the sandy soil with no discharge into the Bush Forever Site.

3.3.1.2 Groundwater

The Perth Groundwater Atlas indicates that regional groundwater levels in the Anketell North LSP area ranges from approximately 20mAHD in the eastern area of the LSP area to approximately 14mAHD in the western areas of the site. Groundwater flow direction is east to west with a gradient of approximately 0.003. Typically, bores located near the wetland feature show groundwater to be within 0.7m of the surface in wetter periods.

To facilitate local scale planning for the Anketell North LSP area, JDA Consultant Hydrologists undertook 2 years of groundwater monitoring from May 2005 to August 2007. Details of the monitoring undertaken and results are provided in the LWMS.

3.4 Bushfire Hazard

A Bushfire Management Plan has been prepared for the LSP in accordance with the WAPC Planning for Bushfire Protection Guidelines 2010. The Fire Management Plan also has considered the requirements of draft State Planning Policy 3.7: Planning for Bushfire Risk and Management. The Fire Management Plan is provided within Appendix 5 the following however provides an overview of fire management assessment undertaken and applicable provisions to development of the site.

3.4.1 Hazard Assessment

The Fire Management Plan (FMP) identifies the site as comprising predominantly a low to moderate fire hazard threat with areas of extreme hazard associated with existing vegetated areas within the LSP area. The fire hazard associated with the adjacent Bush Forever Site 270 is classified as 'moderate'.

The development of the LSP area as per the proposed layout will result in a reduced threat of bushfire.

The FMP identifies the resulting potential bush fire issues for the site:

- Limited fire hazard mitigation within Bush Forever areas adjoining the site;
- Difficulty of vehicular access within Bush Forever areas for fire fighting operations; and
- High level of human activity in the area increasing in the summer months.

3.4.2 Management Requirements

The FMP proposes a variety of measures to manage the fire hazard, including:

- ▲ A minimum 20 metre Building Protection Zones separating future development from fire hazard;
- Dwelling construction to a standard to align with the designated bush fire attack level (BAL) within the Building Protection Zone; and
- ✓ Compliance with and annual Fire Control Notice issued by the City of Kwinana under the Act.

The Bushfire Management Plan will be required to be implemented as a condition of subdivision approval.

3.5 Heritage

3.5.1.1 Indigenous Heritage

R and E O'Connor Pty Ltd undertook an Aboriginal Heritage Analysis of the Anketell North LSP area in May 2009. The purpose of the preliminary analysis was to establish whether there are currently any known Aboriginal heritage constraints which need to be taken into consideration in advance of development in the Anketell LSP area.

A search of the Department of Indigenous Affairs Aboriginal Heritage Inquiry System identified two sites of significance within close proximity to the subject site:

✓ ID: 3427 "Mandogalup Swamp/ The Spectacles", is a mythological hunting place and water source site listed as "Stored Data" under Open Access. ✓ ID: 3555 "Treeby Road Lake", a camp and artefact scatter site and is listed as "Stored Data" rather than a registered Aboriginal site.

Both of the above Register listings are Stored Data rather than registered Aboriginal sites. The provisions of the Aboriginal Heritage Act (AHA) do not apply to Stored Data.

Refer Appendix 6 - Indigenous Heritage Survey.

3.5.1.2 Non-Indigenous Heritage

No places were identified on the Heritage Council of Western Australia Heritage Places Database or the City of Kwinana Municipal Heritage List for the LSP area.

3.6 Context and Other Land Use Constraints

3.6.1 Anketell Road

Anketell Road is identified as a future designated freight route therefore the existing road reserve width is not suitable to facilitate this ultimate use.

In order to facilitate the transfer of the area immediately abutting Anketell Road from Urban Deferred to Urban, detailed design undertaken by the landowners of the Wandi District Centre site to define the extent of the ultimate road reserved. This design work undertaken in consultation with Main Roads Western Australia (MRWA) and the Department of Planning (DoP), also included an access strategy which identified the final intersection arrangements for Anketell Road which comprise:

- Three restricted left in/ left out intersections one north of Anketell Road to the Wandi District Centre, and two accessing the Anketell North LSP area within proximity to the Kwinana Freeway and Lyon Road.
- One full movement signalised intersection at the current Treeby and Anketell Roads intersection.

The above access arrangement was formalised through the transfer of land adjacent to Anketell Road from Urban Deferred to Urban under the MRS in May 2014. As such, the LSP reflects the access arrangements as described above.

3.6.2 Pedestrians and Cyclists

The status of Anketell Road as a proposed primary regional freight route will inhibit north/south pedestrian and cycling movements between the Wandi District Centre and the Anketell North LSP area. The Anketell Road design has made provision for one pedestrian crossing point at the Treeby Road signalised intersection, however additional connections may be desired in future.

The WAPC has identified a grade separated crossing at Anketell Road may be required upon the ultimate upgrade of Anketell Road as a freight route. This grade separated crossing will need to be further investigated as part of the wider provision of pedestrian/ cycle connectivity, in response to the government inter-agency study of Anketell, Rowley and Thomas Roads.

Notwithstanding in the short to medium timeframe, Anketell Road will not be utilised for its ultimate freight purposes and therefore multiple connections could be provided as part of the local urban road network. Grade separated crossings to Anketell Road will need to be addressed as part of the Anketell Road ultimate upgrade by MRWA.

3.6.3 High Voltage Power Line Easement

Two 330kv transmission lines exist within the locality. The Kwinana to Kemerton / Oakley Terminal, series of lines are located within Bush Forever site to the west of the LSP area. The second, Shotts to Southern Terminal/ Oakley Terminal, is located within the eastern portion of the LSP area, extending from Anketell Road to the Bush Forever site. Easement requirements of 60m (30m from centre of steel tower) are applicable.

From ongoing discussions with the City of Kwinana and Western Power, the land encumbered by the High Voltage Power Line easement is to be ceded free of cost. For the purpose of the public open space calculation this area is excluded from the net site area.

3.7 Summary of Opportunities and Constraints

From the above assessment of the LSP area a number of site constraints and opportunities were identified for consideration in the design response, these include:

Constraints:

- ✓ The preservation, protection and appropriate interface treatment with Part C of Bush Forever Site 270;
- The treatment of the Western Power lines and easements;
- ✓ The adjacent rural residential community and any impact which residential development would have upon the existing lifestyle and amenity of the locality;
- → High groundwater levels across the southern portion of the site;
- ▲ The protection and rehabilitation of remnant vegetation;
- ✓ The need for adequate edges to and separation distance from Fire Hazards such as the Bush Forever Site 270: and
- ✓ The potential freight route on Anketell Road and its treatment.

Opportunities:

- The protection and enhancement of the Bush Forever area as a community asset;
- ▲ A community which responds and reflects the attributes of its environmental context;
- Maximisation of residential population within 400m of the Wandi District Centre, and
- Providing for a range of land uses and housing diversity.

Land Use and Subdivision Requirements 4.1 Land Use

The LSP sets out land use, residential densities, public open space, public and private transport provision, environmental considerations and servicing requirements.

The LSP is proposed to comprise residential development ranging from R10 to R60 densities. The LSP also comprises a range of local and neighbourhood public open space areas in accordance with Liveable Neighbourhoods requirements, as well as a Primary School site and community facilities.

The following describes the design response proposed under the LSP and addresses the relevant elements of LN.

Please also refer to the Structure Plan Map – LSP and Figure 12-Indicative Plan of Subdivision.

4.2 Public Open Space

Under the provisions of Liveable Neighbourhoods a range of site responsive urban parkland is required, which appropriately addresses district, neighbourhood and local needs of residents, comprising a mixture of unrestricted and restricted open space.

The LSP therefore provides a framework for the hierarchy and location of public open space areas across the site, considering the requirements for drainage and vegetation retention, defining key strategic areas of open space as identified on The Structure Plan Map. Detailed subdivision design will provide further refinement to the LSP public open space framework, defining the configuration, uses and treatment within each public open space area.

The LSP provides for approximately 12.4 hectares of public open space (POS) across the LSP area by way of one formal playing field, eight neighbourhood parks, three local parks and a community site. This comprises 10.7 hectares of unrestricted (12.7% of gross subdivisible area) and 0.5 hectares of restricted open space (0.6% of gross subdivisible area).

As noted above, the hierarchy and location of POS areas have been designed to ensure residents are within:

- 400m of a neighbourhood park; and
- 600m 1km of a district/ active playing field.

Additional public open space is provided within the Western Power Easement (4.3 hectares) however does not form part of the open space calculation. This area is considered to provide an important north/south pedestrian and cycling connection, which combined with a number of strong east/west links via the road network, ensure appropriate connectivity within and external to, the Anketell North LSP area.

A Landscape Master Plan has been prepared for the LSP area, depicting the anticipated use and intent of each of the public open space areas (Appendix 7).

The following provides a detailed overview of the public open space design response proposed under the LSP.

Refer Figure 13 - Public Open Space Plan, Figure 14 - Public Open Space Schedule.



4.2.1 Anketell North Playing Fields

Given the topography of the LSP area, the Anketell North Playing Fields are located separate to the Primary School in the southern portion of the LSP area. As such, both a junior (within the Primary School grounds) and a senior oval will be provided within the LSP area.

The playing field site has been designed to accommodate the City's Multi Purpose Playing Fields Layout, comprising a site area of approximately 4.9 hectares.

Refer Figure 15 - Indicative Playing Field Layout.

The playing fields are located adjacent to the Western Power easement, central to the LSP area. This provides for a greater catchment within the LSP area, whilst also being adjacent to the linear pedestrian and cycling corridor created by the Western Power easement. Furthermore, the location of the Western Power easement along the site's eastern boundary provides for future opportunities for car parking. Any works within the easement will however be subject to future approvals from Western Power.

4.2.2 Community Site

Under the provisions of ERIC and Developer Contribution Plan 9 (DCA 9), a number of community infrastructure sites are identified within the general Wandi District Centre location.

Through discussions with the City's Technical Officers it was however determined the recreation centre was ideally located at the intersection of Anketell and Treeby Roads, on the basis of the following design considerations:

- ✓ The high accessibility afforded by the signalised intersection to allow for pedestrian and cycling movements between the Wandi and Anketell LSP Areass;
- Its location within close proximity to the retail core and bus routes;
- The land intensive nature of the use and the ability to maximise the residential population within a 400m walkable catchment of the Wandi District Centre, with its location south of Anketell Road;
- ✓ The ability to utilise sterilised land within the easement for parking;
- The opportunity to provide a built form statement to the Anketell North LSP area at a prominent intersection, and
- ✓ The opportunity to provide a land use buffer to Anketell Road for residential uses within the LSP area.

As such, a site of 1.67 hectares is provided at the intersection of Anketell and Treeby Road. This site is sought for inclusion within the public open space provision to enable a cost share arrangement within the Anketell North LSP area for the delivery of this site under DCA 4 (proposed Amendment 100A).

4.2.3 Bush Forever Site

The Negotiated Planning Solution progressed under Bush Forever and the subsequent transfer of the Anketell North and South Cells to the Urban zone under the MRS, defined the boundaries of the Part C area.

Whilst the Bush Forever Site is located external to the LSP area, wetland UFI 15290 which forms part of the Bush Forever Site Part C area extends within the LSP. As such, development within the LSP area, particularly aspects relating to water management and landscape treatments, need to be considered given the relationship between the urban area and adjacent reserve.

Furthermore, given the relatively constrained nature of the ERIC corridor and the extent of wetland conservation areas under the control and management of the City, consolidation of this key wetland area in a high quality conservation reserve was considered to provide a net environmental outcome for the Anketell Cell (comprising both the North and South LSP areas) whilst providing the City with a manageable consolidated conservation area.

The proposed design response therefore aims to deliver:

- ▲ A large and consolidated area of remnant vegetation;
- ▲ Maintain the ecological corridor and linkage between Parts A and B of Bush Forever Site 270;
- ▲ The provision of a 50m buffer for Treeby Road Lake (sumpland);
- Maintain a suitable hydrological regime for Treeby Road Lake and dampland habitat within the proposed conservation area;
- Manage stormwater, water quality and flood mitigation to ensure development does not impinge upon the ecological values of Treeby Road Lake or the environmental values of the proposed conservation reserve;
- ✓ Flora communities, priority flora and vegetation condition to be retained within the ecological corridor:
- Public and vehicular access should be controlled to protect the environmental values of the proposed conservation reserve, and
- Provision of utility services, roads, fire management and emergency vehicle access requirements should complement conservation objectives for the proposed ecological corridor where practicable.

Although modified and degraded through existing land uses, human usage, and public infrastructure such as the construction of roads, freeway and drainage systems, the core wetland area (Treeby Road Lake) is proposed to be retained as public open space, thereby reinstating the linkage between Part A and B of Bush Forever Site No. 270. This linkage also retains areas of upland vegetation providing a transect of vegetation types from seasonally inundated sumpland to Eucalyptus woodland communities, which is also consistent with the intent of the City's Local Biodiversity Policy for the protection of areas of upland vegetation.

The interface of the LSP area has been determined in liaison with the City considering fire management requirements, access and conservation requirements. Given the historic use and degradation of the site, the City have indicated their in principle support of a landscape edge treatment which allows for restricted community access to the Part C area in order for its use as passive recreation area. Treatments of this area will however be subject to further detailed design and review with the City.

For further detailed information regarding the geomorphological, drainage, hydrological and flora considerations which informed the design process is provided within the Wetland Management Strategy provided in Appendix 4 of this Report.

4.2.4 Western Power High Voltage Lines

The Western Power high voltage power lines traversing the eastern portion of the site from Anketell Road through to Part B of Bush Forever Site 270, presents a physical separation to neighbourhoods as well as placing limitations on construction in, and adjacent to, the easement.

The easement is therefore proposed to be utilised for a linear POS link, providing a strong north-south pedestrian and cycling network to the proposed Wandi District Centre. This link combined with strong east-west connections via the road network will ensure connectivity within the LSP area. The easement is provided as restricted POS however as advised by the Department of Planning shall not be credited under the POS schedule.

The easement land shall be ceded to the City free of cost as a condition of subdivision approval as a freehold title.

4.3 Residential

The LSP achieves an average residential density of 26 dwellings per site hectare and 12 dwellings per gross urban hectare. This is consistent with Liveable Neighbourhoods requirement, which stipulates a minimum average of 22 dwellings per site hectare for Greenfields subdivision areas.

The LSP however does not achieve the Directions 2031 target being a minimum 15 dwellings per gross urban hectare on the basis of the following site characteristics:

- ▲ The Western Power Easement which comprises 4.3 hectares of the total gross urban area;
- The non-residential land uses within the LSP including, the Recreation Centre site and the Primary School site;
- The inclusion of the City's standard playing fields design which requires additional POS provision above the 10% requirement; and
- ▲ The inclusion of the R10 interface along the eastern boundary of the LSP area.

Given the location of the LSP area within proximity to the Wandi District Centre, subdivision must however meet the standard 30 – 40 dwellings per site hectare within 400m of the District Centre. From the Indicative Plan of Subdivision, the proposed design and density allocation achieves 35 dwellings per site hectare within 400m of the Wandi District Centre.

The LSP therefore allocates an R30 coding to the majority of the site, with areas of R40 and R60 allocated to lots within proximity to areas of high amenity and access to schools, and adjacent to public transport or neighbourhood connector routes. Within the eastern portion of the LSP area R25 is the predominant density utilised with an interface of R10 to the adjacent rural residential lots.

An Indicative Subdivision Plan has been prepared for the site, identifying a yield of approximately 1180 lots.

4.3.1 Residential R10

R10 lots are proposed to provide a transitional interface from rural to residential to minimise the amenity impacts to existing rural residents.

Detailed Area Plans (Local Development Plans) will be required for R10 lots to provide further guidance for development in regard to:

- Landscape/ Vegetation Areas;
- Setbacks and building envelope;
- Access, and
- Bush Fire Management requirements.

4.3.2 Climate

Under the provisions of LN lots should be oriented to facilitate siting of dwellings and private open space to optimise solar access. Given the site characteristics and design applicable to the LSP area, almost all lots would have their long axis within the range N20°W to N30°E or E20°N to E30°S as presented in Figure 17.

44 Movement Networks

The following provides a summary of the proposed movement network. For further information it is recommended the reader consult the Transport Assessment included at Appendix 8.

Refer Figure 18 - Indicative Movement Network.

4.4.1 **Existing Road Network**

Anketell Road

Anketell Road is classified as a District Distributor A Road in the Main Roads Functional Road Hierarchy and is constructed as a single lane two-way road to a rural standard. Current traffic data from Main Roads indicates 3,682vpd east of the Kwinana Freeway (2008). The data indicates an even split with peak periods occurring between 6am to 7am (335 vehicles) and then 3pm to 4pm (330 vehicles). There has been limited development in the locality and traffic flows would not be expected to have increased significantly in the past 6 years.

Through detailed design undertaken with MRWA and DoP, the ultimate Anketell Road reserve has now been defined and reflected in the transfer of the land adjacent to the Urban zone in May, 2014.

Treeby Road

Treeby Road is a local road, situated centrally within the Anketell North Cell, providing local access to the existing rural residential allotments. Treeby and Anketell Roads intersect at the northern boundary of the LSP area in the form of a priority T-intersection. The southern portion of Treeby Road is currently unconstructed and therefore there is no connection through to Thomas Road. There is a need for Treeby Road to be constructed south to connect with the Anketell South LSP area to provide secondary access as per the fire management plans for both Anketell North and South LSP areas.

4.4.2 **Proposed Road Network**

The proposed road hierarchy for the LSP has been determined from modelling based on the indicative subdivision layout, and provides for simple and efficient vehicle movements through the site.

The movement network reflects a strong north-south and east-west modified grid configuration, with direct connections to Anketell Road. The Treeby Road extension will provide a direct connection south to Thomas Road via the Anketell South LSP area. The street block lengths are consistent with the requirements of LN, providing for connectivity and permeability through the site, for both pedestrians and vehicles.

The indicative road network is proposed to comprise of the following road classifications:

Road Classification	Indicative Upper Traffic Volume (Vehicles Per Day)	Indicative Road Reserve Width
Integrator B	15,000	25.2 metres
Neighbourhood Connector A	7,000	25.2 metres
Neighbourhood Connector B	3,000	19.4 metres
Access Street B	<3,000	16.9 metres
Access Street C	*N/A	15.4 metres
Access Street D (where services are on one side of the street only)	*N/A	13.2 metres

^{*}Widths are a requirement of the City and are not dependent on traffic volumes

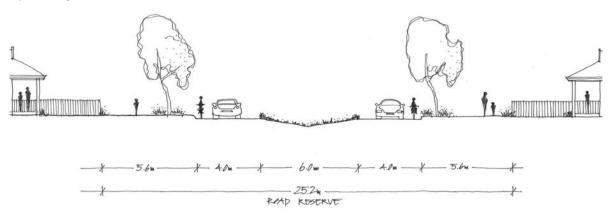
The road hierarchy primarily consists of Access Streets, with a central Integrator B/ Neighbourhood Connector A and an Access Street B providing a north south link connection through the site.

Treeby Road

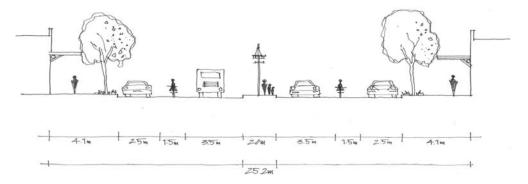
Treeby Road is proposed to be upgraded and in part realigned, through the site to an Integrator B and Neighbourhood Connector A standard. Treeby Road will be upgraded from the full movement intersection at Anketell Road and ultimately connect through to Thomas Road via the proposed Anketell South LSP Neighbourhood Connector.

Given the traffic volumes along the Treeby Road extension are anticipated to range from 3,000vpd in the southern portion of the LSP area through to 10,000 vpd at the Anketell Road intersection, the road design in the southern portions of the LSP area will reflect the typical Neighbourhood Connector cross section utilised in the Wandi Cell of 25.2m. This cross section allows for a central swale and on-street bicycle lanes. Further north in the LSP area where traffic volumes increase, an Integrator B - Centres cross section of 25.2m will be utilised with a reduced centre median to allow for on-street parking.

Typical Neighbourhood Connector A Cross-Section



Typical Integrator B Cross-Section



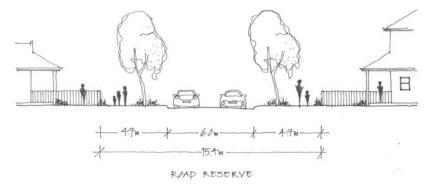
Access Streets

The access streets are proposed to primarily consist of Access Street C roads, designed to a 15.4 metre cross-section. Where services are only required to one side of the road, such as adjacent to public open space or the Kwinana Freeway reserve, a reduced Access Street D cross-section of 13.2 metres is proposed. This is consistent with road cross sections approved within the ERIC corridor.

Traffic volumes along the access roads are typically estimated to be in the order of 1,000 to 3,000 vehicle movements per day, which is consistent with the road hierarchy classification under Liveable Neighbourhoods.

An Access Street B is proposed within the western portion of the LSP area and provides a secondary connection from Anketell Road through to the Primary School site and Treeby Road the volumes anticipated for the Access Street B road ranges from 2,800vpd within proximity to Anketell Road to 1,800 vpd connecting through to Treeby Road.

Typical Access Street C Road Cross-Section



4.4.2.1 Anketell Road Intersection Treatments

As previously noted, Anketell Road may ultimately accommodate freight vehicles and traffic volumes in excess of 50,000vpd. Given this, the number of intersections, their spacing and general access arrangements present limitations for access to the Anketell LSP Area. Through discussions with MRWA and the detail design work undertaken for Anketell Road, three intersections between the Kwinana Freeway and the existing Lyon Road intersection have been secured, being:

- The upgrade of the Treeby / Anketell Roads intersection to a full movement, signalised intersection; and
- Two restricted movement, left in left out intersections between the Kwinana Freeway and Treeby Road intersection and in proximity to Lyon Road.

These three access points to Anketell Road have been managed through the proposed road hierarchy proposed to ensure traffic movements can be evenly distributed through the Anketell Cell.

4.4.2.2 Truncation Variation - Small Lot Product

In accordance with the provisions of LN, Element 2 – Movement Network R55, truncations of $3m \times 3m$ are to generally be provided on corner lots. Notwithstanding, truncations of $6m \times 6m$ have been the traditional standard applied by Local Governments in greenfield areas.

With the introduction of small lot product, the traditional $6m \times 6m$ truncations significantly impede on small lot sites. As such, discussions with the City's Technical Services have indicated that reduced truncations of $3m \times 3m$ in accordance with LN may be entertained at subdivision, subject to an assessment of appropriate sightlines in accordance with Austroads Standards.

Further assessment and documentation is proposed to be undertaken at detailed subdivision, to enable truncations and kerb radii in accordance with R55 and R57 of LN.

4.4.2.3 Connectivity for Pedestrians and Cyclists

In accordance with Liveable Neighbourhoods requirements, footpaths will be provided on at least one side of every street. Footpaths are also proposed along:

- The Integrator B/ Neighbourhood Connector running north-south through the site;
- ▲ The Access Street B adjacent to the proposed Primary School; and
- ✓ On both sides of the street in areas within 400m of the primary school.

As previously noted, the Anketell Road reservation design has made provision for one pedestrian crossing point at the Treeby Road signalised intersection however additional connections may be desired in future.

As previously noted, grade separated pedestrian/ cycle connections between Anketell and the Wandi District Centre should form part of the inter-agency study of Anketell, Rowley and Thomas Roads.

The Perth Bike Map series shows an existing principal shared path along the western side of Kwinana Freeway. The Perth Bike Map also designates Anketell and Thomas Road for bicycle lanes to connect to the regional bike network. Future subdivision approvals should consider the extension of the local bicycle network to connect with the existing shared path network.

4.4.3 Public Transport

The LSP area is not currently directly serviced by public transport. The closest existing bus service is Bus Route No. 57, which runs along Lyon Road, north of Rowley Road through Aubin Grove, approximately 500 metres east of the site. The extension of this route via Honeywood Avenue to the District Centre Site and Anketell Road is anticipated in 2015.

Timing for the extension of bus services through to Anketell Road is not known at this stage, however the upgrade to Treeby Road is designed to accommodate buses, upon the future establishment of services.

The Perth to Mandurah railway line is situated to the west of the site, within the Kwinana Freeway reserve. The closest passenger station to the site is the Kwinana Station, approximately 2.7 kilometres to the south. An additional station is also planned for Russell Road / Success, approximately 6.3 kilometres to the north.

4.5 Water Management

This section addresses the proposed urban water management network.

4.5.1 Water Management Strategies and Planning

4.5.1.1 Regional Water Management Strategy

An overarching draft Drainage Water Management Plan (DWMP) was released by the Department of Water in August 2008. The draft DWMP provides district scale flood modelling, surface water management strategy and groundwater management strategy which specify post-development levels and flows to address the City of Kwinana District structure plan (ERIC).

4.5.1.2 District Water Management Strategy

A District Water Management Strategy (DWMS) was prepared in 2009 and provides guidance on water re-use options, stormwater detention basins, monitoring requirements, and structural and non-structural controls for stormwater treatment. The DWMS has been approved by both the City of Kwinana and the Department of Water (October, 2009).

4.5.1.3 Local Water Management Strategy

A Local Water Management Strategy (LWMS) has been prepared in support of this LSP, and is provided as Appendix 9.

The LWMS addresses the LSP area, and provides a refinement of flood modelling, the surface water management strategy and the groundwater management strategy to a local scale. The LWMS has been prepared in accordance with the water sensitive urban design practices as described in the Stormwater Management Manual of WA.

4.5.2 Proposed Drainage Network and Infrastructure Requirements

Surface water flows are to be managed at a lot level and development scale to maintain predevelopment hydrology by retaining or detaining surface water, and to infiltrate runoff close to source. The design concepts for managing stormwater within the LSP areas are as follows:

- ✓ Employ soakwells in lots to retain and infiltrate the 1:1 yr ARI event and avoid direct runoff to the street conveyance system. This will increase infiltration and detention periods whilst reducing peak flow rates;
- Rain gardens/ swales (where appropriate) along roads to infiltrate 1:1 yr ARI events;
- Provide pipe systems within the road reserve to convey runoff for storm events up to the 1:5 yr event to the basins and Legal Discharge Points (LDP);
- ✓ To provide adequate storage and attenuate post-development flows to predevelopment conditions and maintain the required free-board to finished lot levels; and
- Discharge to receiving environment to provide an outlet to the nearest regional drainage line and ensure that flow rates and water gaulities are within the design limited.

The western power easement is to contain its own runoff, with no additional drainage from the development.

4.5.2.1 Local Drainage

The local stormwater drainage system has been designed using a major/minor approach.

The major drainage system is designed to manage rainfall events greater than the 5 year ARI, up to the 100 year ARI. The key elements of the major drainage system strategy are as follows:

- The road kerb system will convey flows that exceed the capacity of the pipe drainage system in the 1:100yr event, discharging into the proposed detention basins. Detailed design of the drainage system will be undertaken during the UWMP to ensure that adequate freeboard is achieved.
- ✓ The road network provides flood storage as well as conveyance in the 100 year event.
- Minimum habitable floor level to be a minimum 0.5m above the 100 year event to ensure public safety.

This design strategy is consistent with the objectives provided in the DWMS.

The minor drainage system is designed to manage rainfall events up to the 5 year ARI. The following strategies are proposed:

- Soakwells will collect and infiltrate roof runoff at source up to the minimum 1 year event.
- ▲ A road pipe drainage system with leaky manholes will collect and convey flows up to the 5 year ARI event, discharging into bio-retention pockets and infiltration systems incorporated into the median of the collector roads and within the designated drainage reserves.
- Bubble-up pits are proposed at the entrance of the bio-retention systems where runoff cannot enter as overland flow. These bio-retention pockets have been sized to infiltrate/retain up to the 1 year 1 hour ARI event from all connected impervious areas on the site.

