Ordinary Council Meeting

24 February 2016

Minutes

Members of the public who attend Council meetings should not act immediately on anything they hear at the meetings, without first seeking clarification of Council's position. Persons are advised to wait for written advice from the Council prior to taking action on any matter that they may have before Council.

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 messenger.
- Why not yes? – Ideas can grow with a yes.

TABLE OF CONTENTS

Present:

HER WORSHIP MAYOR C ADAMS
DEPUTY MAYOR P FEASEY
CR R ALEXANDER
CR W COOPER
CR S MILLS
CR B THOMPSON
CR D WOOD

MS J ABBISS	-	Chief Executive Officer
MS C MIHOVILOVICH	-	Acting Director City Strategy
Ms M BELL	-	Corporate Lawyer
MR P NEILSON	-	Acting Director City Development
MRS B CLARKE	-	Director City Living
MR E LAWRENCE	-	Director Corporate and Engineering Services
MS A MCKENZIE	-	Council Administration Officer

Members of the Press	2
Members of the Public	3

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 Ruth Alexander 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):

Councillor Sandra Lee from 1 February 2016 to 29 February 2016 inclusive.

4 Public Question Time:

Nil

5 Applications for Leave of Absence:

Nil

6 Declarations of Interest by Members and City Officers:

Nil

7 Community Submissions:

Nil

8 Minutes to be Confirmed:

8.1 Ordinary Meeting of Council held on 10 February 2016:

COUNCIL DECISION
118
MOVED CR S MILLS **SECONDED CR B THOMPSON**

That the Minutes of the Ordinary Meeting of Council held on 10 February 2016 be confirmed as a true and correct record of the meeting.

CARRIED
7/0

9 Referred Standing / Occasional / Management /Committee Meeting:

Nil

10 Petitions:

Nil

11 Notices of Motion:

Nil

12 Reports – Community

Nil

13 Reports – Economic

Nil

14 Reports – Natural Environment

14.1 Waterwise Council Memorandum of Understanding

SUMMARY:

The City of Kwinana has been a participant in the Waterwise Council Program since 2011. The Program is run by the Water Corporation and the Department of Water. The Water Corporation and the Department of Water recently revised the criteria for the program and have asked all participating local governments to re-commit to the program by signing a Memorandum of Understanding. This report seeks Council approval for the City of Kwinana to become a party of the Memorandum of Understanding.

OFFICER RECOMMENDATION:

That the City of Kwinana to become a party to the Waterwise Council Memorandum of Understanding (as per Attachment 2) with the Water Corporation and the Department of Water.

DISCUSSION:

The Water Corporation, Department of Water and ICLEI – Local Governments for Sustainability launched the Waterwise Council Program in 2009 to build a cooperative working relationship with local government to improve water use efficiency in their operations and their communities. The City of Kwinana has been a participant in the Waterwise Council Program since 2011.

The Waterwise Council program was closely linked to ICLEI - Local Government for Sustainability's Water Campaign which the City has also been a participant in for a number of years.

The Water Campaign in Western Australia recently ceased and therefore the Water Corporation and Department of Water took the opportunity to review the Waterwise Council criteria. Following this review the Department of Water and the Water Corporation are asking all existing participants to re-commit to the program by signing a Memorandum of Understanding.

Participating in the Waterwise Council program provides the following benefits:

- A better understanding of water use in council operations and the community,
- Potential water and financial savings through improved efficiency,
- Access to free Waterwise training for staff,
- Access to Waterwise materials to promote water conservation in the community,
- Access to Waterwise Council branding to promote the City as a sustainable water manager,
- Opportunities to participate in funded and co-funded water efficiency initiatives,
- Access to services such as data logging.

14.1 WATERWISE COUNCIL MEMORANDUM OF UNDERSTANDING

The program has been valuable to the City. In particular, over the last two financial years the City has received two grants from the Waterwise Council Program of $10,000 each to implement scheme water efficiency actions. This funding has been used to:

- Conduct water audits at the City Works Depot and Sloans Cottage,
- Retrofit toilets, urinals and tap fittings at the Works Depot and in the Administration building (in progress),
- Install data loggers at the Administration Building and the Works Depot,
- Install sub-meters at Smirks Cottage, Koorliny Arts Centre and Parmelia House to better understand the City's water usage (in progress),
- Install real time monitoring at the Recquatic Centre to easily detect leaks and unusual consumption patterns (in progress),
- Conduct water conservation professional development activities with educators and children at the Bright Futures Family Day Care centre (in progress).

It has been estimated that these actions will save the City approximately 500,000 litres of water every year. This equates to approximately $1,000 of water saved every year.
To retain Waterwise Council endorsement under the new criteria the City must:

- sign the Memorandum of Understanding by the 31st of March 2016,
- review the City's existing Sustainable Water Management Plan by the 31st October 2016,
- commit to the on-going implementation of the plan,
- report on actions implemented to the Water Corporation and Department of Water annually,
- not receive any breaches of the groundwater licence terms and conditions set by the Department of Water,
- not receive any breaches of the permanent water efficiency measures (water restrictions)
- ensure staff receive free Waterwise training conducted by the Water Corporation.

Further information on the program is attached as Attachment 1. The Memorandum of Understanding is attached as Attachment 2.

LEGAL/POLICY IMPLICATIONS:

Complying with groundwater license conditions is a key criteria for retaining Waterwise Council status.

FINANCIAL/BUDGET IMPLICATIONS:

Budget Item Name:	Revolving Energy Fund
Budgeted Amount:	$35,000
Expenditure to Date:	$0
Proposed Cost:	$10,000
Balance:	$25,000

*NOTE: All figures are exclusive of GST

14.1 WATERWISE COUNCIL MEMORANDUM OF UNDERSTANDING

The Waterwise