In accordance with the processes defined under *Better Urban Water Management*, an Urban Water Management Plan (UWMP) will be required to be prepared and implemented at the time of subdivision. The UWMP will refine and implement the proposed drainage network/system, as defined under the LWMS.

4.5.2.2 Minimising Impacts to Treeby Road Lake

Predevelopment surface flows generated in the LSP area predominantly drain to Treeby Road Lake prior to ultimately discharging at the southern Legal Point of Discharge (LDP) at Thomas Road. Changes proposed under the LSP will generate increased flows to Treeby Road Lake and in order to maintain the current hydrological regime the following design objectives have been applied to the LWMS:

- ✓ Flows less than the 5 year ARI are not to enter Treeby Road Lake;
- ✓ Ensure the maximum depth of the lake is not increased by more than 10%;
- Maximise infiltration of runoff to ensure the lake continues to be fed by groundwater, and
- ▲ Allowing the large ARI events to continue to enter the lake.

Outlet structures of the detention basins have been designed such that the low flow culverts will discharge to either the piped drainage network, or as overland flow into the Peel Sub P Drain. This will ensure the smaller ARI events (< 5 year) do not enter the lake.

4.5.2.3 Groundwater Management

Groundwater contours refined to a local scale are in general agreement with the controlled groundwater level presented in the draft DWMP. In areas where finished level depth to groundwater is <1.2m then subsoils are proposed to be laid at or above the CGL consistent with the draft DWMP. For lots, fill of 1.5m above the subsoils is proposed so that soakwells can be installed (or else filled at least 1.2m above draft DWMP defined post-development phreatic line).

4.5.2.4 Ongoing Management and Responsibilities

The ongoing water management and responsibilities are summarised in the table below.

Table 5: Water Management Responsibilities

Organisation	Role/Responsibility	
City of Kwinana	Assumes future long term responsibility for roads and storm water infrastructure including the ongoing operation and maintenance thereof subsequent to agreed handover by the developer.	
Water Corporation	Assumes future responsibility for the potable water supply and sewerage infrastructure including the ongoing operations and maintenance thereof.	
Developer	Obtain approval of the UWMP.	
	Implement approved Acid Sulphate Soils and Dewatering Management Plans, and Taking Water and Disposal Licenses during construction of subdivision works.	
	Demonstrate that the proposed subdivision designs supportive of the UWMP can achieve the water quantity and quality objectives and criteria set by this document.	
	Undertake post development monitoring, including the provision of appropriate monitoring locations, for a period of 2 years following sale of the last lot within the development.	
	Utilise monitoring data to amend or provide BMPs to ensure that water quality objectives are achieved.	
	Construct and subsequently maintain stormwater control measures until handover to the CoK.	

4.6 Education Facilities

In accordance with ERIC, the LSP proposes one primary school located generally centrally within the Anketell North LSP area.

The provision of one primary school is also consistent with the catchment requirements under Liveable Neighbourhoods, which stipulates an average of one primary school per 1,500 lots. Based on current planning, it is anticipated the Anketell North and South LSP areas have the potential to yield up to 1,500 lots combined.

Whilst it is preference for the Anketell North Playing Field (as indentified under ERIC) to be co-located with the proposed Primary School site to facilitate a shared playing field arrangement, the topography of the site is prohibitive. The topography experienced would result in the co-located site being subject to a significant fall with extensive retaining required.

The proposed location of the school site enables an appropriate separation distance from the Western Power Easement and the Bush Forever Site as required by the DoE. To reinforce access for the cell to the school the proposed street network and linear areas of POS create direct pedestrian access. The

relocation of the playing field to its central location ensures a high level of accessibility to this facility for a greater proportion of the LSP area.

The proposed Anketell Primary School site is bounded by three proposed Access B streets. We confirm these road reserves have been provided to accommodate on-street parking. The street network/street block pattern surrounding the school has been designed such that lots/dwellings shall be oriented towards the school for surveillance purposes. Subdivision design for land surrounding the school will need to demonstrate appropriate parking, public transport and walking/cycling. The subdivision application itself must address CPTED/safety principles and housing access.

A search of the DoE system identifies the Anketell area as currently being within the intake areas for the Hammond Park Primary School, Gilmore College (Kwinana Senior High School), and Atwell College. In addition it is anticipated the Wandi Primary School will be opened in the coming 5 years, as such the above school sites will likely service the proposed Anketell population until such time as the Anketell Primary School and Wandi High School are delivered.

4.7 Activity Centres and Employment

4.7.1 Secondary Centres

In accordance with State Planning Policy 4.2: Activity Centres for Perth and Peel (SPP 4.2), the closest secondary centres to the LSP area are Cockburn Gateway (approximately 8.7 kilometres to the north) and the Kwinana Town Centre (approximately 7.5 kilometres to the south west).

Beside the Perth City Centre (Strategic Metropolitan Centre), these centres comprise the main regional activity centres within relatively close proximity to the Anketell North LSP area. They provide a diversity of uses, providing for a range of economic and community services required to service the future population.

4.7.2 District Centre

Current strategic planning identifies the future Wandi District Centre to be located within Wandi on Anketell Road, east of the Kwinana Freeway.

Under the City of Kwinana's Local Commercial and Activity Centres Strategy (LCACS), the Wandi District Centre has been allocated approximately 20,000m² of retail floor space and 10,000m² of non-retail floor space. This floor space allocation is capable of supporting two full line supermarkets and a discount department store, as well as a wide range of complementary specialty shops.

Upon finalisation of the draft LCAC Policy, a structure plan will be lodged for the District Centre. It is anticipated this will occur in 2015.

4.7.3 Employment

Given the location of the site in relation to the Kwinana City Centre, Cockburn Central, Fremantle and its accessibility to the Perth City Centre afforded by access to the Kwinana Freeway and the Perth to Mandurah train line, there are a number of regional employment opportunities available to the community.

Locally within the City there are a number of existing and proposed district employment generators. The Kwinana Industrial Area provides approximately 26,000 employment positions and is located approximately 6 kilometres from the LSP area. The LSP area is also located approximately 3.5

kilometres from the Latitude 32 Industrial Areas (Hope Valley Wattleup Redevelopment Area) which are expected to ultimately provide for 10,000 additional jobs. The City of Kwinana itself is a large employer within the municipality with the City Centre identified as a Secondary Centre under SPP 4.2 and Directions 2031. The centre is fulfilling this charter through projects such as the City Centre Hub Redevelopment.

Additional employment areas are located within the Casuarina Cell comprising the mixed business precinct and the neighbourhood centre located on Mortimer Road, which will also provide local employment opportunities. The existing mushroom farm located within the Casuarina Cell is one of the largest private employers in the locality.

Proposed school sites within Wandi, Anketell and Casuarina will also provide employment opportunities for the ERIC corridor.

4.8 Infrastructure Coordination, Servicing and Staging

The following provides a summary of the infrastructure and servicing for the LSP area, however for further information it is recommended the reader consult the Engineering Services Report provided as Appendix 10.

4.8.1 Water Supply

The Water Corporation has made provision for water supply to the Anketell North Cell in its planning for servicing the south-east corridor. The site is located within the Water Corporation's 'Thomson's Lake' Gravity water supply scheme fed from existing water storage facilities located on Henderson Road, Beeliar.

Further preliminary investigations with the Water Corporation have resulted in a review of the current Water Corporation scheme planning. To service Anketell North a water supply will have to ultimately extend from the distribution mains required for the Wandi Cells. In addition an injection via an additional distribution main (700mm diameter) from the west side of the Kwinana Freeway is required. Preliminary investigations suggest this distribution main would cross under the Kwinana Freeway near to the existing Peel Main Drain Crossing. MRWA has confirmed that a crossing at Rowley Road is not feasible and Water Corporations preference is for a crossing south of Rowley Road. Ultimately the actual crossing location is to be determined by the Water Corporation.

Subject to the status of the Water Corporation Capital Works Program the development of the site may require the prefunding of water supply distribution mains.

Any extensions/upgrades that are necessary for development shall be the responsibility of the developer as part of the normal subdivision process.

4.8.2 Sewerage

The Water Corporation has made provision for a reticulated sewerage scheme for the Anketell LSP area in its planning for servicing the south-east corridor. The site is located within the Water Corporation's 'Thomsons Lake' sewerage catchment which is connected to the Bibra Lake Main sewer that discharges into the Woodman Point Wastewater Treatment Plant.

Preliminary investigations with the Water Corporation have confirmed the establishment of four prefunded pump stations subject to final Water Corporation design checks being;

a) Type 90 Pump Station East of the Kwinana Freeway.

- b) Type 90 Pump Station West of the Kwinana Freeway.
- c) Type 10 Pump Station West of the Kwinana Freeway, Southern area.
- d) Type 40 Pump Station East of the Kwinana Freeway adjacent to Thomas Road.

The Anketell North and South LSP areas area proposed to be serviced from pump stations 'a and 'd'. The northern half of the Anketell North LSP area will be serviced through a gravity sewerage system to pump station 'd' which will be pumped via a pressure main back up into the Anketell North gravity system which ultimately discharges into pump station 'a'.

Subject to the status of the development front north of the site and the Water Corporation's Capital Works Program, the development of the site may require the prefunding of this sewerage infrastructure or alternative arrangements being agreed with the Water Corporation.

Any extensions/upgrades that are necessary for development shall be the responsibility of the developer as part of the normal subdivision process.

4.8.3 Electricity

There is an existing overhead 22Kv power line and low voltage network on Treeby Road, and a small section on the south western corner on Thomas Road, which will need to be removed and replaced with an underground power network. The initial system will connect to the existing overhead/ underground systems located in adjoining roads.

Street lighting will be installed in accordance with the relevant Australian Standards and in accordance with approved Western Power and City of Kwinana designs. The theme is to be determined at subdivision in consultation with the City.

Any extensions/upgrades that are necessary for development shall be the responsibility of the developer as part of the normal subdivision process.

4.8.4 Natural Gas

Westnet Energy has advised the closest supply of gas is 1.6 kilometres south from Thomas Road. Westnet Energy is expected to charge for a capital works contribution for a Pressure Reducing Station and Headworks Gas Main Extension that will need to be paid by the developer.

4.8.5 Communications

There are existing Telstra services within the vicinity of the LSP area. It is intended all lots within the LSP area will be serviced with telecommunication services. This will be either by way of standard Telstra services.

The service provider will be responsible for installing telecommunication facilities within the development. The developer will fund the provision of trenches for cable laying. Alternatively, where cable routes are on the same alignment as Western Power underground power supply routes, the telecommunications will use, where possible, the Western Power trenches in lieu of the developer providing additional trenching.

Head works charges for telecommunication service extensions are anticipated.

4.8.6 Staging An Indicative Staging p

An Indicative Staging plan has been included at Figure 19.

It illustrates that development is likely to commence in the south-western extent of the Structure Plan area and move northwards towards Anketell Road.

As market gardens are decommissioned over time, development opportunities will increasingly open up on the eastern side of Treeby Road.

Given the uncertainty of timing for the cessation of market garden uses on Lot 90, the north eastern corner of the Structure Plan area is seen as likely latter stages of development.

4.8.7 Site Works

The LSP area comprises some low lying areas for development that will require fill to provide for suitable clearance above groundwater. Areas of higher ground will be re-contoured to meet the development constraints, provide for fill and to meet desirable grades applicable to each land use. Bulk earthworks will also be used to ensure adequate grades for drainage and sewerage, and to provide acceptable slopes for building in accordance with marketing and maximum allowable engineering grades.

The LSP is currently used for rural living purposes and whilst the majority of the site has been historically, or is currently cleared, some additional clearing for urbanisation will be required.

Preparatory works for development are as follows:

- Demolition of any existing outbuildings and existing improvements;
- Removal of farm debris, fencing and other improvements as necessary, however, retaining as many existing and significant trees and vegetation as possible;
- Stripping and grubbing of areas to be earth-worked with due regard to vegetation preservation in selected areas;
- Strip and stockpiling topsoil;
- Proof-roll existing sand;
- Bulk Cut to Fill across site and import as required; and
- Replace topsoil where required.

Ewing VDM anticipates the bulk earthwork operations for the recommended development option will be completed using material available from site to fulfil the development requirements.

4.9 Developer Contribution Arrangements

The LSP area is situated within the Anketell Cell for the purposes of Developer Contribution Arrangements, and forms part of Development Contribution Area 9 (DCA 9) for community infrastructure.

DCA 9 was introduced to TPS 2 by way of Scheme Amendment 115 (Gazetted on 19 June 2012), and is intended to have an operation period of 20 years (2011 to 2031).

The following items are currently listed under TPS 2 as being subject to funding by DCA 9.

	DCA 9	Item
	Sub-Regional	Community Knowledge and Resource Centre (excluding leasable office space and cafe component)
mmmillilli.		Destination Park (Calista)
ATTITUTE .		Wells Beach Foreshore Upgrade (Park and Boating facility)
	District A	Sporting Pavilion
		Community Centre
		Youth Centre
		Dry Recreation Centre
		Branch Library
	Local	Local Community House/Centre
		Local Sports Pavilion
	Admin	Administrative Costs

Notwithstanding the above, it is understood the City of Kwinana are currently reviewing the community infrastructure needs for the ERIC corridor on the basis of the reduced urban catchment within Mandoglaup. This is likely to result in a reduced need for facilities to be provided within the ERIC corridor.

Scheme Amendment (Amendment 100A) was initiated by the City of Kwinana at its December, 2014 meeting to introduce 'hard' infrastructure items to the Scheme. Upon gazettal of Amendment 100A, the Anketell Cell will also be subject to Development Contribution Area 4 (DCA 4).

Whilst the items to be included within DCA 4 are yet to be finalised, it is understood the indicative list of items includes the following:

- ▲ Thomas Road;
- ▲ Anketell Road;
- ▲ Treeby Road;
- Public Open Space; and

Should the review of DCA 9 and the finalisation of Amendment 100A not be complete prior to subdivision within the LSP area, it is likely a legal agreement will be entered into between the City of Kwinana and the Developer for the payment of interim costs, to be reconciled upon Gazettal of Amendment 100A and any amendments to the existing DCA 9.

Management Plans
Given the fragmented landours Given the fragmented landownership within the Anketell North LSP area, a number of management plans and additional site investigations are required. The following details the additional investigations/ works to be undertake prior to, or as a condition of, subdivision approval.

5.1 Wetland Management Plan

A Wetland Management Plan is to be developed for the central wetland area within Bush Forever Site Part C. The Wetland Management Plan should be developed in accordance with DEC Guidelines Checklist for Preparing a Wetland Management Plan, December 2008, for wetlands and associated buffer vegetation.

The Wetland Management Plan for the site shall include details pertaining to the following:

- Wetland (Treeby Road Lake) Monitoring Program;
- Additional Spring Survey work (if required);
- Identify improvements proposed to be undertaken by the developer (landscaping and design) intent), estimated costs as well as the ongoing costs of maintenance and replacement costs for the City;
- Areas of remnant vegetation within Bush Forever Part C and shall include objectives and strategies to address issues of fire management, access control (vehicle, pedestrian and emergency vehicle), reserve fencing, weed management, revegetation (species selection, species composition, species density, revegetation rates and survival rates), feral species control and fauna management; and
- Include a formalised handover arrangement to be outlined and endorsed by the City of Kwinana.

5.2 Mosquito and Midge Management Plan

The Mosquito and Midge Management Plan for the site shall include, but not be limited to, the following:

- Mosquito monitoring, surveys and reports (larval, adult, timing) requirements;
- Provision of geographical survey identify breeding habitats;
- Identify land ownership and responsibilities;
- Identify applicable environmental legislation;
- Identify key stakeholders;
- Determine and identify management options;
- Develop a control program;
- Determine potential operational resources (operational timeframes, funding requirements and contributions, community awareness), and
- Ongoing assessment and review of timeframes.

5.3 Acid Sulphate Soil Management Plan

The Acid Sulphate Soil Management Plan shall include, but not be limited to, the following:

- Identify potential issues associated with Acid Sulphate Soils and what measures may be necessary to prevent these issues from arising, and
- The location of services and cut to fill processes.

Engineering drawings are to be finalised prior to approval of the Management Plan.

The Management Plan will be prepared in accordance with the relevant legislation relating to Acid Sulphate Soil management.

5.4 Federal Fauna Management Plans and Fauna Surveys

Previous environmental work has indicated Black Cockatoo habitat is present at the site. Further investigations prior to subdivisional works will need to be undertaken to define the impacts of the development under the *Environment Protection and Biodiversity Conservation Act 1999* ('EPBC Act').

5.5 Landscape Management Plan and Maintenance Programme

Landscaping treatments have been broadly identified through the Landscape Master Plan in Part 2 as well as the indicative cross sections for drainage basins and swales. Whilst the plan and cross sections are provided to illustrate potential development outcomes, further discussion and detailed design is required through the preparation of Landscape Management Plans to finalise proposed treatments.

Landscape Management Plans will give due consideration to the following design criteria:

- Security, safety and surveillance matters, particularly with lots which abutting public open space.
- Minimising the amount of irrigated and turfed areas, without limiting the ability to provide for a suitable range of open space areas for different groups in the community.
- ✓ Fire management considerations, specifically with relation to interface treatments and fuel loads.
- Ensure the proposed streetscape, landscaping and fencing design meets the standards of the City and is maintained to an appropriate standard by the developer until such a time as agreed for handover by the City.
- Management Plans shall include a formalised handover arrangement to be outlined and endorsed by the City of Kwinana.

Amendment 100A provides a framework for the cost share arrangements within the Anketell North Cell for POS delivery in accordance with the LSP.

FIGURES



Planning Design Delivery



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Δ.	2013-09-25	S Blanchard	
3	2014.11.04	K. Trenberth	



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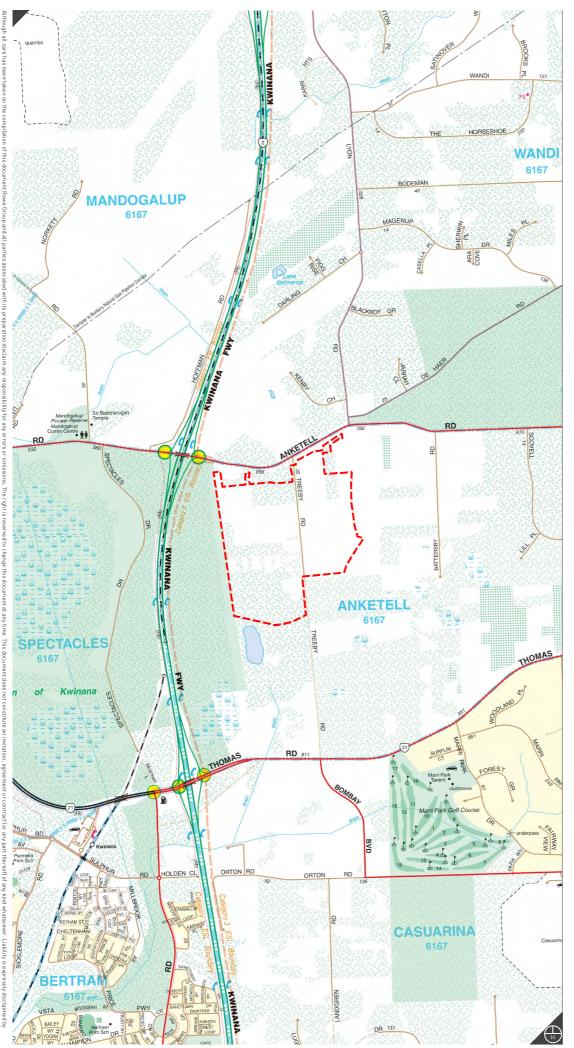
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2013-09-25 NTS @ A4 Mammoth Nominees P Fitzgerald S Blanchard MGA50 GDA94 4583-FIG-03-B

FIGURE 1

Regional Location

Anketell North Structure Plan Anketell



Anketell North Structure Plan Anketell



LEGEND

____ LSP Boundary

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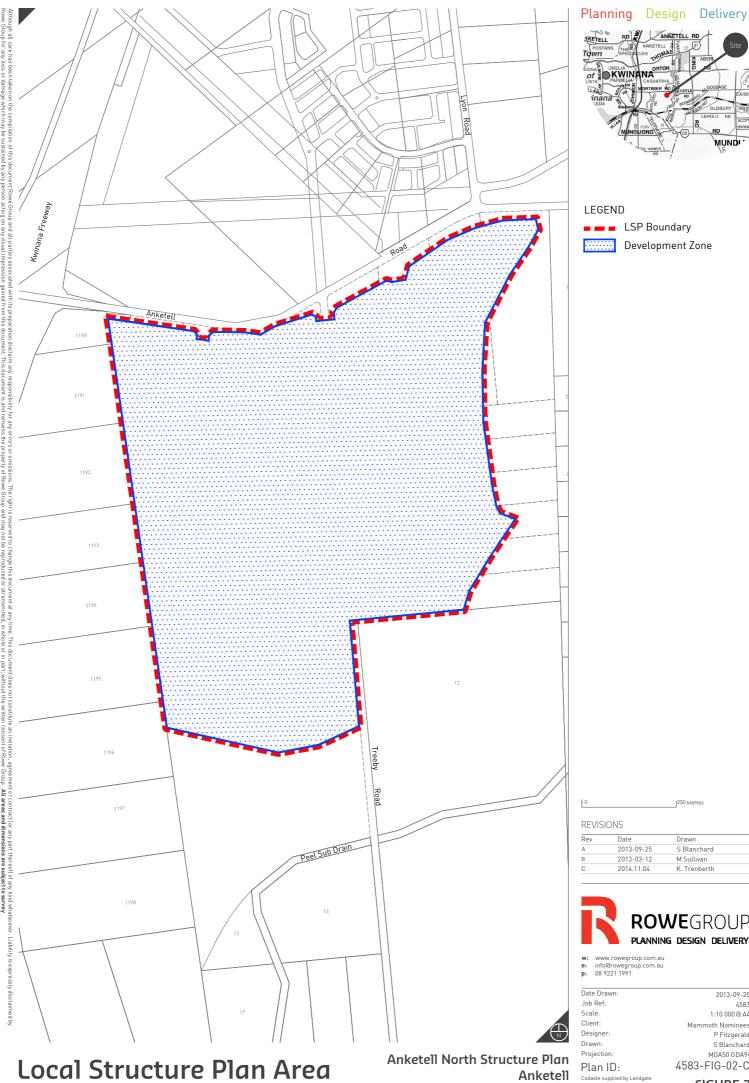


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FIGURE 2

Locality Plan





LEGEND

LSP Boundary

Development Zone

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Aerial, Contours & Cadastral (Site Plan)

Anketell North Structure Plan Anketell Planning Design Delivery



LEGEND

8

LSP Boundary Lot Numbers

Lot Boundary

Contours

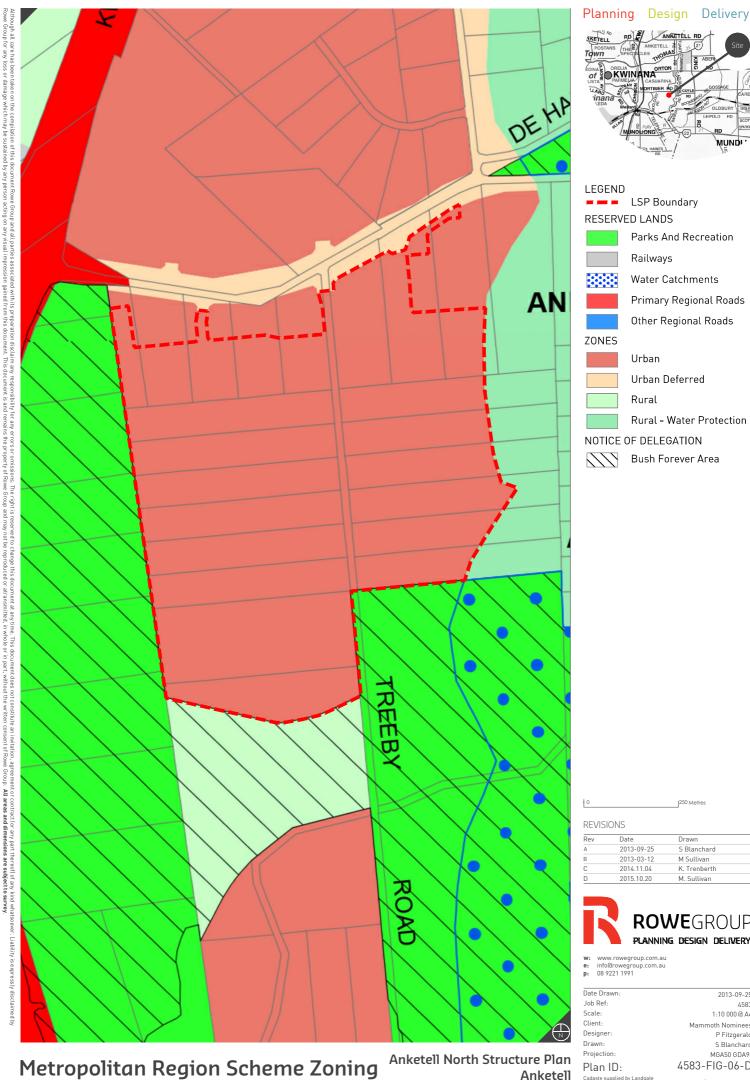
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Anketell

OF SHELIA ORTO LEGEND

LSP Boundary

RESERVED LANDS

Parks And Recreation

Railways Water Catchments

Primary Regional Roads

Other Regional Roads

Urban

Urban Deferred

Rural

Rural - Water Protection

NOTICE OF DELEGATION

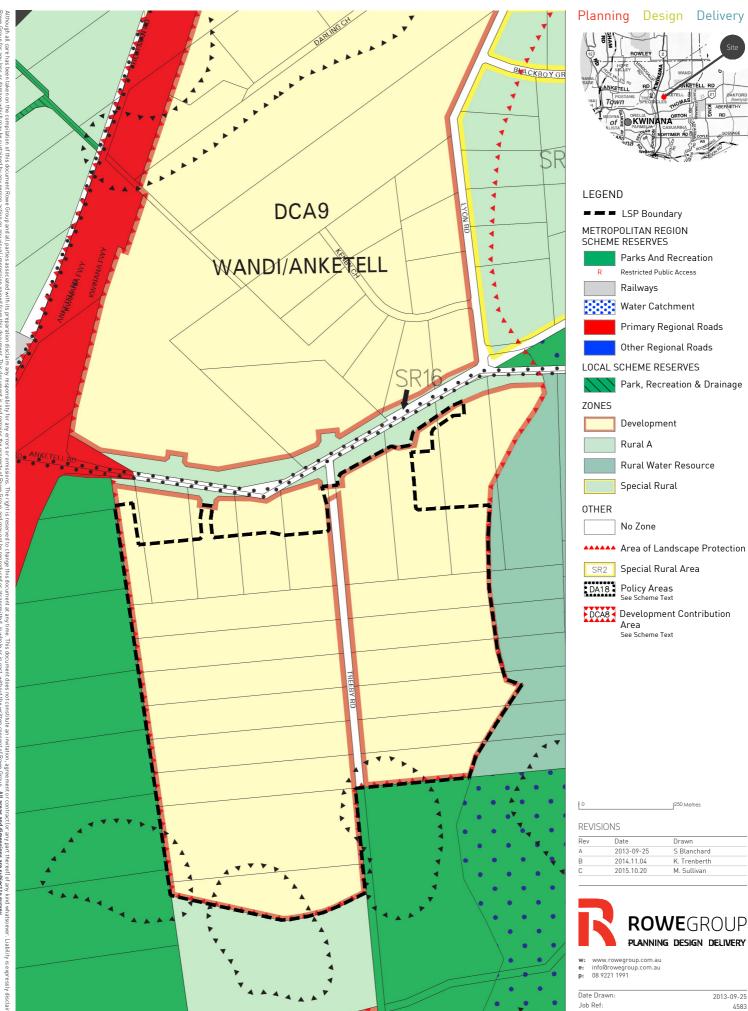
Bush Forever Area

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Local Planning Scheme

Anketell North Structure Plan Anketell

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FIGURE 7

55 | Jandakot Structure Plan

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FIGURE 8

Eastern Residential Intensification Concept (ERIC)

Anketell North Structure Plan Anketell



Planning Design Delivery



LEGEND

LSP Boundary



POS in which vegetation may be retained (in addition to road reserves where possible and Bush Forever)

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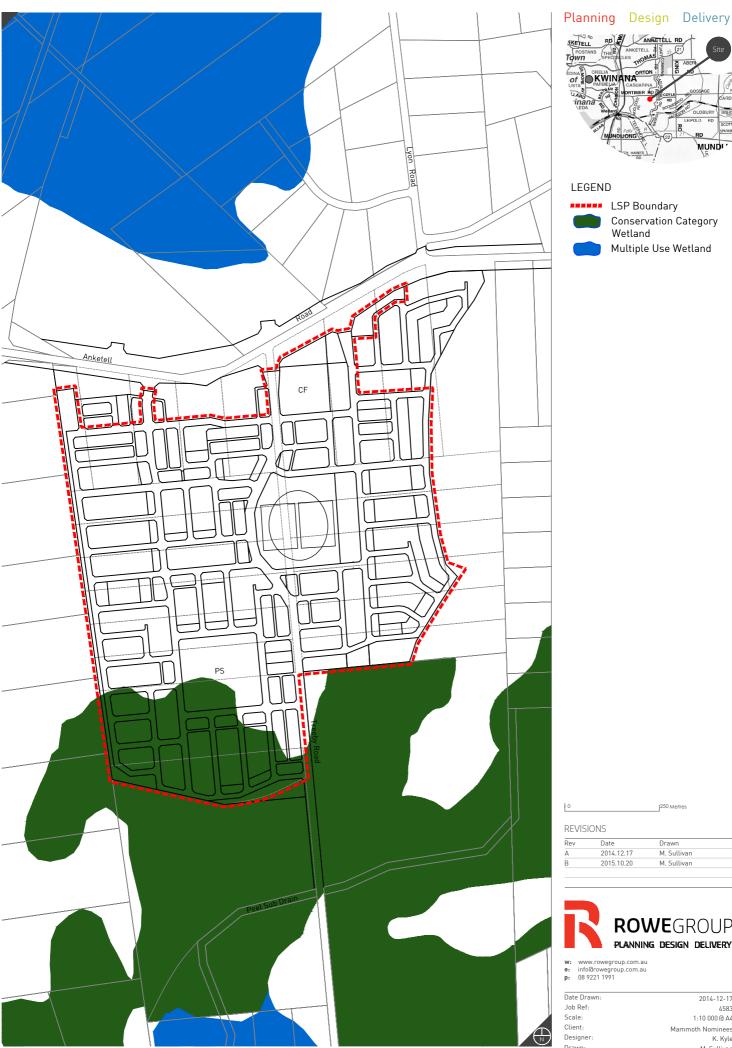
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FIGURE 9

2013-09-25 4583



Wetland Location

Anketell North Structure Plan Anketell

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MUND!

LEGEND

LSP Boundary

Wetland

Conservation Category

Multiple Use Wetland



Acid Sulphate Soil Risk

NATOWN PLANNING/A000-4999/A583/DRAFTING/A-CAD/A583_FIG198_20151020_ANKETELL IACID SULPHATE SOILSI,DWG

Anketell North Structure Plan Anketell Planning Design Delivery



LEGEND

LSP Boundary

Contours

Existing Lot Numbers

Existing Boundaries

Proposed Boundaries

Class 1 - High to moderate risk of ASS occurring within 3m of natural soil surface.

Class 2 - Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface.

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Indicative Plan of Subdivision

Anketell

Planning Design Delivery



LEGEND

LSP Boundary

Contours

Existing Lot Numbers

Existing Boundaries

Proposed Boundaries

REVISIONS

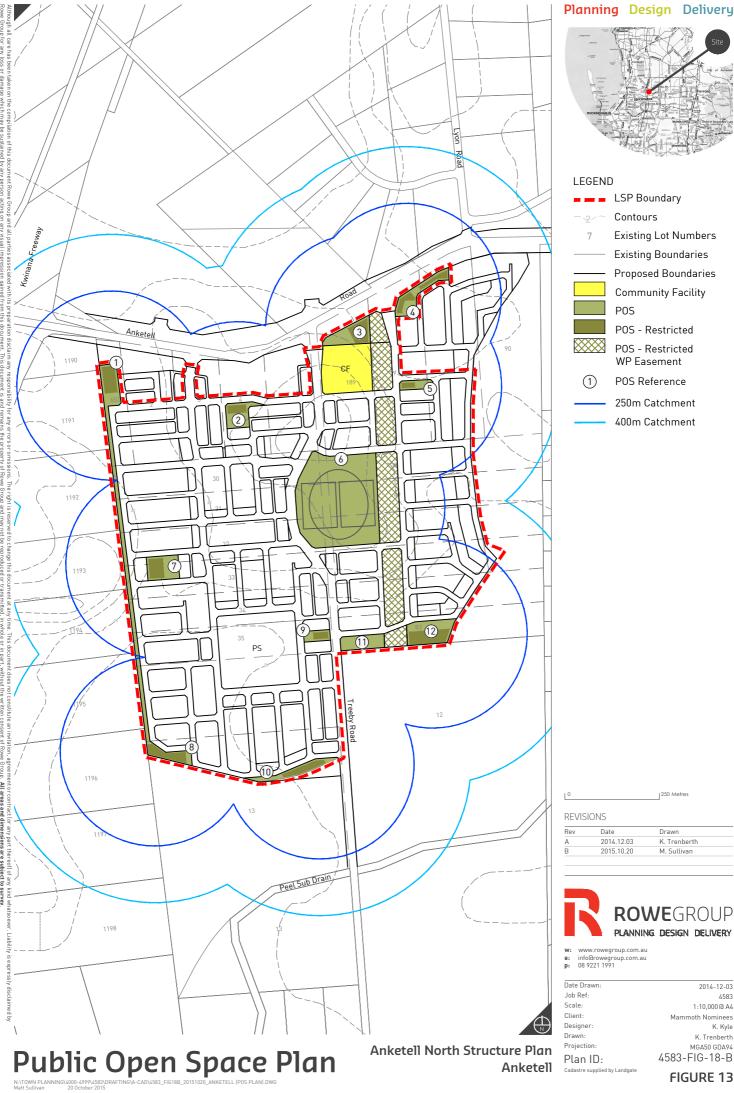
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LSP Boundary

Contours

Existing Lot Numbers

Existing Boundaries Proposed Boundaries

Community Facility

POS

POS - Restricted

POS - Restricted WP Easement

POS Reference

250m Catchment

400m Catchment

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Anketell North Local Structure Plan – Public O	pen Sp	ace Schedule - Plan	4583_LSP4J_20151201_	Anketell (LSP_Plan1)
7.12.15				
Site Area (Local Structure Plan Boundary and 1	50m Ex	(clusion Area)		98.4
Less				
Western Power Easement		4.3		
Net Site Area				94.1
Deductions				
Commercial		5		
Drainage (1:1yr) * See below		1.2		
Primary School		4.0		
Total			10.2	
Gross Subdivisible Area				83.9
POS @10%				8.4
Public Open Space Contribution				
May comprise:				
Min 80% unrestricted POS			6.7	
Min 20% restricted use POS			1.7	
Total Required POS				8.4
POS Reference Number (area within urban	1:1	yr Drainage (m2)	Unrestricted Urban	1:5yr Restricted POS
zone/LSP boundary only)	Dec	luction from Net	POS sites (m²)	(m²)
1 - Neighbourhood Park		2000	1924	272
2 - Neighbourhood Park		800	3374	148
3 - Neighbourhood Park		2000	3507	265
4 - Neighbourhood Park		850	3838	749
5 - Local Park		350	1681	55
6 - Anketell Playing Fields		0	49781	(
7 - Neighbourhood Park		1800	3375	74
8 - Neighbourhood Park		1500	10634	530
9 - Local Park		365	1371	248
10 - Local Park		443	2336	1108
11 - Neighbourhood Park		0	4227	(
12 - Neighbourhood Park		2200	3815	1180
Community Site			16720	
Total		12308	106583	4627
		1.2	10.7	0.5
Percentage of gross subdivisible area		1.5%	12.7%	0.6%

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4	2014.12.19	K. Trenberth	
3	2015.10.21	M. Sullivan	
;	2015.12.07	M. Sullivan	



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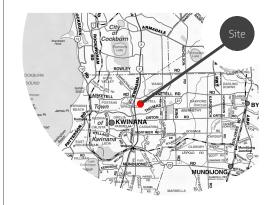
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					Deductio	ns				
Lot No.	Address	Total Site Area (ha)	Commercial	Primary School	Water Protection	Western Power Easement	Anketell Road Widening	Sub Total	Gross Subdivisible Area	Percentage of Total Site Area
652	656 Anketell Road	20000	3344				901	4245	15755	1.9%
2	664 Anketell Road	39836	10141				2346	12487	27349	3.3%
3	676 Anketell Road	33614	9924				2304	12228	21386	2.6%
4	686 Anketell Road	30630	11493				108	11601	19029	2.3%
7	734 Anketell Road	59641				15824	6891	22715	36926	4.5%
89	748 Anketell Road	68384			6085		4782	10867	57517	6.9%
90	758 Anketell Road	84623			59923		3505	63428	21195	2.6%
188	28 Treeby Road	36064	15191				2110	17301	18763	2.3%
189	19 Anketell Road	50649				892	6412	7304	43345	5.2%
36	35 Treeby Road	50687			16693	3952		20645	30042	3.6%
30	36 Treeby Road	48385							48385	5.8%
31	48 Treeby Road	48006							48006	5.8%
37	49 Treeby Road	50181			15926	4969		20895	29286	3.5%
38	55 Treeby Road	49675			14961	4437		19398	30277	3.7%
32	56 Treeby Road	47626							47626	5.7%
39	63 Treeby Road	49169			12546	4197		16743	32426	3.9%
33	64 Treeby Road	47222							47222	5.7%
40	73 Treeby Road	48663			16027	4613		20640	28023	3.4%
34	74 Treeby Road	46868		5595				5595	41273	5.0%
35	82 Treeby Road	46311		18337				18337	27974	3.4%
41	83 Treeby Road	48100			21184	4205		25389	22711	2.7%
100	96 Treeby Road	102000		16068				16068	85932	10.4%
13	140 Treeby Road	48760							48760	5.9%
	TOTAL	1155094	50093	40000	163345	43089	29359	325886	829208	100%

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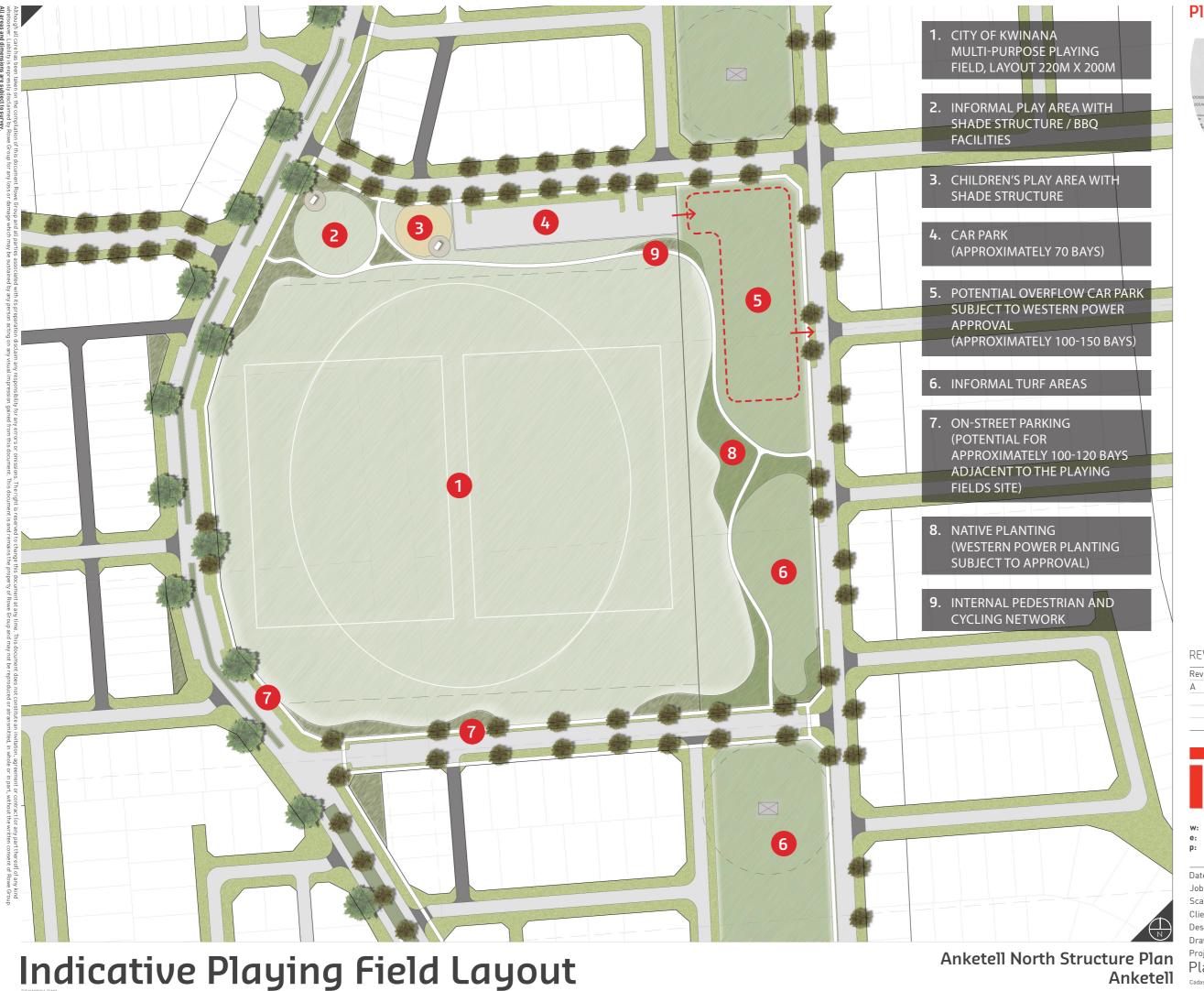


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Anketell North Structure Plan Schedule 2



Anketell North Structure Plan Anketell

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Target Residential Density

Anketell



Planning Design Delivery

LEGEND LSP Boundary Proposed Anketell TC 400m Walkable Catchment 30 Dwellings/Site Ha 400m Radius from Town Centre 800m Walkable Catchment 20 Dwellings/Site Ha 800m Radius from Town Centre Residual Site Area

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В	2014-03-12	M Sullivan
0	2014.11.05	K. Trenberth
D	2014.12.03	K. Trenberth
E	2015.10.20	M. Sullivan



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Anketell 1190 1191 1192 1193 1194 PS 1195 1198 **Anketell North Structure Plan**

Lot Orientation

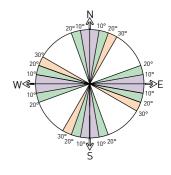
Anketell

Planning Design Delivery



LEGEND

LSP Boundary



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С	2014.12.03	K. Trenberth	
D	2015.10.20	M. Sullivan	



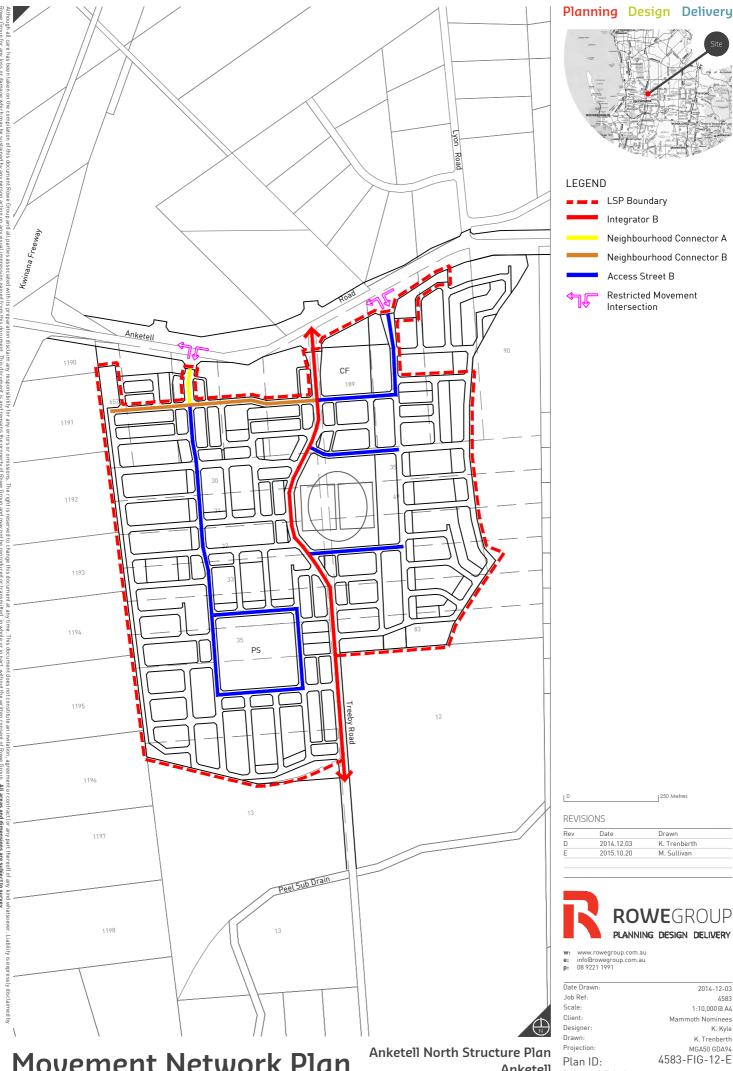
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FIGURE 17

2013-09-25 4583

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MGA50 GDA94



Movement Network Plan

Anketell

LSP Boundary Integrator B

Access Street B Restricted Movement Intersection

Neighbourhood Connector A Neighbourhood Connector B

REVISIONS

Rev	Date	Drawn	
D	2014.12.03	K. Trenberth	
E	2015.10.20	M. Sullivan	



www.rowegroup.com.au info@rowegroup.com.au 08 9221 1991

Date Drawn: Job Ref: Scale: Client: Designer: Drawn: Projection: Plan ID:

2014-12-03 1:10,000 @ A4 Mammoth Nominees K. Kyle K. Trenberth MGA50 GDA94 4583-FIG-12-E



Planning Design Delivery



LEGEND LSP Boundary Stage 1

Stage 2 Stage 3

Stage 4 Stage 5 Stage 6 Stage 7

Stage 8

REVISIONS

Rev	Date	Drawn	
С	2014.11.05	K. Trenberth	
D	2014.12.03	K. Trenberth	
E	2015.10.20	M. Sullivan	



www.rowegroup.com.au info@rowegroup.com.au 08 9221 1991

Date Drawn: Job Ref: Scale: Client: Designer: Drawn: Projection:

Mammoth Nominees P. Fitzgerald S. Blanchard MGA50 GDA94 4583-FIG-15-E

2014-11-05

1:10 000 @ A4

Plan ID: Cadastre supplied by Landgate

Appendix 7

Servicing Report



Telephone: (08) 9481 1900
Facsimile: (08) 9481 1700
Ground Floor "The Atrium"
Suite 3/123A Colin Street
West Perth WA 6005
Our Ref: Servicing Report
6 March 2019.doc

TERRANOVIS PTY LTD LOT 7 ANKETELL RD, ANKETELL ENGINEERING SERVICES REPORT.

1. General:

The above lot is to be developed into 56 urban residential lots. This report covers existing and proposed services, including proposals for earthworks, retaining walls, roads, drainage, groundwater, water supply, power supply, gas, telecommunications and sewerage as required for current urban development standards.

2. Executive Summary.

The land the subject of this report is located on the south side of Anketell Road, some 200 metres west of Lyon Road and some 200 metres east of Treeby Road, in the Anketell district of the City of Kwinana.

The land is vacant, and has an area of some 5.9 hectares, mostly cleared with some residual scrub located on the eastern two thirds of the land, and cleared on the western third where a 330Kva High Tension Pylon power line is located running north – south.

The land is generally at least 4 metres above the groundwater at its lowest point on the north east corner at the north- west corner as determined by the LWMS carried out some time ago by Bioscience Consultants, and as verified by this office. The site soil is classified as "Bassendean Sands" by the Geological Survey of WA on its Environmental geology Map, which is described as "suitable for urbanization". The land is described as "free draining above the water table", with a current process of groundwater recharge.

Site access is from Anketell Rd, which is a sealed rural road subject to future upgrading to a dual carriageway to act as a District distributor.

The land can be connected to all services, either by extension and upgrading from existing infrastructure, or by provision of new infrastructure as set out below. Power, telephone, gas and water services already pass along the site frontage.

It is proposed that all road stormwater from the development for the 1 in 100 year event will be retained on site via infiltration basins, with each residential lot having its own site drainage to cope with the 1 in 1 year storm via soakwells..

Because of the undulating nature of the site, all lots will be developed with retaining walls to provide level building blocks.



3. Site

Lot 7 Anketell Road is located on the south side of Anketell Road, midway between Lyon Road on the east, and Treeby Road on the west, approximately one kilometer east of the Kwinana Freeway.

The western third of the land is fully cleared where a 330Kva high tension pylon power line running north – south is located. The remaining eastern two thirds of the land is covered with light Banksia scrub. A work shed is located in this area adjacent to Anketell Road.

The land is generally the northern side of a hill, with a high point at RL32.5m AHD on the south west corner, RL 28.5m AHD on the south east corner, falling to a low point of RL 24m AHD at an east – west swale area near Anketell Road, thence rising to RL 26m AHD the north eastern corner at Anketell Road, thence falling to the low point of RL 23.5m AHD at the north west corner of the site adjacent to Anketell Road.

The geology of the land is described by the Environmental Geology Map of the Geological Survey of WA, as S8 – Bassendean Sands and described as being suitable for urbanization.

The site is adjacent to Water Corporation scheme water, plus telephone, gas and power. Access is from the existing sealed Anketell Road.

4. Development Proposal

It is proposed to develop the land as a 56 lot residential subdivision, including POS as shown on the plan of subdivision. The development will be provided with all normal services, with links to abutting developments for sewer, water, power, roads, gas and telephone services, with all stormwater drainage to be retained on site.

Water Corporation sewer and water services exist in Anketell Road, with a 200mm diameter water main located in Anketell Road alongside the site, and a sewer connection point located in Anketell Road some 120 metres west of the site.

The development will entail earthworks to provide level, free draining building blocks with extensive low height retaining walls up to 2 metres in height, given the sloping site.

All residential lot storm runoff will be directed to individual site soakage. Road stormwater will be directed to infiltration basins located as shown on the LWMS plans.

5. Earthworks & Retaining Walls.

Because of the sloping nature of the site, overall earthworks will be required to provide level building blocks, thus necessitating extensive low to medium height retaining walls

All retaining walls will be subject to Council building approval.

There is an earthworks embargo for this site during the months of November to March.

Earthworks on site will entail removal of topsoil, extensive cut and fill to balance areas of fill in the northern half of the development. It is proposed to win sand on site from under the high tension power line. No importation of fill is envisaged.



6. Roads

All new subdivisional roads will be constructed to City of Kwinana standards and approval, including kerbing and piped drainage plus provision of footpaths as required. The abutting Anketell Road is a designated district distributor, and will be upgraded at some time in the future. Any works on Anketell Rd as required for this development will be subject to WRWA approval; ie the entry road deceleration lanes and required widening.

Currently Anketell Road is a nominal 7.8 metre wide unkerbed single carriageway rural road lacking formal drainage. Upgrading plans show Anketell Road to be lifted above the existing roadway.

7. Drainage

All road stormwater drainage will be designed to City of Kwinana approval, and will generally be designed to convey the 1 in 5 year storm runoff to the infiltration basins as detailed in the LWMS and the Urban Water Management Plan (UWMP) which will be done in conjunction with the detailed subdivision design.

The development will be self- contained as far as stormwater runoff is concerned as per the LWMS. Two infiltration basins will be required in the north of the site; one within western POS strip containing the high tension power line, and the other within POS adjacent to the cottage lots area between the cottage lots and Anketell Road.

Each house lot will take care of its own drainage by way of soakwells, catering for the 1 in 1 year storm event. Runoff from storm events in excess of the 1 in 1 year storm will enter the existing piped system in the subdivisional roads to end up in the infiltration basins.

The soil characteristics of the Bassendean Sands on the site will allow efficient site soakage, based on the geology and the depth to groundwater, which is a minimum of 4.5 metres below the existing natural surface level, and will be some 5.5 metres below the finished lot levels.

8. Groundwater

The groundwater level at the site varies between RL 18.5m AHD along the western boundary, rising to RL 19.5m AHD along the eastern boundary, as detailed in the LWMS.

The minimum natural surface level of the site is at RL 23.5 m AHD at the north-west corner of the site.

As the northern half of the site has to be filled to achieve the required cover to the sewer, the minimum finished level of lots will be a minimum of RL 24.5m AHD, thus achieving a minimum separation from the groundwater level of 5 metres.

9. Power

Sufficient power supply exists in the area to supply the development. A high and low voltage aerial power line is located along the northern verge of Anketell Road adjacent



to the development. It is not envisaged that this line will be relocated, but connected to via an underground cable drilled under Anketell Road.

A 330 Kva high tension pylon line traverses the western third of the site in its own easement, and this will remain intact. Construction under and across this aerial line will need to be done exercising extreme caution. It is envisaged that all subdivisional services will either cross this line, be constructed under it, or be extended alongside it at the entry road.

All subdivisional power reticulation lines and transformer installations will be constructed at the cost of the developer. Transformer sites will be determined at the detailed subdivision design stage.

10. Water Supply

There is a recently constructed 200mm reticulation water main located along the southern verge of Anketell Road adjacent to the development, which will enable connection to the subdivisional lots.

11. Sewer

The site is not currently connected to sewer, although there is a recently constructed reticulation sewer main is located some 120 metres west of the site on the southern verge of Anketell Road. A connection will be made to this.

Fill will be required on the northern half of the site to enable the required cover to the sewer for its extension along Anketell Road southern verge, and within the subdivisional roads.

12. Telephone & NBN

Telstra underground cable services exist adjacent to the site along the frontage to the site in Anketell Road.

These are most likely to be able to be extended or upgraded to service this proposed development. If Telstra is to be the servicing authority, Telstra normally requires twelve months' notice of development starting to ascertain any upgrading requirements.

An NBN Fibre Optic cable is located along the northern verge of Anketell Road adjacent to the site. It is not expected that any construction will be along that verge, but extreme caution will need to be taken with any service crossings.

In accordance with recent requirements, the developer is required to install NBN "pipe and pit" to allow for future installation of cables for the NBN. The design of the "pipe & pit" is the responsibility of the developer, and will be designed in conjunction with the underground power network, and installed during the construction phase of the development.

13. Gas

A 160mm diameter ATCO gas main has recently been installed along the southern verge of Anketell Road adjacent to the site.



This main will provide a connection to the development. It is expected that reticulated gas services will be extended into this development by ATCO in the normal way, with trenching done by the developer.

DEVELOPMENT ENGINEERING CONSULTANTS PTY LTD THIS REPORT IS DATED 6^{TH} MARCH 2019.

Appendix 8

Transport Assessment



Anketell North Local Structure Plan Amendment

Transport Impact Statement

PREPARED FOR: Anketell Property Investments

March 2019

Document history and status

Author	Revision	Approved by	Date approved	Revision type
S. Maharjan	r01	M Rasouli	5/03/2019	Draft
S. Maharjan	r01a	M Rasouli	6/03/2019	Final

File name: t17.329.sm.r01a

Author: Shaju Maharjan

Project manager: Mohammad Rasouli

Client: Anketell Property Investments

Project: Lot 7 Anketell Road, Anketell

Document revision: r01a

Project number: t17.329

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The Client alone shall have a license to use the documents referred to above for the purpose of completing the Project, but the Client shall not use, or make copies of, such documents in connection with any work not included in the Project, unless written approval is obtained from the Consultant or otherwise agreed through a separate contract.

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1.0 Introduction

This Transport Impact Statement (TIS) has been prepared by Transcore on behalf of Anketell Property Investments with regards to the proposed minor amendments for development of Lot 7 Anketell Road which is located within the Anketell North Local Structure Plan (LSP) area.

The minor amendments include minor modifications to the LSP road network which result in more efficient use of the urban zoned land and increase in number of residential dwellings within Lot 7. A copy of the approved Anketell North LSP which shows the location of Lot 7 is provided in **Appendix A** of this report.

The Transport Impact Assessment Guidelines (WAPC, Vol 4 – Individual Developments, August 2016) states: "A Transport Impact Statement is required for those developments that would be likely to generate moderate volumes of traffic¹ and therefore would have a moderate overall impact on the surrounding land uses and transport networks". Section 6.0 of Transcore's report provides details of the estimated trip generation for the proposed development. Accordingly, as the total peak hour vehicular trips are estimated to be less than 100 trips, a Transport Impact Statement is deemed appropriate for this development.

The key issues that will be addressed in this TIS include establishing the net traffic increase due to the proposed amendment, review access and egress movement patterns, access to the site by alternative modes of transport and the adequacy of the exiting road network to accommodate the net traffic increase.

Figure 1 shows the location of the site and the immediate road network abutting the subject site.

¹ Between 10 and 100 vehicular trips per hour



Figure 1: Location of the site and the surrounding roads

2.0 Proposed Development

The proposed minor amendments to Lot 7 include minor modifications to the LSP road network which result in more efficient use of the urban zoned land and increase in number of residential dwellings. The proposed amendment provides 46 residential dwellings and 10 group dwellings. The original proposal for Lot 7 entailed approximately 40 dwellings for the site.

The proposed amendment retains the proposed 18.0m access street along the Public Open Space (POS) but removes the proposed east-west access road between the proposed access street along the POS and Treeby Road.

Removal of the original east-west access road would redistribute the traffic to the southern east-west road (to the south of the POS). As a result, the southern east-west road would need to be constructed to 18.0m access street B standard and would be able to accommodate the additional redistributed traffic due to the proposed amendments to Lot 7. **Figure 2** illustrates the proposed Subdivision concept plan for Lot 7 Anketell Road. **Appendix B** shows the proposed Subdivision concept plan in context of original Anketell North LSP.

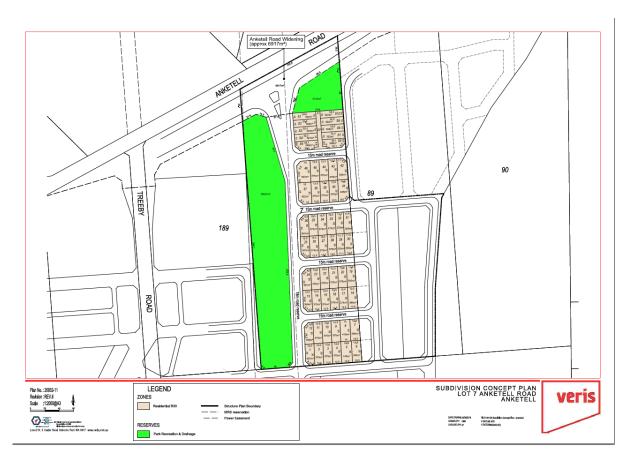


Figure 2: Subdivision concept plan for Lot 7 Anketell Road

3.0 Vehicle Access and Parking

3.1 Access

Vehicular access to Lot 7 would be provided by the proposed 18m road reserve access street along the POS with a left in/left out intersection on Anketell Road at the northern end. Right turn access to and from Anketell Road will be facilitated by the proposed traffic lights at Treeby Road. **Figure 3** represents proposed intersection treatments for the amended LSP area.

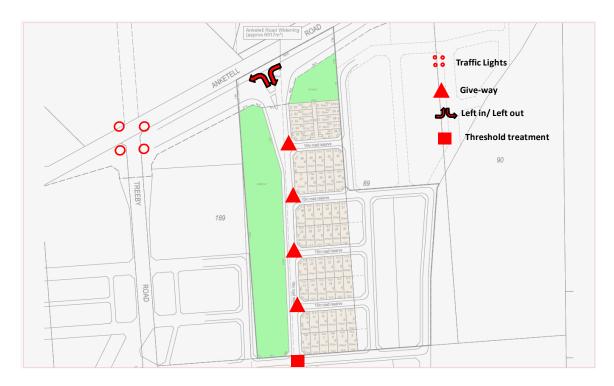


Figure 3: Proposed intersection treatments for the amended LSP area

The side road intersections on the proposed Access Street along the POS will be constructed as T-intersections with give way control on the side road approaches.

The proposed four-way intersection on the 18m road reserve at the southern end of Lot 7 amendment area is recommended to be constructed as a priority-controlled intersection with give way signs on the minor road approaches as suggested in Liveable Neighbourhoods (LN Element 2 pages 31-33). Appropriate entry treatments (such as raised plateaus) are also recommended on the side roads to help to alert drivers to the presence of the intersection and that traffic on the major road has priority. Details of such treatments are to be finalised during the subdivision design stage.

3.2 Parking Demand and Supply

It is expected that sufficient parking bays will be provided for each residential dwelling. The access street along the POS is planned to have 18.0m road reserve and would be constructed to the Access Street B cross-section standard, which allows for visitor parking on both sides of the street.

4.0 Provision for Service Vehicles

Due to the nature of the proposed land uses within the amended LSP area and immediate surrounding areas which are all residential, service vehicle activities are expected to be minimal and limited to waste collection trucks.

It is expected that waste collection vehicles will access the site from Anketell Road and will pick up the rubbish bins from the verge as per normal residential waste collection process.

5.0 Daily Traffic Volumes and Vehicle Types

5.1 Traffic Generation

The proposed amendment to Lt 7 would entail 46 residential dwellings and 10 grouped dwellings in total. The original LSP entailed about 40 dwellings for the site. In order to establish the net traffic increase conservatively a trip rate of 8vpd was assumed for all the residential dwellings. Therefore, the net traffic increase is estimated to be about 128vpd ($16 \times 8 = 128$) or 13vph which is minimal and would be distributed to the surrounding road network as shown in **Figure 4**. This figure also shows the total trip generation of the amended area lot 7 which is about 450vpd.

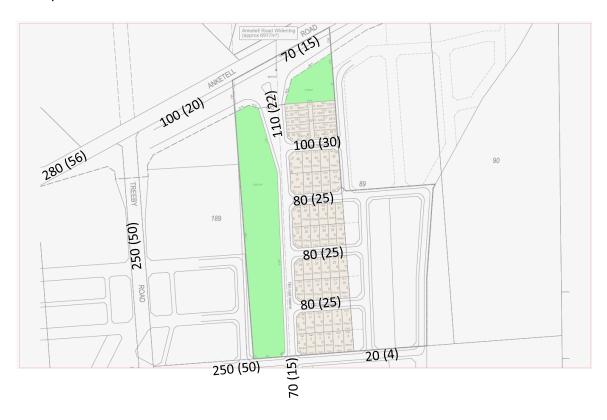


Figure 4: Total traffic (net traffic increase) on surrounding roads (vpd)

5.2 Impact on Surrounding Roads

The WAPC *Transport Impact Assessment Guidelines for Developments* (2016) provides the following guidance on the assessment of traffic impacts:

"As a general guide, an increase in traffic of less than 10 percent of capacity would not normally be likely to have a material impact on any particular section of road, but increases over 10 percent may. All sections of road with an increase greater than 10 percent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 percent of capacity. Therefore, any section of road where

development traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis."

The proposed amended LSP will not increase traffic flows on any roads adjacent to the site by the quoted WAPC threshold of +100vph to warrant any further detailed analysis.

Therefore, the impact on the surrounding road network would be minor.

6.0 Traffic Management on the Frontage Streets

Anketell Road

Anketell Road is a single undivided carriageway (one lane in each in direction) with no pedestrian paths in the immediate vicinity of subject site.

Anketell Road is classified as a *Regional Distributor Road* in the Main Roads WA *Functional Road Hierarchy* and operates under the speed limit of 80km/h in the vicinity of the subject site. Traffic count data obtained from Main Roads WA indicates that Anketell Road east of Kwinana freeway carried the most traffic over the weekdays and the average weekday traffic flow was 6,155vpd in 2017/2018. The same data indicates that the weekday peak hour occurred between 5:45AM and 6:45AM in the morning and between 16:30PM and 17:30PM in the afternoon with 540vph and 769vph respectively. **Figure 5** shows the existing traffic profile along Anketell Road east of Kwinana Freeway.

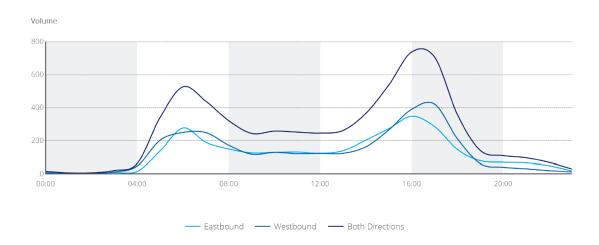


Figure 5: Existing traffic profile along Anketell Road east of Kwinana Freeway

Treeby Road

Treeby Road is single undivided carriageway (one lane in each direction) with no pedestrian paths in the immediate vicinity of subject site. Treeby Road is classified as an Access Road in the Main Roads WA Functional Road Hierarchy and operates under the speed limit of 50km/h in the vicinity of the subject site.

Treeby Road provides local indirect access to the proposed residential dwellings. At present, Treeby Road intersects with Anketell Road to the north in the form of a priority T-intersection.

7.0 Public Transport Access

Figure 6 illustrates the existing bus route 537 in this area which terminates north of the subject site. The existing bus route 537 is anticipated to be extended southbound on continuation of Honeywood Avenue towards Anketell North LSP area in the future and would serve the amended LSP area.

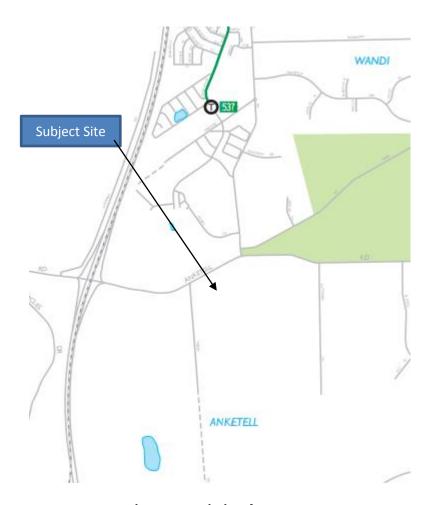


Figure 6: Existing bus stops

8.0 Pedestrian Access

All access streets within Lot 7 will be constructed with a pedestrian path on at least one side of every road in accordance with the WAPC Liveable Neighbourhoods Policy.

The proposed amended LSP removes the original east west access road going through the power easement area and to the south of the proposed community facility to the west of the site. In order to provide pedestrian connectivity to the proposed community facility it is suggested that a shared path should be provided across the power easement area and through the proposed POS area in the vicinity of the proposed community facility.

9.0 Cycle Access

Currently, there is a 2.5m Principal Shared Path (PSP) on the western side of Kwinana Freeway. The Department of Transport's Perth Bike Map series (see **Figure** 7) also shows the existing PSP along Kwinana Freeway in the vicinity of the amended LSP area. According to this plan Anketell Road is considered to be a Good Road Riding Environment.

The proposed shared path across the power easement area and through the proposed POS would provide connectivity for cyclist to the proposed shared path along Treeby Road, which will in turn, connects to Anketell Road and all the other major attractors within the Anketell LSP area.



Figure 7: Bike Map

10.0 Site Specific Issues

No site-specific issues were identified within the scope of this assessment.

11.0 Safety Issues

No safety issues were identified within the scope of this assessment.

12.0 Conclusions

This Transport Impact Statement (TIS) has been prepared by Transcore on behalf of Anketell Property Investments with regards to the proposed minor amendments to Lot 7 Anketell Road which is located within the Anketell North Local Structure Plan (LSP).

The minor amendments include minor modifications to the LSP road network which result in more efficient use of the urban zoned land and an increase in number of residential dwellings within Lot 7.

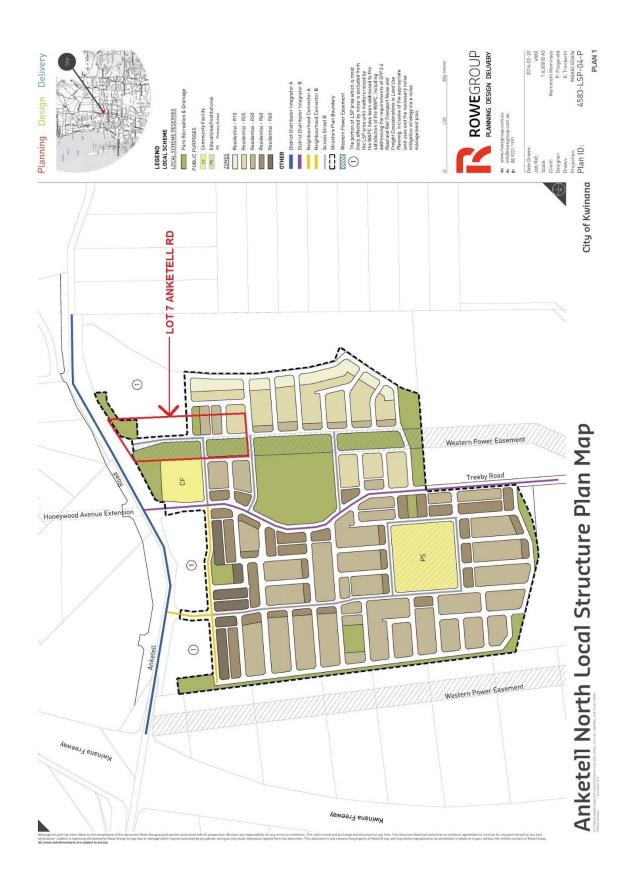
The traffic analysis undertaken in this report shows that the net traffic increase due to the proposed amendment is minimal (about 128vpd) or 13vph and would be distributed to and accommodated by the surrounding network and as such would have insignificant impact on the surrounding road network.

The proposed amendment to Lot 7 removes the proposed east-west access road between the proposed access street along the POS and Treeby Road. Removal of the original east-west access road would redistribute the traffic to the southern east-west road (to the south of the POS). The southern east-west Road is proposed to be constructed to 18.0m access street B standard road and would be able to accommodate the additional redistributed traffic as a result of the proposed amendment.

The proposed amendments would not alter the road hierarchy and standards of the approved Anketell North LSP and the findings of this Transport Impact Statement are supportive of the proposed minor amendments.

Appendix A

CURRENT APPROVED ANKETELL NORTH LOCAL STRUCTURE PLAN



Appendix B

SUBDIVISION CONCEPT PLAN IN CONTEXT OF ANKETELL NORTH LOCAL STRUCTURE PLAN



Appendix 9

Public Open Space Schedule – Anketell North Structure Plan

Site Area (Local Structure Plan Boundary and 150m Exclusion Area)			98.4
Less			
Western Power Easement	4.31		
Net Site Area			94.0
Deductions			
Service Commercial	3.81		
Drainage (1:1yr) * See below	1.18		
Primary School	4.00		
Total		8.99	
Gross Subdivisible Area			85.1
POS @ 10%		8.5	
Public Open Space Contribution			
May Comprise:			
Min 80% unrestricted POS		6.81	
Min 20% restricted use POS		1.70	
Total Required POS			8.5
	1:1yr Drainage (m2) Deduction from Net	Unrestricted Urban POS sites (m2)	1:5yr Restricted POS (m2)
1 - Neighbourhood Park	2,085	2,375	352
2 - Neighbourhood Park	1,044	1,726	431
3 - Neighbourhood Park	2,000	3,507	265
4 - Neighbourhood Park	380	2,769	
5 - Local Park (now removed by this Amendment)	-	-	
6 - Anketell Playing Fields	-	49,781	
7 - Neighbourhood Park	1,800	3,375	74
8 - Neighbourhood Park	1,500	10,634	530
9 - Local Park	365	1,371	248
10 - Local Park	443	2,336	1,106
11 - Neighbourhood Park	- 1	4,227	
12 - Neighbourhood Park	2,200	3,815	1,180
Community Site	_	16,720	
Total (m2)	11,817	102,636	4,186
(ha)	1.18	10.26	0.4
Percentage of gross subdivisable area	1.4%	12.1%	0.59



Appendix 10

Pre-Lodgement Consultation

AGENCY	DATE OF CONSULTATION	METHOD OF CONSULTATION	SUMMARY OF OUTCOME
City of Kwinana	22 November 2018	Meeting	Officers supportive in-principle of lodgement of a Structure Plan Amendment based on the subdivision concept plan. Transport noise impacts on sensitive land uses should be addressed in the report, particularly the proposed residential use in close proximity to the main entry road intersection with Anketell Road.
Water Corporation Western Power Telstra ATCO Gas	Late 2018	Emails	Subject site can be adequately serviced for urban development.



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16 Reports - Civic Leadership

16.1 Monthly Financial Report May 2019

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

The Monthly Financial Report, which includes the Monthly Statement of Financial Activity and explanation of material variances, for the period ended 31 May 2019 has been prepared for Council acceptance.

OFFICER RECOMMENDATION:

That Council:

- 1. Accepts the Monthly Statements of Financial Activity for the period ended 31 May 2019, contained within Attachment A; and
- 2. Accepts the explanations for material variances for the period ended 31 May 2019, contained within Attachment A.

DISCUSSION:

The purpose of this report is to provide a monthly financial report, which includes rating, investment, reserve, debtor, and general financial information to Elected Members in accordance with Section 6.4 of the *Local Government Act 1995*.

The period of review is May 2019. The municipal surplus for this period is \$8,400,173 compared to a budget position of \$5,949,616. This is considered a satisfactory result for the City as it is maintaining a healthy budget surplus position.

Income for the May 2019 period year to date is \$63,507,990. This is made up of \$59,685,848 in operating revenues and \$3,822,142 in non-operating grants, contributions and subsidies received. The budget estimated \$63,724,548 would be received for the same period. The variance to budget is (\$216,558). Details of all significant variances are provided in the notes to the Monthly Financial Report contained within Attachment A.

Expenditure for the May 2019 period year to date is \$67,465,214. This is made up of \$62,281,331 in operating expenditure and \$5,183,883 in capital expenditure. The budget estimated \$74,592,146 would be spent for the same period. The variance to budget is \$7,126,932. Details of all significant variances are provided in the notes to the Monthly Financial Report contained within Attachment A.

LEGAL/POLICY IMPLICATIONS:

Section 6.4 of the *Local Government Act 1995* requires a Local Government to prepare an annual financial statement for the preceding year and other financial reports as are prescribed.

16.1 MONTHLY FINANCIAL REPORT MAY 2019

Regulation 34 (1) of the *Local Government (Financial Management) Regulations 1996* as amended requires the Local Government to prepare monthly financial statements and report on actual performance against what was set out in the annual budget.

FINANCIAL/BUDGET IMPLICATIONS:

Any material variances that have an impact on the outcome of the budgeted closing surplus position are detailed in the Monthly Financial Report contained within Attachment A.

ASSET MANAGEMENT IMPLICATIONS:

There are no asset management implications associated with this report.

ENVIRONMENTAL IMPLICATIONS:

There are no environment implications associated with this report.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objective detailed in the Corporate Business Plan.

Plan	Outcome	Objective
Corporate Business Plan		5.4 Ensure the financial sustainability of the City of Kwinana into the future

COMMUNITY ENGAGEMENT:

There are no community engagement implications as a result of this report.

PUBLIC HEALTH IMPLICATIONS

There are no public health implications as a result of this report.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	Inadequate management of the City's provisions,
	revenues and expenditures.
Risk Theme	Failure to fulfil statutory regulations or compliance
	Providing inaccurate advice/information

16.1 MONTHLY FINANCIAL REPORT MAY 2019

Risk Effect/Impact	Financial
	Reputation
	Compliance
Risk Assessment	Operational
Context	
Consequence	Minor
Likelihood	Unlikely
Rating (before	Low
treatment)	
Risk Treatment in place	Reduce (mitigate the risk)
Response to risk	Annual adoption of variance tolerances for
treatment required/in	reporting purposes.
place	
Rating (after treatment)	Low

COUNCIL DECISION 492

MOVED CR M ROWSE

SECONDED CR S LEE

That Council:

- 1. Accepts the Monthly Statements of Financial Activity for the period ended 31 May 2019, contained within Attachment A; and
- 2. Accepts the explanations for material variances for the period ended 31 May 2019, contained within Attachment A.

CARRIED 8/0



CITY OF KWINANA

MONTHLY FINANCIAL REPORT (Containing the Statement of Financial Activity) For the Period Ended 31 May 2019

LOCAL GOVERNMENT ACT 1995 LOCAL GOVERNMENT (FINANCIAL MANAGEMENT) REGULATIONS 1996

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CITY OF KWINANA STATEMENT OF FINANCIAL ACTIVITY (Statutory Reporting Program) For the Period Ended 31 May 2019

	Note	Adopted Annual Budget	Current Annual Budget	YTD Budget (a)	YTD Actual (b)	Var. \$ (b)-(a)	Var. % (b)-(a)/(a)
		\$	\$	\$	\$	\$	%
Opening Funding Surplus(Deficit)	2	1,345,947	1,259,903	1,259,903	1,259,903	0	0%
Revenue from operating activities							
Governance		35,760	180,822	175,404	378,686	203,282	116%
General Purpose Funding - Rates	8	38,101,480	38,101,480	38,101,480	38,074,897		
	٥	4,477,650	3,658,860		3,043,023	(26,583)	(0%)
General Purpose Funding - Other				2,997,611		45,412	
Law, Order and Public Safety		330,500	382,944	376,314	484,338	108,024	29%
Health		153,066	86,798	71,590	85,722	14,132	20%
Education and Welfare		7,168,961	7,687,476	7,035,366	7,122,680	87,314	1%
Community Amenities		5,534,442	5,578,277	5,506,776	5,550,931	44,155	1%
Recreation and Culture		2,999,818	2,869,605	2,637,833	2,812,003	174,170	7%
Transport		179,611	306,802	240,912	242,095	1,183	0%
Economic Services		1,280,762	1,249,521	1,140,998	1,093,588	(47,410)	(4%)
Other Property and Services		1,364,646	789,202	778,635	797,883	19,248	2%
		61,626,696	60,891,787	59,062,919	59,685,848	622,929	1%
Expenditure from operating activities							
Governance		(2,596,800)	(5,083,536)	(4,750,033)	(4,438,109)	311,924	7%
General Purpose Funding		(790,130)	(872,962)	(803,519)	(594,291)	209,228	26%
Law, Order and Public Safety		(3,369,960)	(3,146,076)	(2,904,143)	(2,806,851)	97,292	3%
Health		(950,887)	(935,803)	(815,981)	(803,637)	12,344	2%
Education and Welfare		(11,379,613)	(11,615,563)	(10,618,810)	(10,209,148)	409,662	4%
Community Amenities		(10,248,550)	(9,905,653)	(8,848,260)	(7,872,618)	975,642	11%
Recreation and Culture		(22,098,138)	(22,328,597)	(20,045,664)	(18,707,873)	1,337,791	7%
Transport		(15,431,921)	(15,037,256)	(13,822,031)	(12,815,598)	1,006,433	7%
Economic Services		(1,861,358)	(1,596,801)	(1,449,206)	(1,329,083)	120,123	8%
Other Property and Services		(3,942,836)	(3,098,214)	(2,850,211)	(2,704,122)	146,089	5%
		(72,670,193)	(73,620,461)	(66,907,858)	(62,281,331)	4,626,527	7%
Operating activities excluded from budget							
Add back Depreciation		13,672,393	14,225,491	13,042,439	13,053,298	10,859	0%
Adjust (Profit)/Loss on Asset Disposal	7	189,040	157,615	150,778	106,542	(44,236)	(29%)
Movement in deferred pensioner rates		0	29,869	29,869	63,844	33,975	114%
Amount attributable to operating activities		2,817,936	1,684,301	5,378,147	10,628,200	5,250,053	98%
Annual Control of the Control							
Investing Activities Non-operating Grants, Subsidies and Contributions		4,285,605	6,118,848	4,801,636	3,962,149	(839,487)	17%
Proceeds from Disposal of Assets	7	423,500	442,884	426,684	342,594	(84,090)	20%
Recognition of Local Government House Trust	,	423,300	442,884	420,004	(122,620)	(84,090)	20%
Reimbursement of Developer Contributions		0	(140,007)	(140,007)	(140,007)	0	
Land and Buildings	11		(2,326,505)	, , ,	(873,445)		F00/
		(4,937,050)		(1,744,367)		870,922	50%
Plant, Furniture and Equipment	11	(2,458,200) (3,000,084)	(1,330,870)	(1,270,870)	(942,433)	328,437	26%
Infrastructure Assets - Roads Infrastructure Assets - Parks and Reserves	11		(3,017,003)	(2,507,719)	(1,940,108)	567,611	23%
	11	(1,869,669)	(2,029,890)	(1,408,890)	(836,132)	572,758	41%
Infrastructure Assets - Footpaths	11	(193,560)	(218,341)	(218,341)	(203,250)	15,091	7%
Infrastructure Assets - Drainage	11	(2,339,323)	(2,360,348)	(187,125)	(162,727)	24,398	13%
Infrastructure Assets - Street Lighting	11	(394,272)	(298,472)	(297,372)	(195,175)	102,197	34%
Infrastructure Assets - Bus Shelters	11	(20,000)	(20,182)	(20,182)	(16,018)	4,164	21%
Infrastructure Assets - Car Parks	11	0	(9,622)	(9,622)	(6,012)	3,610	38%
Infrastructure Assets - Other Structures Amount attributable to investing activities	11	(10 503 053)	(19,800)	(19,800)	(8,582) (1,141,767)	11,218	57%
Amount attributable to investing attivities		(10,503,053)	(5,209,308)	(2,595,975)	(1,141,767)	1,454,208	(56%)
Financing Activities							
Proceeds from New Debentures	9	2,268,000	150,800	0	0	0	0%
Self-Supporting Loan Principal	•	16,168	16,168	16,168	16,168	0	0%
Transfer from Reserves	6	9,499,275	9,453,765	3,492,668	3,204,509	(288,159)	(8%)
Repayment of Debentures	9	(777,133)	(777,134)	(414,866)	(406,715)	8,151	(2%)
Transfer to Reserves	6	(4,667,140)	(6,708,828)	(1,186,429)	(5,160,126)	(3,973,697)	(335%)
Amount attributable to financing activities		6,339,170	2,134,771	1,907,541	(2,346,163)	(4,253,704)	(223%)
Closing Funding Surplus(Deficit)	2	0	(130,333)	5,949,616	8,400,173	2,450,557	41%

This statement is to be read in conjunction with the accompanying Financial Statements and notes. All material variances are discussed in Note 1.

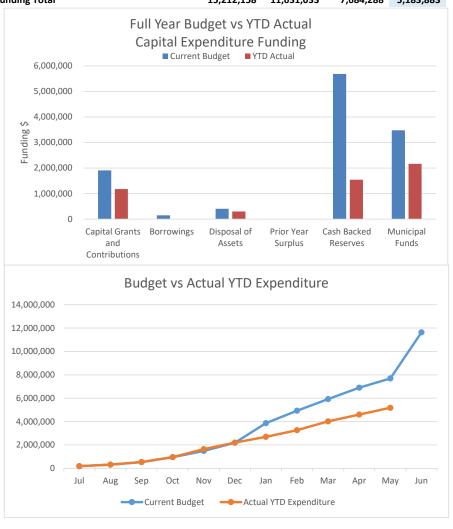
CITY OF KWINANA STATEMENT OF FINANCIAL ACTIVITY (By Nature or Type) For the Period Ended 31 May 2019

	Note	Adopted Annual Budget	Current Annual Budget	YTD Budget	YTD Actual	Var. \$ (b)-(a)	Var. % (b)-(a)/(a)
	Note	\$	\$	(a) \$	(b) \$	\$	%
Opening Funding Surplus (Deficit)	2	1,345,947	1,259,903	1,259,903	1,259,903	0	% 0%
Revenue from operating activities							
Rates	8	38,101,480	38,101,480	38,101,480	38,074,897	(26,583)	(0%)
Operating Grants, Subsidies and							
Contributions		7,639,227	7,606,218	6,990,607	7,049,604	58,997	1%
Fees and Charges		11,694,484	11,633,952	11,117,239	11,404,190	286,951	3%
Interest Earnings		2,690,500	2,365,046	1,707,414	1,743,987	36,573	2%
Other Revenue		1,489,873	1,176,222	1,137,773	1,406,991	269,218	24%
Profit on Disposal of Assets	7	11,132	8,869	8,406	6,178	(2,228)	(27%)
		61,626,696	60,891,787	59,062,919	59,685,848	622,929	1%
Expenditure from operating activities							
Employee Costs		(28,625,503)	(27,600,162)	(25,517,711)	(23,645,949)	1,871,762	7%
Materials and Contracts		(26,006,185)	(27,432,397)	(24,801,293)	(22,071,858)	2,729,435	11%
Utility Charges		(2,361,417)	(2,371,839)	(2,155,424)	(2,211,251)	(55,827)	(3%)
Depreciation on Non-Current Assets		(13,672,393)	(14,225,491)	(13,042,439)	(13,053,298)	(10,859)	(0%)
Interest Expenses		(1,111,762)	(1,111,762)	(578,834)	(576,165)	2,669	0%
Insurance Expenses		(570,108)	(586,895)	(586,895)	(571,916)	14,979	3%
Other Expenditure		(122,653)	(125,431)	(66,078)	(38,176)	27,902	42%
Loss on Disposal of Assets	7	(200,172)	(166,484)	(159,184)	(112,720)	46,464	
		(72,670,193)	(73,620,461)	(66,907,858)	(62,281,331)	4,626,527	7%
Operating activities excluded from budget							
Add back Depreciation		13,672,393	14,225,491	13,042,439	13,053,298	10,859	0%
Adjust (Profit)/Loss on Asset Disposal	7	189,040	157,615	150,778	106,542	(44,236)	(29%)
Movement in deferred pensioner rates		0	29,869	29,869	63,844	33,975	114%
Amount attributable to operating activities		2,817,936	1,684,301	5,378,147	10,628,200	5,250,053	98%
Investing activities							
Grants, Subsidies and Contributions		4,285,605	6,118,848	4,801,636	3,962,149	(839,487)	17%
Proceeds from Disposal of Assets	7	423,500	442,884	426,684	342,594	(84,090)	20%
Recognition of Local Government House Trust		0	0	0	(122,620)		
Reimbursement of Developer Contributions		0	(140,007)	(140,007)	(140,007)	0	
Land and Buildings	11	(4,937,050)	(2,326,505)	(1,744,367)	(873,445)	870,922	50%
Plant, Furniture and Equipment	11	(2,458,200)	(1,330,870)	(1,270,870)	(942,433)	328,437	26%
Infrastructure Assets - Roads	11	(3,000,084)	(3,017,003)	(2,507,719)	(1,940,108)	567,611	23%
Infrastructure Assets - Parks and Reserves	11	(1,869,669)	(2,029,890)	(1,408,890)	(836,132)	572,758	41%
Infrastructure Assets - Footpaths	11	(193,560)	(218,341)	(218,341)	(203,250)	15,091	7%
Infrastructure Assets - Drainage	11	(2,339,323)	(2,360,348)	(187,125)	(162,727)	24,398	13%
Infrastructure Assets - Street Lighting	11	(394,272)	(298,472)	(297,372)	(195,175)	102,197	34%
Infrastructure Assets - Bus Shelters	11	(20,000)	(20,182)	(20,182)	(16,018)	4,164	21%
Infrastructure Assets - Car Parks	11	0	(9,622)	(9,622)	(6,012)	3,610	38%
Infrastructure Assets - Other Structures	11	0	(19,800)	(19,800)	(8,582)	11,218	57%
Amount attributable to investing activities		(10,503,053)	(5,209,308)	(2,595,975)	(1,141,767)	1,454,208	(56%)
Financing Activities							
Proceeds from New Debentures	9	2,268,000	150,800	0	0	0	
Self-Supporting Loan Principal	•	16,168	16,168	16,168	16,168	0	0%
Transfer from Reserves	6	9,499,275	9,453,765	3,492,668	3,204,509	(288,159)	(8%)
Repayment of Debentures	9	(777,133)	(777,134)	(414,866)	(406,715)	8,151	(2%)
Transfer to Reserves	6	(4,667,140)	(6,708,828)	(1,186,429)	(5,160,126)	(3,973,697)	(335%)
Amount attributable to financing activities		6,339,170	2,134,771	1,907,541	(2,346,163)	(4,253,704)	(223%)
Closing Funding Surplus (Deficit)	2	0	(130,333)	5,949,616	8,400,173	2,450,557	41%

This statement is to be read in conjunction with the accompanying Financial Statements and notes. All material variances are discussed in Note 1.

CITY OF KWINANA STATEMENT OF CAPITAL ACQUISITIONS AND CAPITAL FUNDING For the Period Ended 31 May 2019

Capital Acquisitions	Note	Adopted Annual Budget	Current Annual Budget	YTD Budget (a)	YTD Actual Total (b)	Variance (a) - (b)
		\$	\$	\$	\$	\$
Land and Buildings	11	4,937,050	2,326,505	1,744,367	873,445	870,922
Plant, Furniture and Equipment	11	2,458,200	1,330,870	1,270,870	942,433	328,437
Infrastructure Assets - Roads	11	3,000,084	3,017,003	2,507,719	1,940,108	567,611
Infrastructure Assets - Parks and Reserves	11	1,869,669	2,029,890	1,408,890	836,132	572,758
Infrastructure Assets - Footpaths	11	193,560	218,341	218,341	203,250	15,091
Infrastructure Assets - Drainage		2,339,323	2,360,348	187,125	162,727	24,398
Infrastructure Assets - Street Lighting		394,272	298,472	297,372	195,175	102,197
Infrastructure Assets - Bus Shelters		20,000	20,182	20,182	16,018	4,164
Infrastructure Assets - Car Parks	11	0	9,622	9,622	6,012	3,610
Infrastructure Assets - Other Structures	11	0	19,800	19,800	8,582	11,218
Capital Expenditure Totals		15,212,158	11,631,033	7,684,288	5,183,883	2,500,405
Capital acquisitions funded by:						
Capital Grants and Contributions		1,423,989	1,908,414	1,202,479	1,174,793	27,686
Borrowings		2,268,000	150,800	0	0	0
Disposal of Assets		423,500	404,507	404,507	301,162	103,345
Prior Year Surplus		550,934	0	0	0	0
Cash Backed Reserves		8,133,427	5,687,004	0	1,543,335	(1,543,335)
Municipal Funds		2,412,308	3,480,308	6,077,302	2,164,593	3,912,709
Capital Funding Total		15,212,158	11,631,033	7,684,288	5,183,883	2,500,405



Note 1: Explanation of Operating Revenue and Expenditure Material Variances by Nature and Type

The material variance thresholds are adopted annually by Council as an indicator of whether the actual expenditure or revenue varies from the year to date budget materially.

The material variance adopted by Council for the 2018/19 year is the greater of \$50,000 or 5%.

Nature and Type Category	Var. \$	Var. %	Var.	Timing/ Permanent	Explanation of Variance
Operating Revenues					
Rates	(26,583)	(0%)		No Material Variance	
Operating Grants, Subsidies and Contributions	58,997	1%		No Material Variance	
Fees and Charges	286,951	3%		No Material Variance	
Interest Earnings	36,573	2%		No Material Variance	
Other Revenue	269,218	24%	M	Permanent	Recognition of Units held in Local Government House Trust \$122,620, Recognition and transfer of STCs due to installation of Solar Panels at John Wellard Community Centre \$18,102. Workers Compensation Reimbursement received \$48,843 over budget amount. Other ad-hoc reimbursements received but not budgeted \$58,000.
Profit on Disposal of Assets	(2,228)	(27%)		No Material Variance	
Operating Expense					
Employee Costs	1,871,762	7%	M	Timing	The current spread of budget does not take into account the end of year accrual for payroll. However there is still expected to be a surplus of unspent funds at 30 June.
Materials and Contracts	2,729,435	11%	M	Timing	Historically June records a higher expenditure than other months as projects wind up and the accruals are taken into account as part of the year end process to ensure the City captures all of the costs pertaining to the 19/20 year. As the City approaches year end there will be consideration made for those projects not completed to be carried forward to the 19/20 budget. However there is still expected to be a surplus of unspent funds at 30 June.
Utility Charges	(55,827)	(3%)		No Material Variance	
Depreciation on Non-Current Assets	(10,859)	(0%)		No Material Variance	
Interest Expenses	2,669	0%		No Material Variance	
Insurance Expenses	14,979	3%		No Material Variance	
Other Expenditure	27,902	42%		No Material Variance	
Loss on Disposal of Assets	46,464	0%		No Material Variance	

Note 1: Explanation of Operating Revenue and Expenditure Material Variances by Nature and Type

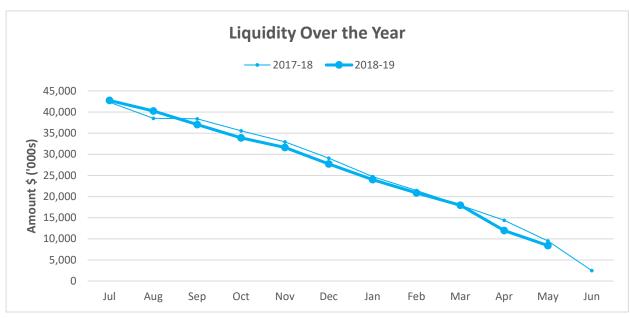
The material variance thresholds are adopted annually by Council as an indicator of whether the actual expenditure or revenue varies from the year to date budget materially.

The material variance adopted by Council for the 2018/19 year is the greater of \$50,000 or 5%.

Nature and Type Category	Var. \$	Var. %	Var.	Timing/ Permanent	Explanation of Variance
Capital Revenues					
Grants, Subsidies and Contributions	(839,487)	17%	M	Timing	The timing of contributions are difficult to estimate due to the unknown timing of subdivisions. Further detail is provided in Note 12.
Proceeds from Disposal of Assets	(84,090)	20%	M	Timing	Hino Truck and Skid steer Loader have not yet been sold at auction, proceeds not expected until next financial year \$45,000. A proposal has been put forward to retain the Cat Roller and Trailer that had been budgeted for disposal in 2018/2019 \$17,000.
Capital Expenses					
Land and Buildings	870,922	50%	M	Timing	DCA 9 - Local Sports Ground Clubroom (Clubroom construction cost) will be carried forward to 2019/2020 \$90,054. Kwinana South and Mandogalup Fire Station upgrades and extensions will be carried forward to 2019/2020 \$370,500. DCA 12 - Local Sporting Ground with Community Centre / Pavilion - Wellard West has been delayed until 2020/2021 \$212,896.
Plant, Furniture & Equipment	328,437	26%	M	Timing	Skid Steer Loader to be purchases in June. Mitsubishi Canter Tip Truck replacement to be carried forward to 2019/2020.
Infrastructure - Roads	567,611	23%	M	Timing	DCA 5 Lyon Road - Cassowary to Kenby will be carried forward to 2019/2020 \$437,250. DCA 1 - Wellard Road Upgrade – Bertram Road to Millar Road will be carried forward to 2019/2020 \$72,034.
Infrastructure Assets - Parks and Reserves	572,758	41%	M	Timing	Sporting Infrastructure - Wandi Playing Fields (Honeywood) will be carried forward to 2019/2020 \$89,100. Kwinana Loop Trail will be carried forward to 2019/2020 \$80,000. Other various projects are to be completed in June and awaiting invoices to be received, approved and processed. Further detail is provided in Note 11.
Infrastructure Assets - Footpaths	15,091	7%		No Material Variance	·
Infrastructure Assets - Drainage	24,398	13%		No Material Variance	
Infrastructure Assets - Street Lighting	102,197	34%	M	Timing	Various projects are to be completed in June and awaiting invoices to be received, approved and processed. Further detail is provided in Note 11.
Infrastructure Assets - Bus Shelters	4,164	21%		No Material Variance	
Infrastructure Assets - Car Parks	11,218	57%		No Material Variance	
Financing					
Proceeds from New Debentures	0	0%		No Material Variance	
Self-Supporting Loan Principal	0	0%		No Material Variance	
Transfer from Reserves	(288,159)	(8%)	M	Timing	Actual reserve transfers were conducted in April but budgeted for June.
Advances to Community Groups	0	0%		No Material Variance	
Repayment of Debentures	8,151	(2%)		No Material Variance	
Transfer to Reserves	(3,973,697)	(335%)	M	Timing	Actual reserve transfers were conducted in April but budgeted for June.

Note 2: Net Current Funding Position

		Last Years Closing	This Time Last Year	Current
	Note	30 Jun 2018	31 May 2018	31 May 2019
		\$	\$	\$
Current Assets				
Cash Unrestricted		21,137	9,897,783	3,042,164
Cash Restricted - Reserves	6	52,875,771	45,924,184	54,831,388
Receivables - Rates	5(a)	3,597,121	3,521,387	5,001,320
Receivables - Sundry Debtors	5(b)	720,635	1,020,912	642,791
Other Current Assets		411,656	196,864	663,001
Accrued Income		491,927	0	0
Inventories	_	34,180	33,920	33,598
		58,152,427	60,595,050	64,214,262
Less: Current Liabilities		(4,016,753)	(5,191,789)	(982,701)
Less: Cash Reserves	6	(52,875,771)	(45,924,184)	(54,831,388)
Net Current Funding Position - Surplus/(Deficit)		1,259,903	9,479,077	8,400,173



Note 3(a): Cash and Investments

			Calculated					
	Total	Interest	Interest			Deposit	Maturity	Term
	Amount	Rate	Earnings	Institution	S&P Rating	Date	Date	Days
	\$	%	\$					
CBA Municipal Bank Account	4,352,703	Variable	N/A	CBA	AA	N/A	N/A	N/A
CBA Trust Bank Account	1,735,142	Variable	N/A	CBA	AA	N/A	N/A	N/A
Cash On Hand - Petty Cash	4,570	N/A	N/A	PC	N/A	N/A	N/A	N/A
Sub-total Cash Deposits	6,092,415							
(b) Term Deposits - Investments								
BEN - TD2716903	2,000,000	2.75%	48,671	BEN	Α	22/08/2018	11/07/2019	323
BWA - TD4749322	2,000,000	2.75%	48,822	BWA	AA	28/08/2018	18/07/2019	324
BEN - TD2737116	4,000,000	2.68%	80,180	BEN	Α	11/09/2018	11/06/2019	273
Sub-total - Term Deposits - Investments	8,000,000		177,673					
Reserve Funds Investments (Cash Backed Reserves)								
Aged Persons Units Reserve - TD36-866-8236	764,526	2.60%	9,857	NAB	AA	01/03/2019	29/08/2019	181
Asset Management Reserve - TD36-842-8945	497,865	2.60%	6,419	NAB	AA	01/03/2019	29/08/2019	181
Asset Replacement Reserve - TD42-972-1062	601,650	2.60%	7,800	NAB	AA	05/03/2019	03/09/2019	182
Banksia Park DMF Reserve - TD42-997-1790	118,009	2.60%	1,530	NAB	AA	05/03/2019	03/09/2019	182
Community Services & Emergency Relief Reserve - TD43-069-3230	88,101	2.60%	1,142	NAB	AA	05/03/2019	03/09/2019	182
CLAG Reserve - TD32-591-0424	284,781	2.60%	3,692	NAB	AA	05/03/2019	03/09/2019	182
Workers Compensation Reserve - TD69-136-9789	140,284	2.60%	1,819	NAB	AA	07/03/2019	05/09/2019	182
Settlement Agreement Reserve - TD68-951-1678	163,535	2.60%	2,120	NAB	AA	07/03/2019	05/09/2019	182
Infrastructure Reserve - TD68-832-2429	345,231	2.60%	4,476	NAB	AA	07/03/2019	05/09/2019	182
Golf Course Cottage Reserve - TD68-730-8350	28,652	2.60%	371	NAB	AA	07/03/2019	05/09/2019	182
Employee Leave Reserve - TD44-453-4644	2,077,584	2.65%	45,402	NAB	AA	27/08/2018	24/06/2019	301
Employee Leave Reserve - TD76-099-7157	2,090,308	2.65%	45,529	NAB	AA	28/08/2018	24/06/2019	300
Refuse Reserve - TD80-618-4101	2,232,687	2.60%	28,945	NAB	AA	28/02/2019	29/08/2019	182
Refuse Reserve - TD4770589	3,224,544	2.50%	40,196	BWA	AA	28/02/2019	29/08/2019	182
Information Technology Reserve - TD2922164	1,290,959	2.50%	13,529	BEN	AA	21/03/2019	21/08/2019	153
Sub-total - Term Deposits - (Cash Backed Reserves)	13,948,716		212,828					
Reserve Funds Investments (Developer Contributions)								
DCA - 1 Hard Infrastructure - Bertram - TD2921869	1,934,055	2.50%	20,268	BEN	AA	21/03/2019	21/08/2019	153
DCA - 2 Hard Infrastructure - Wellard - TD2921865	2,556,858	2.50%	26,794	BEN	Α	21/03/2019	21/08/2019	153
DCA 5 - Hard Infrastructure - Wandi - TD74-094-8075	1,194,349	2.50%	12,598	NAB	AA	26/03/2018	27/08/2019	154
DCA - 7 Hard Infrastructure - Mandogalup (West) - TD27-609-7675	20,032	2.42%	159	NAB	AA	16/04/2019	14/08/2019	120
DCA - 9 Soft Infrastructure - Wandi/Anketell - TD97-154-6348	11,667,615	2.60%	151,263	NAB	AA	26/02/2019	27/08/2019	182
DCA - 10 Soft Infrastructure - Casuarina/Anketell - TD27-453-1941	232,037	2.42%	1,846	NAB	AA	16/04/2019	14/08/2019	120
DCA - 11 Soft Infrastructure - Wellard East - TD2921872	6,045,331	2.50%	63,352	BEN	AA	21/03/2019	21/08/2019	153
DCA - 12 Soft Infrastructure - Wellard West - TD2900814	6,838,948	2.60%	88,176	BEN	AA	28/02/2019	28/08/2019	181
DCA - 13 Soft Infrastructure - Bertram - TD27-521-3013	289,796	2.42%	2,306	NAB	AA	16/04/2019	14/08/2019	120
DCA - 14 Soft Infrastructure - Wellard/Leda - TD27-496-1706	619,115	2.42%	4,926	NAB	AA	16/04/2019	14/08/2019	120
DCA - 15 Soft Infrastructure - Townsite - TD27-479-8398	169,427	2.42%	1,348	NAB	AA	16/04/2019	14/08/2019	120
Sub-total - Reserve Funds Investments (Developer Contributions)	31,567,563		373,036					
Total	59,608,694		763,536					
Less Trust Bank	(1,735,142)							
Total Municipal Controlled Funds	57,873,552		763,536					

Note 3(b): Cash and Investments - Compliance with Investment Policy

		Actual at		
Portfolio Credit Risk	Funds Held	Period End	Limit per Policy	
AAA & Bendigo Bank Kwinana Community Branch	8,556,858	6%	100%	>
AA	51,047,265	94%	100%	>
A	-	0%	60%	>
BBB	-	0%	20%	>
Unrated	-	-	20%	¥

		Actual at		
Counterparty Credit Risk	Funds Held	Period End	Limit per Policy	
BEN (AAA)	24,666,151	6%	45%	~
BWA (AA)	5,224,544	29%	45%	>
CBA (AA)	6,087,845	24%	45%	>
NAB (AA)	23,625,584	41%	45%	>

Comments - Investment Policy Compliance

The City's investments are invested in line with Council Policy - Investments. The above tables exclude the total of petty cash (\$4,570) held by the City. Interest received on the City's investments year to date is \$987,069.

5.5.1 Portfolio Credit Framework

To control the credit quality on the investment portfolio, the following credit framework limits the percentage of the portfolio exposed to any particular credit rating category.

S&P Long Term Rating	S&P Short Term Rating	Direct Investment Maximum for category %
AAA and Bendigo Bank	A-1+ and Bendigo Bank	100%
Kwinana Community	Kwinana Community	
Branch	Branch	
AA	A-1+	100%
Α	A-1	60%
BBB	A-2	20%

If any of the investments within the portfolio are subject to a credit rating downgrade such that the portfolio credit percentages are no longer compliant with the Investment Policy, or there is a review of this policy, the investment will be divested as soon as practicable.

5.5.2 Counterparty Credit Framework

Exposure to an individual counterparty/institution will be restricted by its credit rating so that single entity exposure is limited, as detailed in the table below:

S&P Long Term Rating	S&P Short Term Rating	Direct Investment Maximum for category %
AAA and Bendigo Bank	A-1+ and Bendigo Bank	45%
Kwinana Community	Kwinana Community	
Branch	Branch	
AA	A-1+	45%
Α	A-1	25%
BBB	A-2	10%

If any of the investments within the portfolio are subject to a credit rating downgrade such that the portfolio credit percentages are no longer compliant with the Investment Policy, or there is a review of this policy, the investment will be divested as soon as practicable.

GL Code	Description	Increase / (Decrease) to Net Surplus Position	Amended Budget Surplus / (Deficit)
27/06/2018 Annua	l Budget Adoption	\$	\$ 0
Items not requiring	g Council Approval as per OCM 27/06/2018 Council Decision 210		
C	Children I. Book Council of Australia to compare of control in the control of Australia		
400104.1106.60	n Children's Book Council of Australia to cover fees of authors, illustrators and storyt Library - Op Exp - Advertising and Promotions	(1,200)	
300018.1297.15	Library - Op Rev - Library Contributions	1,200)	
300018.1237.13	Library - Op Nev - Library Contributions	0	σ
Transfer Library so	ftware expenditure from IT budget to Library budget		
400761.2020.64	Computing Infrastructure - Corporate Applications	(12,000)	
400104.1124.60	Library - Computer Services	12,000	
		0	0
Transfer program i	ncome and expenditure to be managed by the Recquatic		
400275.2034.60	Recquatic operating expenditure - Senior Sational	(3,000)	
400275.2035.60	Recquatic operating expenditure - Active Women	(3,000)	
300234.2034.30	Recquatic operating income - Senior Sational	1,550	
300234.2035.30	Recquatic operating income - Active Women	1,550	
400094.1600.60 400094.1600.60	CDO Recreation & Leisure operating expenditure - Senior Sational CDO Recreation & Leisure operating expenditure - Active Women	3,000	
300158.1600.30	CDO Recreation & Leisure operating expenditure - Active Women CDO Recreation & Leisure operating income - Senior Sational	3,000 (1,550)	
300158.1600.30	CDO Recreation & Leisure operating income - Active Women	(1,550)	
300130.1000.30	eso necreation a resource operating meaning Active Women	0	O
Transfer funds to n	niscellaneous expendable equipment to Community Centres Admin budget		
400708.1144.60	Community Centres Admin - Expendable Equipment	(4,000)	
400733.1144.60	Bertram Community Centre - Expendable Equipment	1,000	
400731.1144.60	Darius Community Centre - Expendable Equipment	2,000	
400732.1144.60	Wellard Community Centre - Expendable Equipment	1,000 0	C
Tomporary omploy	ment of City Legal Officer to assist the City Legal Team with tasks and projects		
400008.1210.61	Operating Expense – GSS Contract Salaries	(25,000)	
400512.1031.50	Operating Expense – Governance Salaries	25,000	
	Speciality 2parise section and section as	0	O
•	lation granted funds to assistance with the Get Online Week as part of the City's invo	lvement with	
the Be Connected		/4 500	
400104.1106.60 300018.1297.15	Operating Expense – Library Advertising & Promotions Operating Income – Library Contributions & Donations	(1,500) 1,500	
300018.1237.13	Operating income – Library Contributions & Donations	0	o
To cover the cost of	f fixed term Community Development Officer		
400067.1210.61	Operating Expense – ©ommunity Services Admin Contract Salaries	(27,200)	
400092.1031.50	Operating Expense – CDO Recreation & Leisure Salaries	27,200 0	O
-	for Environment Services to allocate legal expenses sought on development and san m Consultancy budget due to reduction of expected costs for Street Tree Data projec	d mining issues.	
400439.1177.60	Operating Expense - Natural Environment Legal Expenses	(8,000)	
400439.1125.60	Operating Expense - Natural Environment Consultancy	8,000	
		0	0

GL Code	Description	Increase / (Decrease) to Net Surplus Position	Amended Budget Surplus / (Deficit)
Increase scope of F	ire Notice project to include public notice, printing of leaflet and information letter, a	and postage to	
residents.			
400503.1220.60	Operating Expense - Fire and Emergency Stationery	(23,500)	
400053.1106.60	Operating Expense - Governance Advertising and Promotion	23,500 0	c
Pasllocation of Pos	ads to Recovery funding from Orelia Avenue capital roadworks project to Cowcher W	av.	
600007.1561.60	Capital Expense - Infrastructure Roads - Cowcher Way	(24,439)	
600007.1561.60	Capital Expense - Infrastructure Roads - Orelia Avenue	24,439	
300137.1003.16	Grant - Roads to Recovery - Cowcher Way	24,439	
300137.1003.16	Grant - Roads to Recovery - Orelia Avenue	(24,439)	
300137.1003.10	Grant - Roads to Recovery - Orena Avenue	0	d
	llocated to eProcurement system that were not needed this financial year to the City	's legal budget	
	external legal advice as needed.		
400002.1177.60	Operating Expense – Executive Management Legal Expenses	(14,500)	
400018.1222.60	Operating Expense – Contracts Subscriptions and Publications	14,500 0	C
Use of salary saving	gs due to vacant position to fund contract salary staff.		
400456.1210.61	Operating Expense –Community Services Admin Contract Salaries	(9,030)	
	, , ,	` ' '	
400454.1031.50	Operating Expense – CDO Recreation & Leisure Salaries	9,030	
	Operating Expense – CDO Recreation & Leisure Salaries	9,030 0	d
400454.1031.50	Operating Expense – CDO Recreation & Leisure Salaries Council falling outside Council Decision 210		c
400454.1031.50 Items approved by		0	
400454.1031.50 Items approved by	Council falling outside Council Decision 210	0	
400454.1031.50 Items approved by 08/08/2018 Addition	Council falling outside Council Decision 210	0 Inity Sports Facility (150,000)	
400454.1031.50 Items approved by 08/08/2018 Addition	Council falling outside Council Decision 210 onal funds required for the completion of DCA 13 Local Sporting Ground with Commu	0 Inity Sports Facility (150,000)	
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60	Council falling outside Council Decision 210 onal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility	0 Inity Sports Facility (150,000)	
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06	Council falling outside Council Decision 210 onal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility	0 inity Sports Facility (150,000) 150,000 0	y
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve	0 inity Sports Facility (150,000) 150,000 0	y
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06 22/08/2018 Capita	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19.	y
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06 22/08/2018 Capita 600023.1565.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727)	y
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06 22/08/2018 Capita 600023.1565.60 600008.1568.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000)	v C
400454.1031.50 Items approved by 08/08/2018 Addition 600019.1002.60 700013.1917.06 22/08/2018 Capita 600023.1565.60 600008.1568.60 600015.1002.60 12/09/2018 Transfe	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Community Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0	y
12/09/2018 Transfunder the threshol	Council falling outside Council Decision 210 onal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves.	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 items that are	v C
12/09/2018 Transfunder the threshold	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense – Aged Persons Unit Maintenance Program	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 items that are (192,750)	v C
12/09/2018 Transfunder the threshold 400644.1600.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Building Renewals	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 items that are (192,750) 192,750	v C
12/09/2018 Transfunder the threshold 40044.1001.60 1000074.1014.06	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Building Renewals Reserve Transfer - Aged Persons Unit Operating	0 inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 items that are (192,750) 192,750 192,750	v C
12/09/2018 Transfunder the threshold 400644.1600.60 600072.1014.06 108/0072.1014.06	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Building Renewals Reserve Transfer - Aged Persons Unit Operating Reserve Transfer - Aged Persons Unit Capital	0 Inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 Items that are (192,750) 192,750 (192,750)	v C
12/09/2018 Transformer the threshold 400643.1600.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Community Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Building Renewals Reserve Transfer - Aged Persons Unit Operating Reserve Transfer - Aged Persons Unit Capital Operating Expense - Banksia Park Maintenance Program	0 Inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 Items that are (192,750) 192,750 192,750 (192,750) (90,000)	v C
12/09/2018 Transfunder the threshol 400443.1600.60 600072.1014.06 700072.1014.06 400643.1600.60 600068.1002.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Community Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Operating Reserve Transfer - Aged Persons Unit Capital Operating Expense - Banksia Park Maintenance Program Capital Expense - Banksia Park Maintenance Program Capital Expense - Banksia Park Maintenance Program	0 Inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 Items that are (192,750) 192,750 192,750 (192,750) (90,000) 90,000	v C
12/09/2018 Transfunder the threshol 400443.1600.60 700072.1014.06 400643.1600.60 600068.1002.60	Council falling outside Council Decision 210 onal funds required for the completion of DCA 13 Local Sporting Ground with Commu Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense – Aged Persons Unit Maintenance Program Capital Expense – Aged Persons Unit Operating Reserve Transfer – Aged Persons Unit Capital Operating Expense – Banksia Park Maintenance Program Capital Expense – Banksia Park Building Renewals Reserve Transfer – Banksia Park Building Renewals	0 Inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 Items that are (192,750) 192,750 (192,750) (90,000) 90,000 90,000	v C
12/09/2018 Transfunder the threshol 400443.1600.60 600072.1014.06 700072.1014.06 400643.1600.60 600068.1002.60	Council falling outside Council Decision 210 conal funds required for the completion of DCA 13 Local Sporting Ground with Community Capital expenditure - DCA 13 Local Sporting Ground with Community Sports Facility Transfer from reserve - Future Community Infrastructure Reserve I projects funded in 2017/18 that were not finalised, requiring funds to be carried for Capital expenditure - Kwinana Tennis Courts fencing Capital expenditure - Medina Oval bitumenise entrance and carpark Capital expenditure - Building Contingency er of Aged Person Units and Banksia Park capital works to operating maintenance for d for asset capitalisation, including transfer from capital to operating reserves. Operating Expense - Aged Persons Unit Maintenance Program Capital Expense - Aged Persons Unit Operating Reserve Transfer - Aged Persons Unit Capital Operating Expense - Banksia Park Maintenance Program Capital Expense - Banksia Park Maintenance Program Capital Expense - Banksia Park Maintenance Program	0 Inity Sports Facility (150,000) 150,000 0 ward to 2018/19. (22,727) (7,000) 29,727 0 Items that are (192,750) 192,750 192,750 (192,750) (90,000) 90,000	v C

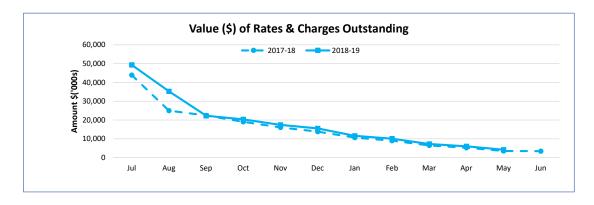
GL Code	Description	Increase / (Decrease) to Net Surplus Position	Amended Budget Surplus / (Deficit)
12/09/2018 Aborig	inal Resource Worker funding from the Department of Education and Training, and N	/ly Time funding	
- · · · ·	t been confirmed at the time of the Budget 2018/2019 preparation. This funding has		
•	expenditure budgets are required to be applied. The additional cost of the Aborigina		
	proposed to be funded from a reduction in Family Day Care general employee expen		
400654.1031.50	Employee Expense - Family Day Care Aboriginal Resource - Salaries	(26,369)	
400654.1035.50	Employee Expense - Family Day Care Aboriginal Resource - Superannuation	(3,164)	
400655.1126.60	Operating Expense - Family Day Care Aboriginal Resource - Consumables	(4,500)	
400655.1195.60	Operating Expense - Family Day Care Aboriginal Resource – Other Expenses	(3,500)	
400655.1210.61	Operating Expense - Family Day Care Aboriginal Resource – Salaries Contract	(2,000)	
400655.1226.60	Operating Expense - Family Day Care Aboriginal Resource - Telephone	(450)	
400655.1826.60	Operating Expense - Family Day Care Aboriginal Resource – Travel FDC Van	(4,300)	
400656.1037.51	Operating Expense - FDC Aboriginal Resource - Workers Compensation Premium	(527)	
400656.1038.51	Employee Expense Other - Family Day Care Aboriginal Resource – Training Staff	(1,000)	
400311.1031.50	Employee Expense - Family Day Care General - Salaries	26,369	
400311.1031.50	Employee Expense - Family Day Care General - Superannuation	3,164	
400311.1033.50	Operating Expense - Family Day Care General - Workers Compensation Premium	527	
300210.1362.15	Operating Revenue - Family Day Care Aboriginal Resource - Operational Subsidy	30,500	
300210.1302.13	Operating Revenue - FDC Aboriginal Resource - NGALA My Time Funding	10,000	
300210.1041.13	Operating Nevertide 11 De Aboriginal Nesource 1 NOALA My Time Funding	24,750	24,75
		24,730	24,73
including the instal transferred from th 600019.1002.60	are required for the replacement of nine reverse cycle air conditioner unit/motors at llation of manholes to enable servicing of units. It is proposed that the funds for the part capital contingency budget allocation under Building Construction. Capital Expense – Buildings – Library air conditioning motor replacement	(31,000)	
600015.1002.60	Capital Expense – Buildings – Building contingency	31,000	24,75
	onal funds required to complete the Orelia Oval project. The additional funds will be ghting project budget as the tender quote was lower than originally budgeted. Capital Expense - Reserve Development - Orelia Oval Steps Capital Expense - Reserve Development - Medina Oval Lighting	(20,000)	
		20,000 0	24,75
	onal funds required to complete custom fit out for Building Services vehicle. Addition sale proceeds of 1EWS395.	0	24,75
provided by excess		0	24,75
provided by excess 600013.1000.60	sale proceeds of 1EWS395.	0 al funds	24,75
provided by excess 600013.1000.60 600011.1000.60	sale proceeds of 1EWS395. Capital Expense - Transportation Vehicles - Plant Replacement of KWN1983	0 al funds (11,700)	24,75
provided by excess 600013.1000.60 600011.1000.60	sale proceeds of 1EWS395. Capital Expense - Transportation Vehicles - Plant Replacement of KWN1983 Capital Expense - Transportation Vehicles - Plant Replacement of 1EWS395	0 al funds (11,700) 10,000	·
provided by excess 600013.1000.60 600011.1000.60	sale proceeds of 1EWS395. Capital Expense - Transportation Vehicles - Plant Replacement of KWN1983 Capital Expense - Transportation Vehicles - Plant Replacement of 1EWS395	0 al funds (11,700) 10,000 1,700	·
provided by excess 600013.1000.60 600011.1000.60 500007.1488.05	sale proceeds of 1EWS395. Capital Expense - Transportation Vehicles - Plant Replacement of KWN1983 Capital Expense - Transportation Vehicles - Plant Replacement of 1EWS395	0 al funds (11,700) 10,000 1,700 0	·
provided by excess 600013.1000.60 600011.1000.60 500007.1488.05 05/12/2018 City co 670 Bertram Road	capital Expense - Transportation Vehicles - Plant Replacement of KWN1983 Capital Expense - Transportation Vehicles - Plant Replacement of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395	0 al funds (11,700) 10,000 1,700 0	·
provided by excess 600013.1000.60 600011.1000.60 500007.1488.05 05/12/2018 City co 670 Bertram Road 600007.1567.60	capital Expense - Transportation Vehicles - Plant Replacement of KWN1983 Capital Expense - Transportation Vehicles - Plant Replacement of 1EWS395 Capital Revenue - Transportation Vehicles - Sale of 1EWS395 contribution towards the upgrade and relocation of the nutrient stripping basin located and Peel Main Drain. Project commencing July 2019. Capital Expense - Street Lighting - Johnson / McWhirter	0 al funds (11,700) 10,000 1,700 0 d between Lot 40,000	·
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15/12/2018 Noise level testing of Ken Jackman Hall has indicated that the extent of works for the soundproofing needs of increase. 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-1002-50 10/10013-100	GL Code	Description	Increase / (Decrease) to Net Surplus Position	Amended Budget Surplus / (Deficit)
solicites as a comparation of STC's in lieu of payment for solar panel installation. 300191002.60 Building Renewals - Soundproof Drainage Ken Jackman Hall (4,000) 300171002.60 Building Renewals - Kwinana Senior Citizens Centre (4,000) 3000191002.60 Building Construction - Solar Panels upgrade (18,102) 3000191002.60 Building Construction - Solar Panels upgrade (18,102) 3000091364.22 Operating Expense - Governance - Other Reimbursements (18,102) 3000091364.22 Operating Expense - Governance - Other Reimbursements (18,102) 31/303/2019 As per Budget Review Report. Decrease in Opening Funding Surplus (14,45,170) Increase in Non-Operating Grants, Subsidies & Contributions (14,45,170) Increase in Proceeds from Disposal of Assets (19,384) Reimbursement of Developer Contributions (14,485,170) Increase in Capital Expenditure (3,485,419) Decrease in Capital Expenditure (3,485,419) Decrease in Capital Expenditure (18,772) Additional Reserve Transfer (18,770) 33,398 Increase in Capital Expenditure (18,772) Additional Reserve Transfer (18,700) 300016.1002.60 Capital Expense - Kwinana South Volunteer Fire Brigade (208,000) 300178.1002.16 Grant - Department of Fire and Emergency Services (18,500) 315,500 300178.1002.16 Grant - Department of Fire man Emergency Services (18,500) 316,703/2019 Recognition of Corporate Business System licence as operating, as originally budgeted as capital (19,500) 316,703/2019 Recognition of the donation of two fire support utilities from BP, including expected operating costs for hese vehicles. 310,004/2019 Recognition of the donation of two fire support utilities from BP, including expected operating costs for hese vehicles. 310,004/2019 Recognition of Capital Expense - Vehicle Operating - Emergency Management (14,500) 310,004/2019 Recognition of Capital Expense - Palnat and Equipment - Fire & Emergency Management (14,500) 310,004/2019 Recognition of Capital Expense - Palnat and Equipment - Fire & Emergency Management (14,500) 310,004/2019 CCTV for Recquatic at identi		·		. ,
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13/03/2019 As per Budget Review Report. 24,756			0	24,750
13/03/2019 As per Budget Review Report. Decrease in Opening Funding Surplus Operating Activities Increase in Non-Operating Grants, Subsidies & Contributions Increase in Proceeds from Disposal of Assets Increase in Capital Expenditure Decrease in Capital Expenditure Decrease in Capital Expenditure Decrease in Capital Expenditure Decrease in Financing Activities Individual Expenditure Decrease in Financing Activities Increase in Capital Expenditure Decrease in Financing Activities Increase in Capital Expenditure Individual Expenditure Decrease in Financing Activities Increase in Capital Expenditure Individual Expenditure Individual Reserve Transfer Individual Reserve Reserve Transfer Individual Reserve Reserve Transfer Individual Reserve Reserve Transfer Individual Reserve Res	13/02/2019 Transfe	er of STC's in lieu of payment for solar panel installation.		
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Operating Expense - Vehicle Operating - Law, Order and Public Safety 3,000 Capital Expense - Plant and Equipment - Fire & Emergency Management (14,500) Donation - BP 14,500 0 Capital Expense - Plant and Equipment - Fire & Emergency Management (14,500) O Capital Expense - Plant and Equipment - Fire & Emergency Management (14,500) O Capital Expense - BP Capital Expense - Building Construction - Building Upgrade CCTV - Administration (8,000) Building, Recquatic, Darius Wells Library and Resource Centre		Operating Evponce Mahielo Operating Fire & Emergency Management	(2,000)	
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	400275.1144.60	Operating Expense - Recquatic Health & Fitness — Expendable Equipment	5 000	
	400259.1051.51			
			2,528	

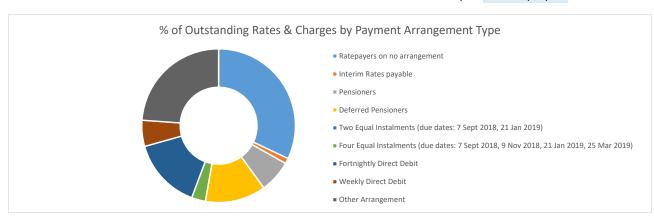
GL Code	Description	Increase / (Decrease) to Net Surplus Position	Amended Budget Surplus / (Deficit)
24/04/2019 Recogn	ition of the purchase of a Matterport Pro 2 3D 360view camera and accessories as ca	pital as it was	, ,
originally budgeted	as operating.		
600002.10001.60	Capital Expense – Computing Equipment – Matterport Pro 2 3D 360view camera	(5,150)	
400761.2018.64	Operating Expenses – Computing Infrastructure – Computer Fleet/Materials	5,150	
24/04/2019 To reco	gnise a Budget shortfall in the following areas for Public Health operating budget for	2018/2019	
400424.1177.60	Operating Expenses - Public Health – Legal Expenses	(28,140)	
300097.1828.30	Operating Revenue - Public Health - Food Businesses Fees	(103,900)	
300097.1308.30	Operating Revenue - Public Health – Equine Premise Fee	(6,202)	
300097.1360.30	Operating Revenue - Public Health – Offensive Trade Licence	(1,055)	
300097.1548.22	Operating Revenue - Public Health – Long Service Leave Reimbursement	5,124	
300097.1827.25	Operating Revenue - Public Health – Food Act Fines & Penalties	3,840	
		(130,333)	(130,333
22/05/2019 Grant a	pproval received from WALGA for bin tagging.		
400434.1600.60	Operating Expense - Mainstream Waste Projects - Bin Tagging	(8,000)	
300144.1600.15	Grant - Mainstream Waste - WALGA Bin Tagging	8,000	
		0	(130,333
22/05/2019 Recogn	ition of new tennis court booking system as an asset. Jointly funded by the City and	the Kwinana Tenn	nis Club.
600008.1568.60	Capital Expense - Reserve Development - Kwinana Tennis Courts Fencing	(6,145)	
300142.1003.16	Contribution - Kwinana Tennis Club	3,073	
	Operating Expense - City Engagement Projects - Community Development Officer	3,072	
400094.1600.60	Programs	0	(130,333
		ŭ	(130,333
22/05/2019 Three n	ninor capital projects to be funded from savings in operational cleaning budget.		
600017.1002.60	Capital Expense - Buildings - Budden Way Carpet Replacement	(8,800)	
600004.1002.60	Capital Expense - Buildings - Kwinana Recquatic Strip and Seal Stadium Flooring	(8,800)	
600021.1002.60	Capital Expense - Buildings - Workshop - New Automated Roller Door	(7,480)	
400492.1004.60	Operating Expense - Recreation & Culture Facility - Contractors	25,080	
		0	(130,333
	Amended Budget Su	ırplus / (Deficit)	(130,333
	Amended budget St	i pius / (Delicit)	(130,333

Note 5(a): Receivables - Rates & Charges

Receivables - Rates & Charges Receivable	30 June 2018	31 May 2018	31 May 2019
	\$		\$
Opening Arrears Previous Years	3,360,788	2,906,198	4,275,903
Levied this year	46,715,340	47,015,825	49,784,525
Less Collections to date	(45,056,420)	(45,063,681)	(48,444,170)
Less Excess Rates received	(743,805)	(743,805)	(799,399)
Rates & Charges Collectable	4,275,903	4,114,537	4,816,859
Less Pensioner Deferred Rates	(678,782)	(593,150)	(614,938)
Net Rates & Charges Collectable	3,597,121	3,521,387	4,201,921
% Outstanding	7.70%	7.49%	8.44%



	Number of		
Outstanding Rates & Charges by Payment Arrangement Type	Assessments	Balance O	utstanding
		\$	%
Ratepayers on no arrangement	603	1,543,235	32.04%
Interim Rates payable	856	55,049	1.14%
Pensioners	188	328,560	6.82%
Deferred Pensioners	192	614,938	12.77%
Two Equal Instalments (due dates: 7 Sept 2018, 21 Jan 2019)	1122	0	0.00%
Four Equal Instalments (due dates: 7 Sept 2018, 9 Nov 2018, 21 Jan 2019, 25 Mar 2019)	3534	140,675	2.92%
Fortnightly Direct Debit	3573	720,476	14.96%
Weekly Direct Debit	1205	264,728	5.50%
Other Arrangement	254	1,149,198	23.86%
	11,527	4,816,859	100.00%

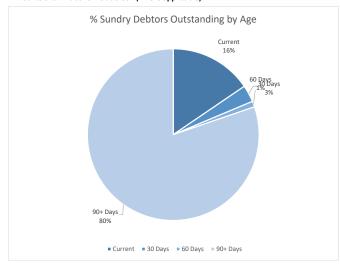


Note 5(b): Receivables - General

Receivables - General

	Current	30 Days	60 Days	90+ Days	Total
	\$	\$	\$	\$	\$
Sundry Debtors Infringements Register	73,931	15,170	5,157	382,984	477,242 165,549
Total Receivables General	Outstanding				642,791

Amounts shown above include GST (where applicable)



Sundry Debtors Outstanding Over 90 Days Exceeding \$1,000

Debtor #	Description	Status	\$
Debts with	n Fines Enforcement Registry (FER)		
	Prosecution Local Law Fencing	Registered with FER. Payments are being received.	2,073
	Prosecution Dog Act 1976	Registered with FER. No payments received.	5,732
2535.07	Prosecution Dog Act 1976	Registered with FER. Warrant of Commitment issued and time served. Report to be prepared for Council recommending write off.	6,444
2726.07	Prosecution Planning and Development Act 2005	Registered with FER. Warrant of Commitment issued and time served. Report to be prepared for Council recommending write off.	20,171
3321.07	Prosecution and Infringement Dog Act 1976	Registered with FER. Regular fortnightly payments.	1,860
3485.07	Prosecution Food Act 2008	Registered with FER. Business deregistered. Report to be prepared for Council recommending write off.	13,524
3909.07	Prosecution Local Government Act 1995	Registered with FER.	3,652
3936.07	Prosecution Building Act 2011 and Planning and Development Act 2005	Registered with FER. Regular fortnightly payments.	6,302
3953.07	Prosecution Local Law Urban Environment Nuisance - Disrepair Vehicle	Registered with FER. Regular fortnightly payments.	1,699
4060.07	Prosecution Littering Act 1979	Payment Arrangement by direct debit fortnightly.	1,512
4131.07	Prosecution Dog Act 1976 Dangerous Dog	Registered with FER. Debtor is making payments to FER. City yet to receive payments due to quantum of fines outstanding.	4,654
4233.07	Prosecution Local Law Fencing	Registered with FER.	2,500
4274.07	Prosecution Dog Act 1976	Registered with FER.	9,247
4275.07	Prosecution Local Law Urban Environment Nuisance - Disrepair Vehicle	Registered with FER.	14,350
Other Sun	dry Debtors		
854.04	Lease Arrears Rent and Outgoings	Outstanding balance has been paid June 2019.	4,844
897.04	Deed of Settlement	Payment arrangement being negotiated.	75,000
1512.11	Maintenance Fee	Outstanding amount to be cleared upon sale of unit.	2,832
2864.07	Rugby hire & tenancy costs	Approved payment arrangement in place.	1,385
3884.03	Local Government Act 1995 abandoned vehicle	Approved payment arrangement in place.	1,315
3922.03	Local Government Act 1995 verge clean up works	Collection attempts unsuccessful to date. Debt has been linked to property.	1,090
3951.06	Developer Contributions	Collection attempts unsuccessful to date. Debt to be written off and report submitted to Council.	3,786
4162.04	Facility / Community Centre hire fees	Collection attempts unsuccessful to date. Debt to be written off and report submitted to Council.	1,768
4311.06	Developer Contributions	Outstanding balance has been paid June 2019.	186,501
Total Debt	tors 90+ days > \$1,000		372,242

Note 6: Cash Backed Reserves

		Adopted	Budget			Current E	Budget				Actual			Variance
		Transfers In (incl				Transfers In (incl		Current		Actual				Actual vs
	Opening	Interest)	Transfers Out	Closing	Opening	Interest)	Transfers Out	Budget Closing	Opening	Transfers In	Interest	Transfers Out	YTD Closing	Current
	Balance	(+)	(-)	Balance	Balance	(+)	(-)	Balance	Balance	(+)	Earned (+)	(-)	Balance	Budget
Reserve	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Municipal Reserves														
Aged Persons Units Reserve	765,541	308,844	(232,750)	841,635	748,728	286,126	(256,025)	778,829	748,728	0	15,797	0	764,525	(14,304)
Asset Management Reserve	501,595	8,721	(180,000)	330,316	501,595	335,776	(180,000)	657,371	501,595	324,018	11,725	(55,779)	781,559	124,188
Asset Replacement Reserve	748,122	263,007	(351,200)	659,929	498,123	264,099	(320,790)	441,432	498,123	250,000	14,099	(83,962)	678,260	236,828
Banksia Park Reserve	134,175	2,333	(49,738)	86,769	115,626	32,922	(90,000)	58,548	115,626	0	2,382	0	118,008	59,460
City Assist Initiative Reserve	100,401	1,743	(102,144)	(0)	100,401	2,571	(102,972)	0	100,401	0	2,571	(33,873)	69,100	69,100
Community Services & Emergency Relief Reserve	84,017	1,461	0	85,478	84,017	4,084	0	88,101	84,017	0	4,084	0	88,101	0
Contiguous Local Authorities Group Reserve	263,146	14,575	(20,000)	257,721	265,873	25,478	(35,000)	256,351	265,873	15,810	5,838	(2,740)	284,781	28,430
Employee Leave Reserve	4,119,629	71,623	(300,000)	3,891,252	4,231,590	98,193	(300,000)	4,029,783	4,231,590	0	10,893	0	4,242,483	212,700
Family Day Care Reserve	1,479,306	25,719	(805,560)	699,465	1,462,302	23,397	(30,924)	1,454,775	1,462,302	0	36,542	0	1,498,844	44,069
Future Community Infrastructure Reserve	1,538,389	26,746	(663,284)	901,851	1,381,900	23,485	(809,536)	595,849	1,381,900	0	35,718	(347,337)	1,070,281	474,432
Golf Course Cottage Reserve	28,033	487	0	28,520	28,033	619	0	28,652	28,033	0	619	0	28,652	0
Information Technology Reserve	1,890,703	32,871	(1,416,000)	507,574	1,890,703	402,447	(810,000)	1,483,150	1,890,703	370,000	34,109	(52,884)	2,241,928	758,778
Infrastructure Reserve	339,968	5,911	0	345,879	339,968	5,262	0	345,230	339,968	0	5,280	0	345,248	18
Refuse Reserve	8,698,885	180,697	(83,880)	8,795,702	8,736,657	191,380	(105,085)	8,822,952	8,736,657	0	148,421	0	8,885,078	62,126
Renewable Energy Efficiency Reserve	0	0	0	0	0	15,000	0	15,000	0	15,000	0	0	15,000	0
Restricted Grants & Contributions Reserve	1,694,812	0	(1,694,812)	0	2,491,721	145,000	(2,459,230)	177,491	2,491,721	145,000	31,870	(1,690,047)	978,544	801,053
Settlement Agreement Reserve	160,000	2,782	0	162,782	160,000	3,534	0	163,534	160,000	0	3,534	0	163,534	0
Workers Compensation Reserve	330,200	5,741	0	335,941	338,710	6,820	(205,247)	140,283	338,710	0	6,830	(205,247)	140,293	10
Youth Engagement Reserve	130,412	2,264	(132,676)	0	144,650	4,581	(149,231)	0	144,650	0	4,581	(147,942)	1,288	1,288
Sub-Total Municipal Reserves	23,007,334	955,524	(6,032,043.9)	17,930,814	23,520,597	1,870,774	(5,854,040)	19,537,331	23,520,597	1,119,828	374,894	(2,619,810)	22,395,509	2,858,178
Developer Contribution Reserves														
DCA 1 - Hard Infrastructure - Bertram	1,851,461	182,424	(491,817)	1,542,068	1,887,550	174,406	(491,394)	1,570,562	1,887,550	83,972	46,506	0	2,018,027	447,465
DCA 2 - Hard Infrastructure - Wellard	1,772,974	429,946	(2,197,177)	5,743	1,877,524	420,838	(2,197,684)	100,678	1,877,524	636,230	43,105	0	2,556,859	2,456,181
DCA 4 - Hard Infrastructure - Anketell	0	0	0	0	0	633,006	0	633,006	0	633,006	0	0	633,006	0
DCA 5 - Hard Infrastructure - Wandi	1,286,174	661,998	(454,627)	1,493,545	1,309,322	649,155	(594,315)	1,364,162	1,309,322	0	25,034	(140,007)	1,194,349	(169,813)
DCA 7 - Hard Infrastructure - Mandogalup West	11,803	14,077	(159)	25,720	11,713	14,014	(153)	25,574	11,713	8,034	285	0	20,032	(5,542)
DCA 8 - Soft Infrastructure - Mandogalup	0	0	0	0	0	0	0	. 0	0	0	0	0	. 0	0
DCA 9 - Soft Infrastructure - Wandi/Anketell	10,446,476	576,997	(141,136)	10,882,338	10,487,573	1,180,041	(136,633)	11,530,981	10,487,573	978,831	201,211	0	11,667,615	136,634
DCA 10 - Soft Infrastructure - Casuarina/Anketell	229,412	246,696	(3,099)	473,009	227,912	244,065	(2,969)	469,008	227,912	0	4,125	0	232,037	(236,971)
DCA 11 - Soft Infrastructure - Wellard East	5,734,336	1,081,744	(77,473)	6,738,607	5,944,904	995,267	(77,451)	6,862,720	5,944,904	410,213	134,907	(444,692)	6,045,331	(817,389)
DCA 12 - Soft Infrastructure - Wellard West	6,622,131	355,217	(89,468)	6,887,880	6,663,351	367,429	(86,811)	6,943,969	6,663,351	172,217	154,714	0	6,990,283	46,314
DCA 13 - Soft Infrastructure - Bertram	283,730	8,356	(3,833)	288,252	282,230	7,565	(3,677)	286,118	282,230	0	7,566	0	289,796	3,678
DCA 14 - Soft Infrastructure - Wellard/Leda	480,660	130,374	(6,494)	604,540	504,779	128,486	(6,576)	626,689	504,779	102,069	12,267	0	619,115	(7,574)
DCA 15 - Soft Infrastructure - City Site	144,189	23,788	(1,948)	166,029	158,316	23,782	(2,062)	180,036	158,316	6,872	4,240	0	169,428	(10,608)
Sub-Total Developer Contribution Reserves	28,863,346	3,711,616	(3,467,231)	29,107,731	29,355,174	4,838,054	(3,599,725)	30,593,503	29,355,174	3,031,445	633,959	(584,699)	32,435,879	1,842,376
Total Reserves	51,870,680	4,667,140	(9,499,275)	47,038,545	52,875,771	6,708,828	(9,453,765)	50,130,834	52,875,771	4,151,273	1,008,853	(3,204,509)	54,831,388	4,700,554

Note 7: Disposal of Assets

			YTD A	Actual			Budg	et	
Asset		Net Book				Net Book			
Number	Asset Description	Value	Proceeds	Profit	(Loss)	Value	Proceeds	Profit	(Loss)
		\$	\$	\$	\$	\$	\$	\$	\$
	Motor Vehicles								
5061	Plant Replacement - P402	20,000	20,509	509		20,000	20,509	509	
5060	Plant Replacement - P403	20,000	21,645	1,645		20,000	21,645	1,645	
5080	Plant Replacement - P407	19,097	14,373		(4,724)	19,097	14,373		(4,724)
5597	Plant Replacement - P435	21,934	23,464	1,529		21,934	23,464	1,530	
5705	Plant Replacement - P445	19,833	20,055	221		20,437	14,400		(6,037)
5876	Plant Replacement - P457					14,360	12,600		(1,760)
5859	Plant Replacement - P460	29,045	19,600		(9,445)	29,045	19,600		(9,445)
5884	Plant Replacement - P461	14,005	12,555		(1,451)	16,451	18,900	2,449	
5871	Plant Replacement - P464	21,475	11,645		(9,830)	21,475	11,645		(9,830)
5838	Plant Replacement - P465	22,860	15,736		(7,124)	22,860	15,736		(7,124)
5809	Plant Replacement - P467	26,600	23,009		(3,591)	26,600	23,009		(3,591)
5872	Plant Replacement - P462	23,020	16,191		(6,829)	23,020	16,191		(6,829)
5983	Plant Replacement - P490	18,413	15,736		(2,677)	18,413	15,736		(2,677)
5831	Plant Replacement - P455	26,313	23,009		(3,304)	26,313	23,009		(3,304)
5856	Plant Replacement - P459	28,967	20,509		(8,458)	28,967	20,509		(8,458)
5093	Plant Replacement - P406	18,000	13,236		(4,764)	18,000	13,236		(4,764)
5885	Plant Replacement - P463					22,625	10,800		(11,825)
5666	Plant Replacement - P437	21,467	10,509		(10,958)	21,467	10,509		(10,958)
	Plant & Equipment								
2587	Plant Replacement Program - 7 X 4 Box Trailer with Water Tank and 5.5 Hp Pump - P148					0	0		(0)
4957	Plant Replacement Program - Agrizzi Rota Slasher 72 inch - P413	0	2,273	2,273		0	2,273	2,273	
3974	Plant Replacement Program - Cat Skid Steer Loader - P347					24,000	20,000		(4,000)
3722	Plant Replacement Program - Hino 300 Series 816 Crew Cab Truck - Parks - P324					34,789	25,000		(9,789)
4083	Plant Replacement Program - Massey Ferguson Tractor - Parks - P354	49,748	30,000		(19,748)	50,000	30,000		(20,000)
3842	Plant Replacement Program - Mitsubishi Canter Tip Truck - Infra - P333					29,250	15,000		(14,250)
2819	Plant Replacement Program - Salloy Boxtop Trailer with Water Tank and Pump - P199					0	0		
3407	Plant Replacement Program - Disposal Only					19,300	12,000		(7,300)
3447	Plant Replacement Program - Disposal Only					3,737	4,200	463	
5646	Plant Replacement Program - KAP Ride on Mower with Catcher - replace P444	17,794	6,364		(11,430)	17,794	6,364		(11,430)
3481	P289 Tip Truck from 17/18	30,564	22,176		(8,388)	30,564	22,176		(8,388)
		449,136	342,594	6,178	(112,720)	600,498	442,884	8,869	(166,484)
	Net Profit/(Loss)			_	(106,542)			_	(157,615)

				YTD Act	tual			Budget					
Note 8: Rating Information		Number						Number					
		of	Rateable	Rate	Interim	Back	Total	of	Rateable	Rate	Interim	Back	Total
	Rate in	Properties	Value	Revenue	Rates	Rates	Revenue	Properties	Value	Revenue	Rate	Rate	Revenue
RATE TYPE	\$		\$	\$	\$	\$	\$		\$	\$	\$	\$	\$
Differential General Rate													
Gross Rental Value (GRV)													
Improved Residential	0.07999	13,747	238,950,796	18,859,093	413,654	11,467	19,284,214	13,549	235,768,136	18,859,093	529,676	0	19,388,769
Improved Special Residential	0.07120	815	19,436,231	1,372,308	11,525	(724)	1,383,110	807	19,273,991	1,372,308	0	0	1,372,308
Light Industrial and Commercial	0.09043	133	23,230,285	2,118,044	27,193	(2,340)	2,142,897	136	23,421,923	2,118,044	0	0	2,118,044
General Industry and Service Commercial	0.08647	319	35,313,111	3,074,926	28,378	(8,387)	3,094,917	320	35,560,611	3,074,926	0	0	3,074,926
Large Scale General Industry and Service Commercial	0.08909	47	47,549,186	4,178,852	22,756	37,854	4,239,462	46	46,905,960	4,178,852	0	0	4,178,852
Vacant Residential	0.16828	376	7,792,630	1,375,819	(55,435)	(3,207)	1,317,177	415	8,175,770	1,375,819	0	0	1,375,819
Vacant Non Residential	0.10304	35	2,422,880	235,692	30,427	0	266,119	33	2,287,380	235,692	0	0	235,692
Unimproved Value (UV)													
General Industrial	0.01759	3	121,200,000	2,131,908	0	0	2,131,908	3	121,200,000	2,131,908	0	0	2,131,908
Mining	0.00847	25	39,960,000	338,461	0	0	338,461	25	39,960,000	338,461	0	0	338,461
Urban/Urban Deferred	0.00505	143	242,241,000	1,241,497	(3,753)	(630)	1,237,114	143	245,841,000	1,241,497	0	0	1,241,497
Sub-Totals		15,643	778,096,119	34,926,600	474,746	34,034	35,435,380	15,477	778,394,771	34,926,600	529,676	0	35,456,276
	Minimum										_		
Minimum Payment	\$												
Gross Rental Value (GRV)													
Improved Residential	\$1,036	1,438	1,658,878	1,481,480	3,991	1,056	1,486,527	1,430	16,916,772	1,481,480	0	0	1,481,480
Improved Special Residential	\$1,036	4	6,228	3,108	1,036	0	4,144	3	40,820	3,108	0	0	3,108
Light Industrial and Commercial	\$1,348	25	31,800	33,700	2,696	0	36,396	25	274,661	33,700	0	0	33,700
General Industry and Service Commercial	\$1,348	34	47,994	45,832	0	0	45,832	34	299,022	45,832	0	0	45,832
Large Scale General Industry and Service Commercial	\$1,348	0	0	0	0	0	-	0	-	-	0	0	-
Vacant Residential	\$1,036	904	923,572	992,488	(25,891)	452	967,049	958	4,987,503	992,488	0	0	992,488
Vacant Non Residential	\$1,036	2	0	2,072	0	0	2,072	2	4,320	2,072	0	0	2,072
Unimproved Value (UV)													
General Industrial	\$1,348	0	923,572	0	0	0	-	0	0	0	0	0	C
Mining	\$1,348	16	47,994	20,220	1,344	0	21,564	15	186,557	20,220	0	0	20,220
Rural	\$1,036	115	1,658,878	66,304	5,572	4,057	75,933	64	9,608,600	66,304	0	0	66,304
Sub-Totals		2,538	5,298,916	2,645,204	(11,252)	5,565	2,639,517	2,531	32,318,255	2,645,204	0	0	2,645,204
		18,181	783,395,035	37,571,804	463,494	39,599	38,074,897	18,008	810,713,026	37,571,804	529,676	0	38,101,480
Concession							-						-
Amount from General Rates							38,074,897						38,101,480
Ex-Gratia Rates							-						-
Specified Area Rates							-						_
Totals							38,074,897						38,101,480

Note 9: Information on Borrowings

(a) Debenture Repayments

		New	Loans	Principal Repayments			cipal anding	Interest Repayments	
Particulars	01 Jul 2018	Actual	Current Budget	Actual	Current Budget	Actual	Current Budget	Actual	Current Budget
		\$		\$	\$	\$	\$	\$	\$
Governance									
Loan 99 - Administration Office Renovations	761,572	0	0	44,196	89,773	717,376	671,799	25,680	51,364
Loan 107 - Administration / Chambers Building Refurbishment	0	0	150,800	0	0	0	150,800	0	0
Education & Welfare									
Loan 96 - Youth Specific Space	147,840	0	0	12,449	25,366	135,391	122,474	5,689	11,654
Loan 100 - Youth Specific Space	1,521,312	0	0	60,551	122,515	1,460,761	1,398,797	39,497	79,645
Recreation and Culture									
Loan 94 - Wellard Sports Pavilion	204,825	0	0	46,488	46,488	158,337	158,337	11,001	13,704
Loan 95 - Orelia Oval Pavilion	354,815	0	0	29,876	60,878	324,939	293,937	13,653	27,970
Loan 97 - Orelia Oval Pavilion Extension	1,685,135	0	0	97,793	198,641	1,587,342	1,486,494	56,822	113,653
Loan 102 - Library & Resource Centre	7,421,567	0	0	0	0	7,421,567	7,421,567	188,041	386,720
Loan 104 - Recquatic Refurbishment	3,350,000	0	0	0	0	3,350,000	3,350,000	77,805	159,125
Loan 105 - Bertram Community Centre	1,296,840	0	0	0	0	1,296,840	1,296,840	35,528	50,827
Loan 106 - Destination Park - Calista	1,516,532	0	0	47,681	96,111	1,468,851	1,420,421	28,243	57,307
Transport									
Loan 98 - Streetscape Beautification	1,028,123	0	0	59,664	121,193	968,459	906,930	34,668	69,341
Loan 101 - City Centre Redevelopment	2,500,000	0	0	0	0	2,500,000	2,500,000	54,463	79,250
Self Supporting Loans									
Recreation and Culture									
Loan 103B - Golf Club Refurbishment	282,850	0	0	8,017	16,168	274,833	266,682	5,074	11,202
	22,071,411	0	150,800	406,715	777,133	21,664,696	21,445,078	576,165	1,111,762

(b) New Debentures

No new debentures were raised during the reporting period.

Note 10: Trust Fund

Funds held at balance date over which the City has no control and which are not included in this statement are as follows:

	Opening		_	Closing
	Balance	Amount	Amount	Balance
Description	01 Jul 2018	Received	Paid	31 May 2019
	\$	\$	\$	\$
Hall Security Bonds	71,653	142,787	(154,536)	59,904
Footpath & Kerbing Security Deposits	410,680		(147,040)	263,640
Sports Forfeiture Security Deposits	200			200
Bus Hire Security Deposits	3,000	2,500	(1,500)	4,000
Demolition Security Deposits	2,351			2,351
Miscellaneous Deposits	82,423	1,073	(600)	82,896
Footpath Construction Bonds	2,000			2,000
Land Subdivision Bonds	588,211	61,261	(157,691)	491,781
Road Maintenance Bonds	293,234	52,637	(269,402)	76,469
Landscaping Subdivision Bonds	138,787		(1,197)	137,590
Mortimer Road - Community Trust	10,421			10,421
ATU Landscaping Bonds	2,378			2,378
Landscaping Development Bonds	64,477			64,477
Subdivision Handrails	15,395			15,395
APU Security Bonds	15,481	580	(470)	15,591
Off Road Vehicles	1,510			1,510
DCA Contingency Bonds	265,736		(89,842)	175,894
Contiguous Local Authorities Group (CLAG)	200			200
Retention Funds	37,524	25,818	(43,751)	19,591
City of Kwinana Staff Christmas Saver	0	109,395	(601)	108,794
Public Open Space Cash In Lieu	200,061			200,061
	2,205,722	396,051	(866,631)	1,735,142

Note 11. Capital Acquisitions		Budget				
		Adopted	Current			
	Total YTD	Annual	Annual			
Assets	Actual	Budget	Budget	YTD Budget	YTD Variance	Comment
Local of completion indicator, places can table at the and of this nate for further datail	\$	\$		\$	\$	
Level of completion indicator, please see table at the end of this note for further detail.						
Buildings						
Arts & Cultural Centre Upgrade - Stage 1 of 2	103,872	100,000	110,000	110,000	6,128	Completed, awaiting outstanding invoices.
Automated Gates - Recquatic Front Counter	9,000	90,000	99,000	9,000	0	Carry forward to 19/20 Budget.
Banksia Park Retirement Village Building Renewals	0	90,000	0	0	0	Budget variation to transfer funds to the operating budget approved by Council 12 September 2018.
Building Contingency	22,550	100,000	90,001	90,001	67,451	
Building Renewals - Darius Wells	32,580	25,000	31,500	31,500	(1,080)	Completed.
I Building Renewals - Kwinana Senior Citizens Centre	64,502	100,000	106,000	106,000	41,498	Currently out to market, estimated completion date June 2019.
all Building Renewals - Margaret Feilman	9,288	15,000	10,000	10,000	712	Completed.
Building Renewals - Thomas Oval Netball Clubrooms	7,935	6,500	10,150	10,150	2,215	Project completion expected June 2019.
Building Renewals - Wheatfield Cottage	23,765	20,000	23,765	23,765	0	Completed.
Building Upgrades - CCTV Administration Building	70,105	100,000	114,245	6,245	(63,860)	CCTV to be purchased for Recquatic, Darius Wells Library and Resource Centre, Administration Building. Carry forward to 19/20 Budget.
Building Upgrades - Medina	0	100,000	100,000	0	0	Carry forward to 19/20 Budget.
Callistemon Court Retirement Village Building Renewals	0	192,750	0	0	0	Budget variation to transfer funds to the operating budget approved by Council 12 September 2018.
DCA 12 - Local Sporting Ground with Community Centre / Pavilion - Wellard West	66,475	294,300	323,730	279,371	212,896	Construction delayed until 2020/21.
DCA 14 - Local Sporting Ground with Pavilion Extension (Wellard/Leda) storage room	153,510	261,484	156,148	156,148	2,638	Construction complete. Awaiting outstanding invoices.
DCA 9 - Local Sports Ground Clubroom (Clubroom construction cost)	23,042	107,500	118,250	113,096	90,054	Feasibility study has been completed. Carry forward to 19/20 Budget.
Solar Panels Upgrade	41,644	30,000	63,102	63,102	21,458	Budget variation to transfer STC's in lieu of payment for solar panel installation approved by Council 13 February 2019. Carry forward to 19/20 Budget.
Administration Building & Civic Centre - Stage 1 of 2	0	2,268,000	150,800	100,800	100,800	Process to engage architect under way.
Callistemon Court Retirement Village Building Upgrade	4,000	40,000	44,000	4,000	0	Expected completion in June 2019.
Entry Statement	0	18,000	0	0	0	Marketing signage project in April. Actual expenditure to be journalled to Other Infrastructure below.
DCA 13 - Local Sporting Ground with Community Sports Facility Bertram Oval Ablution block	206,570	328,516	311,309	311,309	104,739	External works complete.
Family Daycare Building Replacement of Playroom, Kitchenette and Toy Library	0	650,000	0	0		Carry forward to 19/20 Budget.
Library - Replacement of Air Conditioners Motors	31,533	0	31,000	31,000		Complete.
Kwinana South VBFB Station Upgrade - Local Projects Local Jobs	0	0	30,000	30,000		Project has been delayed until 2019/20. Carry forward to 19/20 Budget.
Mandogalup VBFB Station Upgrade - Local Projects Local Jobs Grant	0	0	25,000	25,000	25,000	
Kwinana South VBFB Station Extensions - Meeting/Training Room &	0	0	178,000	108,103		Project has been delayed until 2019/20. Carry forward to 19/20 Budget.
Mandogalup VBFB Station Extensions - Ablutions - \$275k DFES LG Grant	0	0	137,500	87,852	87,852	
Smirks Heritage Site Artefacts Shed	U	0	20,000	20,000	20,000	New project approved at Budget Review OCM 13 March 2019. Carry forward to 19/20 Budget.
Mirks Cottage install urinal	3,075	0	2,925	2,925	(150)	
Kwinana Tennis Club Ablutions	0	0	15,000	15,000	15,000	New project approved at Budget Review OCM 13 March 2019. Carry forward to 19/20
Budden Way - Carpet Replacement	0	0	8,800	0	0	Budget. Budget variation for new project approved by Council 22 May 2019. Carry forward to
Kwinana Recquatic - Strip and Seal Stadium Flooring	0	0	8,800	0	n	19/20 Budget. Budget variation for new project approved by Council 22 May 2019
Transition recognition of the state of the s	-					
■ Workshop - New Automated Roller Door	0	0	7,480	0	Ω	Budget variation for new project approved by Council 22 May 2019

			Bu	dget		
Assets	Total YTD Actual	Adopted Annual Budget	Current Annual Budget	YTD Budget	YTD Variance	Comment
Plant, Furniture and Equipment						
Furniture and Equipment						
Design and Replacement of Mayoral Chains	0	10,000	10,000	0	0	Carry forward to 19/20 Budget.
Computing Equipment	0					
City Website Redevelopment	54,841	70,000	70,000	58,656	3,815	Carry forward to 19/20 Budget.
Corporate Business System Renewal - Implementation	129,559	1,191,000	176,147	137,491	7,932	Project commenced in April 2019.
Self Check Touchscreen Computer & Workstation - Library	5,150	7,000	0	0	(5,150)	Carry forward to 19/20 Budget.
Matterport Pro 2 3D 360view camera	0	0	5,150	5,150	5,150	Purchase completed.
Plant and Equipment	0					
CFWD Disability Hoist - Recquatic	13,459	12,000	12,000	12,000	(1,459)	Work has been completed.
CWD Fixed Variable Notice Board	0	70,000	. 0	0	0	Cancelled pending further investigation.
Plant Replacement Program - 7 X 4 Box Trailer with Water Tank and 5.5 Hp Pump - P148	0	7,000	0	0	0	Cancelled.
Plant Replacement Program - Agrizzi Rota Slasher 72 inch - P413	7,136	9,000	7,135	7,135	(1)	Purchase completed.
Plant Replacement Program - Cat Skid Steer Loader - P347	0	90,000	90,000	90,000		Purchase expected June.
Plant Replacement Program - Hino 300 Series 816 Crew Cab Truck - Parks - P324	77,610	80,000	80,000	80,000		Purchase completed.
Plant Replacement Program - Massey Ferguson Tractor - Parks - P354	78,172	85,000	85,000	85,000		Purchase completed.
Plant Replacement Program - Mitsubishi Canter Tip Truck - Infra - P333	0	120,000	120,000	120,000	•	Carry forward to 19/20 Budget.
Plant Replacement Program - Salloy Boxtop Trailer with Water Tank and Pump - P199	0	7,000	0	0		Cancelled.
Plant Replacement Program - Toro Ground Master Ride on Mower - Capital Maintenance - P499	0	7,000	0	0		Cancelled.
Plant Replacement Program - Toro Rear Discharge Ride on Mower - P500	0	7,000	0	0		Cancelled.
Plant Replacement Program - KAP Ride on Mower with Catcher - replace P444	37,291	38,200	37,291	37,291		Purchase completed.
Donation of Fire Support Vehicles for use by Fire Brigades- 2009 Ford Ranger Utility & 2006 Ford Courier Utility	0	38,200	14,500	14,500		Donation by BP.
Motor Vehicles Motor Vehicles	U	U	14,500	14,300	14,300	boliation by br.
Plant Replacement - P402 - KWN1961	38,521	37,500	38,521	38,521	0	Purchase completed.
Plant Replacement - P403 - KWN1961	•					Purchase completed.
·	38,071	37,500	38,071	38,071		Purchase completed.
Plant Replacement - P406 - KWN1898	28,884	28,500	28,884	28,884		·
Plant Replacement - P407 - KWN1949	28,884	28,500	28,883	28,883		Purchase completed.
Plant Replacement - P435 - KWN1957	33,882	33,500	33,882	33,882		Purchase completed. Purchase completed.
Plant Replacement - P437 - KWN1993	24,518	25,000	24,518	24,518		
Plant Replacement - P445 - KWN1983	38,768	28,500	40,200	40,200	•	Purchase completed.
Plant Replacement - P455 - KWN1987	24,304	25,000	24,304	24,304		Purchase completed.
Plant Replacement - P457 - 1EXX509	0	41,500	41,500	41,500	41,500	Purchase no longer required in 2019. Carry forward of disposal only to 19/20 Budget.
Plant Replacement - P459 - 1EWW253	36,380	41,500	36,380	36,380	(0)	Purchase completed.
Plant Replacement - P460 - 1EWW269	38,127	41,500	38,127	38,127		Purchase completed.
Plant Replacement - P461 - 1EXX886	0	41,500	41,500	41,500		Purchase no longer required in 2019.
Plant Replacement - P462 - 1EWO612	24,335	25,000	24,335	24,335	•	Purchase completed.
Plant Replacement - P463 - 1GBJ678	38,591	41,500	38,591	38,591		Purchase completed.
Plant Replacement - P464 - 1EXM745	35,053	41,500	35,053	35,053		Purchase completed.
Plant Replacement - P465 - 1EWS395	40,319	53,500	40,319	40,319		Purchase completed.
Plant Replacement - P467 - KWN1984	33,424	35,000	33,424	33,424	. ,	Purchase completed.
Plant Replacement - P490 - 1GCH844	37,155	41,500	37,155	37,155		Purchase completed.
	5.,133	. 1,550	,155	3.,133	(0)	r

			Ві	udget		
Assets	Total YTD Actual	Adopted Annual Budget	Current Annual Budget	YTD Budget	YTD Variance	Comment
Park and Reserves						
Bore - Current Condition 5 Cubicle & Pump Replacement Program	86,350	75,000	82,500	82,500	(3,850)	
Bore - Renewal / Replacement	46,429	105,000	115,500	115,500	69,071	Bulk of work to be completed after irrigation season. Expected completion in June
FIME CFWD Family Daycare Play Equipment and Landscaping	0	101,569	0	0	0	2019 Carry forward to 19/20 Budget.
Fencing Replacement Program	75,762	57,000	62,700	62,700		Project completed.
KIA Street Tree Planting Program (B)	10,016	75,000	82,500	45,000		Expected completion in June 2019.
M Kwinana Loop Trail	8,000	80,000	88,000	8,000		Carry forward to 19/20 Budget.
TOP CFWD Medina Oval Lighting	233,177	300,000	304,375	304,375		Project has been completed. Awaiting outstanding Western Power invoice.
Parks and Reserves Renewals - Kwinana Adventure Park	47,621	40,000	44,000	44,000	,	Project completed.
Pimlico Crescent Maintenance (F)	31,198	110,000	111,000	111,000		Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Exercise Equipment/Sport	2,160	5,000	5,500	5,500		Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Goal Post Renewal	500	5,000	5,500	5,500	•	Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Oval/Courts/Lights	800	8,000	8,800	8,800	•	Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Park Furniture / Lights	600	6,000	6,600	6,600		Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Prince Regent Park/Calista Oval Playground	85,910	100,000	110,000	110,000	•	Combination units and softfall. Expected completion in June 2019.
Public Open Space Playgrounds Renewals - Casuarina Fire Station Reserve/Casuarina Reserve Park/Peace Park	0	8,000	0	0	0	Budget has been removed in Budget Review.
Public Open Space (POS) Upgrade - Orelia Oval Additional Steps to meet grass	39,832	20,000	42,000	42,000	2,168	Project is completed. Awaiting outstanding invoices.
Public Open Space (POS) Upgrades - Parks for People Minor Projects	2,500	25,000	27,500	27,500	25,000	Expected completion in June 2019.
Public Open Space (POS) Upgrades - Parks for People Strategy	22,105	100,000	121,030	121,030	98,925	Expected completion in June 2019.
Sporting Infrastructure - Wandi Playing Fields (Honeywood)	8,910	89,100	98,010	98,010	89,100	Carry forward to 19/20 Budget.
Street Tree Planting Program (A) - Bertram Stage 2	9,831	65,000	71,500	71,500	61,669	Designs are completed, works are due to commence in June.
Thomas Oval Lighting	49,500	495,000	544,500	49,500	0	Concept design completed. Carry forward to 19/20 Budget.
Kwinana Tennis Courts - Fencing	30,504	0	37,872	37,872		Budget variation approved by Council 22 August 2018. Project completed. Budget variation approved by Council 22 May 2018 for the Kwinana Tennis courts booking system (The Kwinana Tennis Club will pay 50% as per agreement).
✓ Installation of fencing in Council Reserves to prevent illegal dumping	29,003	0	29,003	29,003	0	New project approved at Budget Review OCM 13 March 2019.
Ridley Green Disconnect Power and reconnect at Hewison Reserve for BBQ	0	0	14,000	10,000	10,000	New project approved at Budget Review OCM 13 March 2019. Carry forward to 19/20 Budget.
Calista Oval Construction of access ramp	15,427	0	10,000	10,000	(5,427)	New project approved at Budget Review OCM 13 March 2019.
Calista Oval Bollards installation	0	0	7,500	3,000	3,000	New project approved at Budget Review OCM 13 March 2019.
Parks and Reserves Total	836,132	1,869,669	2,029,890	1,408,890	572,758	

NOTE 11. Capital Acquisitions			В	udget		
Assets	Total YTD Actual	Adopted Annual Budget	Current Annual Budget	YTD Budget	YTD Variance	Comment
Roads						
Urban Road Grant Construction						
■ Road Reseal A - Gilmore Avenue - South bound lanes	302,425	380,490	383,944	383,944	81,519	Line marking completed. Awaiting outstanding invoices.
Road Reseal C - Sulphur Road - Tanson road to Parmelia Ave	312,312	361,900	365,191	365,191	52,879	Line marking completed. Awaiting outstanding invoices.
Road Reseal B - Orelia Avenue - Thomas Road to Christmas Ave (including roundabout)	460,100	492,800	497,281	497,281	37,181	Line marking and bus shelter hand rails have been completed. Awaiting outstanding invoices.
Black Spot Grant Construction	0					
■ Kwinana Beach Road (J)	40,250	48,253	43,498	43,498	3,248	Project completed. Awaiting outstanding invoices.
Roads to Recovery Grant Construction	0					
📶 Road Reseal D - Orelia Avenue - Nye Way to Christmas Ave	143,590	181,500	183,150	183,150	39,560	Expected completion in June 2019.
Road Reseal E - Cowcher Way West & Ridley Way West From Derbal Street to Medina Avenue	277,439	253,000	255,300	255,300	(22,139)	Project completed.
DCA Funded Construction	0					
d DCA 1 - Millar Road	48,820	436,703	436,703	436,703	387,883	Expected completion in June 2019.
DCA 1 - Wellard Road Upgrade – Bertram Road to Millar Road (Item J)	27,966	100,000	100,000	27,966	0	Awaiting MRS amendment. Carry forward to 19/20 Budget.
DCA 5 - Lyon Road - Cassowary to Kenby (Satterleys)	0	437,250	437,250	0	0	Carry forward to 19/20 Budget.
Municipal Road Construction	0					
■ Gilmore Avenue Pedestrian Crossing	42,153	60,000	43,863	43,863	1,710	Project completed.
Local Area Traffic Management B - Harlow Road Bollard Installation	12,723	17,188	12,723	12,723	(0)	Project completed.
Road Reseal F - Duckpond Road & Banksia Road intersection	128,393	82,500	108,250	108,250	(20,143)	Project completed.
Road Reseal G - Clementi Road	104,882	104,500	105,450	105,450	568	Project completed.
Road Reseal L - Henry Street A	39,054	44,000	44,400	44,400	5,346	Project completed.
Roads Total	1,940,108	3,000,084	3,017,003	2,507,719	567,611	
Street Lighting						
all Latitude 32 Lighting Changeover	147,917	262,272	205,272	205,272	57,355	Expected completion in June 2019.
★ Street Lighting - Various Locations	12,278	22,000	22,200	21,100	8,822	Expected completion in June 2019.
street Lighting - Johnson Road/McWhirter Promenade	34,980	110,000	71,000	71,000	36,020	Expected completion in June 2019.
street Lighting Total	195,175	394,272	298,472	297,372	102,197	
Bus Shelter Construction						
Bus Shelters	16,018	20,000	20,182	20,182		
Bus Shelter Construction Total	16,018	20,000	20,182	20,182	4,164	
Footpath Construction						
Footpath A - Rowley Road - Lyon Road to Freeway	40,408	55,000	55,500	55,500		Landscaping to be completed in June 2019.
Footpath Construction - between Adventure Park and Gilmore Avenue	162,842	138,560	162,841	162,841	. (1)	Project completed.
il Footpath Construction Total	203,250	193,560	218,341	218,341	15,091	

Note 11: Capital Acquisitions

			Ві	ıdget		
Assets	Total YTD Actual	Adopted Annual Budget	Current Annual Budget	YTD Budget	YTD Variance	Comment
Drainage Construction						
DCA 2 - Peel Sub N Drain - Lot 64 Woolcoot Rd & Lot 379 Millar, 27 & 201 Mortimer Rd's	0	1,916,198	1,916,198	0	0	Project has been deferred until 19/20.
DCA 2 - Peel Sub N2 Drain - Lot 64 Woolcoot Rd	0	257,025	257,025	0	0	Project has been deferred until 19/20.
☐ Drainage A - Burlington Street Drainage Sump	69,951	93,500	94,350	94,350	24,399	Minor footpath works still outstanding. Project completion expected June 2019.
Trainage B - Gilmore Avenue	33,549	33,000	33,548	33,548	(1)	Project completed.
☑ Drainage C - Sulphur Road - Tanson To Parmelia	59,228	39,600	59,227	59,227	(1)	Project completed.
Drainage Construction Total	162,727	2,339,323	2,360,348	187,125	24,398	
Car Park Construction						
Medina Oval - Bituminise entrance & Carpark	6,012	0	9,622	9,622	3,610	Budget Variation approved by Council 22 August 2018. Project completed.
Car Park Construction Total	6,012	0	9,622	9,622	3,610	
Other Infrastructure						
Intry Statement - Upgrade from Town to City	8,582	0	19,800	19,800	11,218	Moved from Buildings to Other Infrastructure for capitalisation purposes.
Other Infrastructure Total	8,582	0	19,800	19,800	11,218	
Capital Expenditure Total	5,183,883	15,212,158	11,631,033	7,684,288	2,500,405	

Level of Completion Indicators (Percentage YTD Actual to Annual Budget)

₫ 0%

20%

40%

60%

80% 100%

Over 100%

Note 12: Schedule of Grants, Subsidies & Contributions

Description	Current Annual Budget	YTD Actual	Comments
Operating Grants, Subsidies & Contributions			
Community Amenities			
PTA Bus Shelter Subsidy	13,000	-	Expected to be received in June.
SMCC - KIC Coastcare in the KIA	10,000	10,000	
SMCC - BP Coastcare	-	-	Funding has expired.
SMCC - Perth Region NRM for SMCC	5,000	5,000	8
SMCC - Tronox Adopt a Beach	5,000	5,000	
SMCC - Degremont Adopt a Beach	5,000	-	Expected to be received in June.
Alcoa - Challenger Beach Rehabilitation	-	-	Funding has expired.
NATE - Seedling Subsidy Scheme	499	499	
WALGA Bin Tagging	8,000	8,000	
Education and Welfare			
	224 244	202.000	Manakh, anakh kanana an ha falla anakhad ka tana
Banksia Park Operating Cost Contribution	331,344		Monthly rental income to be fully received by June.
Family Daycare - Mainstream Childcare Benefit Subsidy	4,213,907		Government contributions, fully offset by payments to Care Providers.
Family Daycare - Subsidy Other	107,889		Government contributions, fully offset by payments to Care Providers.
Family Daycare - Inclusion Subsidy Scheme	16,018		Government contributions, fully offset by payments to Care Providers.
CCB Subsidy	805,483		Government contributions, fully offset by payments to Care Providers.
Subsidy Other	14,053		Government contributions, fully offset by payments to Care Providers.
NGALA My Time Program	10,000	10,560	
Operational Subsidy - Aboriginal Resource Worker	30,500	33,566	
Youth Social Justice Program	172,561	177,627	
Youth Incentive Sponsorship	10,000	30,000	
Youth Pathways Strategy Grant	2,500	-	Funding still expected this financial year.
Skate Park Activation Grant		-	Funding has not been approved.
Good Spirit Learning Program Grant	-	-	Funding application unsuccessful.
Youth Wellbeing Benchmark Survey Grant	5,000	-	Funding still expected this financial year.
Art Therapy Youth Grant	-	-	Funding application unsuccessful.
General Purpose Funding			
Local Government General Purpose Grant	477,320	477,320	First instalment received in June 2018.
Local Government General Purpose Grant - Roads	378,440	378,440	First instalment received in June 2018.
Non Rateable Property - Dampier to Bunbury Natural Gas Pipeline Corridor	170,000	177,226	
Health			
Mosquito Management Contributions (CLAG)	19,640	29,786	
Department of Health - Larvicide	14,000		
Law Order & Public Safety			
Department Fire and Emergency Services - ESL	124,864	124.864	First quarter payment was received in June 2018.
Department Fire and Emergency Services - Other	,,,,,		Bush Fire Brigade supplement operating grant
Department Fire and Emergency Services - LEMC Aware Grant	-	/	Funding has not been approved.
Recreation & Culture Arts - Harmony & Reconciliation	5,000		Sponsorship not achieved.
	62,500	62,500	Sponsorship not achieved.
Sponsorship - Big Concert Childrens Festival			
	35,000 2,000	35,000 1,870	
Youth Festival	2,000	1,870	Funding has been unsurgessful
Music in the Schools/Community		-	Funding has been unsuccessful.
Recreation - KidSport (DLGSC)	16,635	16,649	Condition to continue the Midward conserve (March 1997) and the Midward Condition (March 1997) and the Midward (Ma
Metro Every Club Funding	25,000	25,000	Funding to replace the Kidsport program, will go toward covering the cost of CDO - Recreation & Inclusion Officer.
Library Contributions & Donations	7,700	4,933	
Shared Use Agreements	115,642	98,498	Bi-annual agreements - final invoice to be claimed in June.
Recquatic Holiday Program DEDU payments	78,421	81,829	Holiday care payments expected to be received again in June.
Volunteer Centre - Thank a Volunteer Event	1,500	-	Acquittal being prepared in June. Funding expected after acquittal.
Transport			
Transport Main Roads Annual Direct Grant	170,022	176,206	
		1/0,206	Evaceted to be received in June
Main Roads Street Light Subsidy Main Roads Maintenance Contribution	5,000 131 780	EE 000	Expected to be received in June.
iviani ricaus ivianiteriance Contributioff	131,780	65,890	
Total Operating Grants, Subsidies & Contributions	7,606,218	7,049,604	

Note 12: Schedule of Grants, Subsidies & Contributions

Description	Current Annual Budget	YTD Actual	Comments
Non-Operating Grants, Subsidies & Contributions			
Community Amenities			
DCA 1 - Hard Infrastructure - Bertram	127,900	184,445	Developer Contributions are estimated at budget, but actual receipts rely on the timing of subdivisions.
DCA 2 - Hard Infrastructure - Wellard	377,733	636,230	
DCA 4 - Hard Infrastructure - Anketell	633,006	633,006	
DCA 5 - Hard Infrastructure - Wandi	624,121	-	
DCA 7 - Hard Infrastructure - Mandogalup (west)	13,729	11,820	
DCA 9 - Soft Infrastructure - Wandi / Anketell	978,832	978,831	
DCA 10 - Soft Infrastructure - Casuarina/Anketell	239,940	-	
DCA 11 - Soft Infrastructure - Wellard East	912,873	(34,478)	Reallocation of income attributed to DCA 2 and not DCA 11.
DCA 12 - Soft Infrastructure - Wellard West	160,201	329,459	
DCA 14 - Soft Infrastructure - Wellard / Leda	116,219	102,069	
DCA 15 - Soft Infrastructure - Townsite	19,542	6,872	
Economic Services			
Medina CCTV Grant	100,000	-	Application for funding has been approved.
Fire & Emergency Management			
BP Fire Support Units - donation	14,500	-	Awaiting paperwork from BP
Law, Order & Public Safety			
Premier & Cabinet Department	30,000	30,000	Kwinana South VFB ATU (Septic Units)
Premier & Cabinet Department	25,000	25,000	Mandogalup VFB ATU (Septic Units)
Department Fire and Emergency Services	178,000	-	Kwinana South VFB Upgrade. Project will not start until 19/20.
Department Fire and Emergency Services	137,500	-	Mandogalup VFB Upgrade. Project will not start until 19/20.
Recreation & Culture			
Department of Infrastructure - Thomas Oval Lighting	150,000	-	Grant approval received.
Department of Education - Wandi Playing Fields	25,500	-	Invoiced in June 2019.
Lotterywest - Kwinana Loop Trail	37,670	-	
Department of Infrastructure - Varris Park	11,030	11,030	Funding received.
Kwinana Tennis Club	3,073	-	Kwinana Tennis Club contribution towards booking system for courts.
Transport			
City of Cockburn - Contribution to Footpath	25,000	25,000	
Roads to Recovery - Reseal Orelia Avenue	132,382	132.382	
Roads to Recovery - Reseal Orella Averlue Roads to Recovery - Reseal Cowcher Way West & Ridley Way	253,000	253,000	
State Road Grant - Orelia Avenue Resurfacing	298,667		Claims are made as construction progresses.
State Road Grant - Sulphur Road Resurfacing	219,333		Project is complete.
State Road Grant - Sulphur Road Resurfacing	230,600		Claims are made as construction progresses.
State Road Grant - State Black Spot - Kwinana Beach Road	43,497		Claims are made as construction progresses. Claims are made as construction progresses.
Total Non-Operating Grants, Subsidies & Contributions	6,118,848	3,962,149	

16.2 Appointment of Council Representative to the Cockburn Sound Management Council

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

At the 9 May 2018 Ordinary Council Meeting, it was resolved that Council appoint Councillor Sandra Lee as Council representative to the Cockburn Sound Management Council (CSMC). The Department of Water and Environmental Regulation has invited the City of Kwinana to nominate a representative and a proxy for membership on the CSMC for a new three-year term (Attachment A).

OFFICER RECOMMENDATION:

That Council approve the Elected Member appointments to the Cockburn Sound Management Council, as follows:

Position / Organisation	Name
Elected Member	
Elected Member (proxy)	

DISCUSSION:

The Cockburn Sound Management Council is an advisory council to the Minister for Environment and was established in August 2000 to coordinate environmental planning and management of Cockburn Sound and its catchment. The Cockburn Sound Management Council comprises of an independent Chair and 19 members who represent the community; conservation; recreational user and industry interests; and Australian, State and Local government.

Once the nomination has been approved by Council, the Cockburn Sound Management Council will be notified in writing of the new Elected Member representative and the Elected Member will be required to provide a two-page summary curriculum vitae consistent with the CSMC requirements.

Attachment B provides additional information regarding the Cockburn Sound Management Council.

If at any time or after an election, the Elected Member no longer holds office, a Council report will be prepared for Council to nominate an Elected Member to the CSMC.

LEGAL/POLICY IMPLICATIONS:

The Elected Members and Officers Representing Council or the City as Delegates Council Policy states:

4.1 Officers appointed to external committees or representing the City at any meeting other than Council meetings are to maintain close liaisons with Council.

16.2 APPOINTMENT OF COUNCIL REPRESENTATIVE TO THE COCKBURN SOUND MANAGEMENT COUNCIL

- 4.2 When a delegate requires a decision from Council in respect to their external appointment, a request should be provided to the Chief Executive Officer to enable the preparation of a written report. The views of the delegate may, if deemed appropriate by the Chief Executive Officer, be expressed in the report, however the Officers should only reflect his or her professional opinion on the subject.
- 4.3 Wherever practicable, delegate's reports should be submitted in writing to Council and circulated to Elected Members.

Section 5.10 of the *Local Government Act 1995* states:

- (2) provides that at any given time, each Council member is entitled to be a member of at least one committee of Council. If the member is not a member of any other committee, they may nominate themselves to be a member of a committee and the local government is to make them a member.
- (4) requires that if the Mayor informs the local government of his or her intention to be a member of a committee, then the local government is to appoint the Mayor to be a member of that committee.

FINANCIAL/BUDGET IMPLICATIONS:

No financial/budget implications have been identified as a result of this report or recommendation.

ASSET MANAGEMENT IMPLICATIONS:

No asset management implications have been identified as a result of this report or recommendation.

ENVIRONMENTAL IMPLICATIONS:

City of Kwinana will be represented and is part of the Cockburn Sound Management Council that advises the Minister for Environment of any matters related to the Cockburn Sound.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objectives detailed in the Corporate Business Plan.

Plan	Outcome	Objective
Corporate Business Plan	Civic Leadership	5.1 An Active and engaged Local Government, focussed on achieving the community's vision

COMMUNITY ENGAGEMENT:

There are no community engagement implications as a result of this report.

16.2 APPOINTMENT OF COUNCIL REPRESENTATIVE TO THE COCKBURN SOUND MANAGEMENT COUNCIL

PUBLIC HEALTH IMPLICATIONS:

There are no public health implications as a result of this report.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	Without Council representation on committees and organisations, there is a risk that the community will not be represented in decisions made by such committees and organisations or be provided with information that may affect the City of Kwinana.
Risk Theme	Inadequate engagement practices
Risk Effect/Impact	Service Delivery
Risk Assessment Context	Operational
Consequence	Moderate
Likelihood	Rare
Rating (before treatment)	Low
Risk Treatment in place	Avoid - remove cause of risk
Response to risk treatment required/in place	City Officer has prepared a Council Report to ensure the Council appoints an Elected Member to the Cockburn Sound Management Council.
Rating (after treatment)	Low

COUNCIL DECISION

493

MOVED CR M KEARNEY

SECONDED CR W COOPER

That Council approve the Elected Member appointments to the Cockburn Sound Management Council, as follows:

Position / Organisation	Name
Elected Member	Councillor Sandra Lee
Elected Member (proxy)	Mayor Carol Adams

CARRIED 8/0



Your ref:

Our ref: DWERDG365/19

Enquiries: Tina Runnion, Ph 6364 6668

Mayor Carol Adams City of Kwinana PO Box 21 KWINANA WA 6966

Dear Mayor Adams

NOMINATION FOR MEMBERSHIP TO THE COCKBURN SOUND MANAGEMENT COUNCIL

The Cockburn Sound Management Council is an advisory council to the Minister for Environment established under section 25 of the Environmental Protection Act 1986 (EP Act). The Council membership comprises an independent Chair and 19 members representing the general community; conservation, recreational user and industry interests; and Australian, State and Local Government.

Members of the Council are appointed by the Minister for Environment under section 25(2) of the EP Act. The City of Kwinana has had a longstanding involvement with the Council and I would like to invite you to nominate a representative and a proxy for membership on the Council for a new three year term. I understand that the City of Kwinana's current representatives are Councillor Sandra Lee and yourself (proxy).

In line with the McGowan Government's commitment to diversity on Government boards and committees, and in particular, increasing the representation of women to 50 per cent by 2019, please consider female nominations for the membership where possible.

Nominees for the Council should be able to represent the opinions of their organisation on matters relating to Cockburn Sound and be of sufficient authority to make decisions on its behalf.

It would be appreciated if you can nominate a representative and proxy within two weeks of the date of this letter, including provision of a two-page summary curriculum vitae consistent with the enclosed proforma.

Telephone: 08 6364 7000 Facsimile: 08 6364 7001

Should you require further information or have any queries, please do not hesitate to contact Dr Tina Runnion, Coordinator, Cockburn Sound Management Council on 6364 6668 or by email to Tina.Runnion@dwer.wa.gov.au.

I would like to thank you for City of Kwinana's commitment to the Council to date and look forward to your continued involvement.

Yours sincerely

Mike Rowe

DIRECTOR GENERAL

26 June 2019

Att.

Curriculum Vitae Proforma

The following information is required by the Department of the Premier and Cabinet from board member nominees for both new members and reappointed members. A maximum of two pages is needed for each member.

Title

Full Name

Postal Address

Contact Telephone Number

Email Address

Current employer and position

Work history relevant to board position

Voluntary involvement relevant to board position

Qualifications/training

Other board experience (list all current positions)

Current contact details of two (2) referees

The following information is optional and provides us with important data on the diversity of our board membership across government and helps us assess how well we are achieving these outcomes.

Date of Birth dd/mm/yyyy

Aboriginal Yes / No

Torres Strait Islander Yes / No.

Country of Birth – Australian Yes / No If no, please specify

Language other than English spoken at home Yes / No If yes, please specify

Person with a disability or special needs Yes / No If yes, please specify





Cockburn Sound Management Council

Purpose of the Group:

The Cockburn Sound Management Council was established in August 2000 to coordinate environmental planning and management of Cockburn Sound and its catchment.

The Management Council comprises of an independent Chair and 19 members who represent the community; conservation; recreational user and industry interests; and Australian, State and local government.

Mission:

The Council was established in response to increasing pressures on Cockburn Sound, which is the most intensively used marine embayment in Western Australia

Members:

Members of the Cockburn Sound Management Council:

Position / Organisation	Name
Elected Member	Councillor
Elected Member (proxy)	Councillor

Meeting Information

Meeting frequency: Quarterly

Meeting commencement time: 9am

Meeting duration: 3 Hours

Expenses: The City will meet travel expenses as per the Elected

Members Allowances, Expenses and Gifts Council Policy

Sitting fee: Nil

16.3 Budget Variations

DECLARATION OF INTEREST:

There were no declarations of interest declared.

SUMMARY:

To amend the 2019/2020 budget to reflect various adjustments to the General Ledger with nil effect to the overall budget as detailed below. Due to the nature of these variations, they fall outside the annual budget review.

OFFICER RECOMMENDATION:

That Council approves the required budget variations to the Adopted Budget for 2019/2020 as outlined in the report.

NOTE: AN ABSOLUTE MAJORITY OF COUNCIL IS REQUIRED

DISCUSSION:

ITEM #	DESCRIPTION	CURRENT BUDGET	INCREASE/ DECREASE	REVISED BUDGET
1A	Reserve Transfer – from DCA1 Reserve	Nil	1,794,860	1,794,860
	Municipal Bank Account	Nil	(1,794,860)	(1,794,860)
1B	Municipal Bank Account	(1,794,860)	1,794,860	Nil
	New – City of Kwinana DCA 1 Liability	Nil	(1,679,934)	(1,679,934)
	Reserve Transfer – to Restricted Grants & Contributions Reserve – DCA 1 Nutrient Stripping Basin	Nil	(114,926)	(114,926)

- 1A To reduce the DCA1 reserve account to reflect the actual balance of what should be in the DCA1 reserve (\$223,166.10) in accordance with the Cost Apportionment Schedule and Developer Contribution Report for DCA1.
- 1B The City is a developer in DCA1 as a result of assuming liability for developments that occurred before DCA1 was seriously entertained. The developments included Homestead Ridge and Emerald Park Estate (stages 1 to 4 (phase 1)). The liability amount for these developments is \$1,679,934. The \$1,794,860 in 1A will be used to pay the City's developer contribution liability with the balance of \$114,926 being transferred to the Restricted Grants and Contributions Reserve to be used towards the DCA1 Nutrient Stripping Basin project, if the City agrees to prefunding this item.

16.3 BUDGET VARIATIONS

There will be a requirement for the City to contribute to the construction of Wellard Road and Bertram Road for the external traffic generated that cannot be contributed to any developers in the DCA1 cell, which has been outlined in the Cost Apportionment Schedule, estimated to be \$9,468,739.

LEGAL/POLICY IMPLICATIONS:

The *Local Government Act 1995* Part 6 Division 4 s 6.8 (1) requires the local government not to incur expenditure from its municipal fund for an additional purpose except where the expenditure-

(b) is authorised in advance by resolution*

"additional purpose" means a purpose for which no expenditure estimate is included in the local government's annual budget.

*requires an absolute majority of Council.

FINANCIAL/BUDGET IMPLICATIONS:

The financial implications are detailed in this report.

ASSET MANAGEMENT IMPLICATIONS:

The allocation of funds towards the upgrading and purchase of City assets will be included in the City's Asset Management Strategy.

ENVIRONMENTAL IMPLICATIONS:

No environmental implications have been identified as a result of this report or recommendation.

STRATEGIC/SOCIAL IMPLICATIONS:

This proposal will support the achievement of the following outcome and objective detailed in the Corporate Business Plan.

Plan	Outcome	Objective
Corporate Business Plan	Business Performance	5.4 Ensure the financial
		sustainability of the City of
		Kwinana into the future

COMMUNITY ENGAGEMENT:

There are no community engagement implications as a result of this report.

16.3 BUDGET VARIATIONS

PUBLIC HEALTH IMPLICATIONS

There are no public health implications as a result of this report.

RISK IMPLICATIONS:

The risk implications in relation to this proposal are as follows:

Risk Event	The City does not manage its finances adequately and allows budget expenditure to exceed allocation and the City then finds itself unable to fund its services that have been approved through the budget process
Risk Theme	Failure to fulfil statutory regulations or compliance
	Providing inaccurate advice/information
Risk Effect/Impact	Financial
	Reputation
	Compliance
Risk Assessment Context	Operational
Consequence	Moderate
Likelihood	Rare
Rating (before treatment)	Low
Risk Treatment in place	Reduce (mitigate risk)
Response to risk treatment	Submit budget variation requests to Council as they arise,
required/in place	identifying financial implications and ensuring there is nil effect
	on the budget adopted
Rating (after treatment)	Low

COUNCIL DECISION

494

MOVED CR S MILLS

SECONDED CR S LEE

That Council approves the required budget variations to the Adopted Budget for 2019/2020 as outlined in the report.

CARRIED BY AN ABSOLUTE MAJORITY OF COUNCIL 8/0

17 Urgent Business

Nil

18 Councillor Reports

18.1 Deputy Mayor Peter Feasey

Deputy Mayor Peter Feasey reported that he had attended the City of Kwinana Citizenship Ceremony and welcomed 56 new Australians.

The Deputy Mayor advised that he had attended the community meeting regarding Thomas Road traffic issues, which was well attended with many residents raising concerns.

18.2 Councillor Wendy Cooper

Councillor Wendy Cooper reported that she had attended two Southern Metropolitan Regional Council (SMRC) meetings.

Councillor Cooper advised that she had attended a Womens Voice – group in Baldivis, which they spoke about issues relating to women in the electorate.

Councillor Cooper mentioned that she had attended the NAIDOC week opening and stated that it had been one of the best events for NAIDOC week that she has attended.

Councillor Cooper reported that she had attended the City of Kwinana Citizenship Ceremony.

Councillor Cooper advised that she had attended the Kwinana Industries Council Bright Sparks Graduation and that it is wonderful to see young people excelling.

Councillor Cooper mentioned that she had attended a community meeting regarding Thomas Road traffic issues.

Councillor Cooper reported that she had attended the Medina Sheds Meeting with the Medina Residents' Group and that they had received a very warm welcome and that they had been supportive and appreciative of the enormous amount of work undertaken.

18.3 Councillor Merv Kearney

Councillor Merv Kearney passed on his congratulations to Councillor Cooper on becoming the Rotary President.

Councillor Kearney passed on his thanks to the Director City Engagement for her glass works on repairing a door for the Mens' Shed.

18 COUNCILLOR REPORTS

18.4 Councillor Sandra Lee

Councillor Sandra Lee reported that she had attended the City of Kwinana Citizenship Ceremony.

Councillor Lee advised that she had attended the KIC Bright Sparks Graduation.

18.5 Councillor Matthew Rowse

Councillor Matthew Rowse reported that he had attended the City of Kwinana Citizenship Ceremony.

Councillor Rowse advised that he had attended the KIC Bright Sparks Graduation which was a wonderful evening.

Councillor Rowse mentioned that he had attended the community meeting regarding Thomas Road traffic issues.

Councillor Rowse reported that he had attended the Town Team Movement Launch Phase 2 and explained that it is a growing movement across the state with 31 Town Team organisations that engage business, residents and revitalise areas such as laneways.

Councillor Rowse passed on his thanks to the City Officers on the new look agenda.

18.6 Councillor Dennis Wood

Councillor Wood reported that he had attended the Medina Sheds Meeting with the Medina Residents' Group and that they had shown great camaraderie.

Councillor Wood advised that he had attended the community meeting regarding Thomas Road traffic issues, which was quite exciting.

Councillor Wood mentioned that he had attended the Elders Luncheon held at the Kwinana Bowling Club and that there had been a high attendance.

Councillor Wood reported that he had attended the City of Kwinana Citizenship Ceremony which is always fun.

Councillor Wood advised that he had attended the KIC Bright Sparks Graduation and that it had been great to see young people doing well.

19 Response to Previous Questions

Nil

20 Mayoral Announcements (without discussion)

Mayor Carol Adams reported that she had attended the NAIDOC week opening in Kwinana at the Darius Wells Library and Resource Centre. The Mayor explained that this year's theme is "Voice, Treaty, Truth. Let's work together for a shared future".

The Mayor advised that she had attended the City of Kwinana Citizenship Ceremony, where 56 new citizens were welcomed, including 29 from the Philippines, nine from India and seven from Nigeria.

The Mayor mentioned that she had attended the WALGA (WA Local Government Association) State Council Meeting, where the following items were discussed:

- The City of Kwinana's emerging issue, which deals with the Regional Road Group Project delay in finalisation of grant payments. The Mayor advised that it was supported with some minor amendments to the recommendation.
- There was much a precautionary approach to the National Redress Scheme and whether local governments should participate. The Mayor stated that the final resolution was that participation would only be with full financial coverage by the State.
- There was much concern expressed in relation to the announcement of the Select Committee into Local Government. The concerns were about the breadth of the terms of the Notice of Motion as well as some of the membership of the parliamentary committee given some of the comments made by them and recorded in Hansard when this matter was debated. There was also concern about the short time period for the Select Committee's Public Submission Period which ends on 23 August 2019.

The Mayor reported that she had attended the official opening of ECO Resources recycling plant, which was opened by Minister Stephen Dawson. The Mayor explained that the company have actually been operating in Kwinana for eight years but have been able to purchase land in Postans and have invested significantly in plant and equipment. The Mayor added that through their processes, they actually have a landfill diversion rate of 93%.

The Mayor advised that she had attended the KIC Bright Sparks Graduation. The Mayor explained that the program is aimed at year nine students who are interested in exploring science and engineering career pathways. The students are chosen from 17 schools within the KIC Education Partnership region and that includes Gilmore College, Peter Carnley Anglican Community School and The Kings College.

The Mayor mentioned that she had attended the Rotary Club of Kwinana's Changeover Function and passed on her congratulations to the 2019/20 President, Wendy Cooper.

The Mayor advised that she had attended a meeting with the Medina Residents Group to discuss the Medina Shed issue. The Mayor added that in addition to this the CCTV grant, beautification opportunities, off-road vehicle access and the potential to have Medina listed with the National Trust as a heritage precinct were also discussed.

20 MAYORAL ANNOUNCEMENTS (WITHOUT DISCUSSION)

The Mayor announced that last week our Chief Executive Officer (CEO) of nearly six years, Joanne Abbiss, announced that she was the successful candidate for the vacant CEO position at the City of Armadale. Joanne's last day with the City of Kwinana will be 27 September 2019. We certainly wish Joanne all the best in her new appointment and we will expand on this more at her final Ordinary Council Meeting (OCM) on 25 September 2019. Needless to say, we are now preparing for the recruitment of a new CEO and the wheels are now in motion in that regard with an item coming to full Council on 14 August 2019, which will seek formal approval of the process to be adopted.

21 Matters Behind Closed Doors

Nil

22 Meeting Closure

The Mayor declared the meeting closed at 8:38pm.

Chairperson: 24 July 2019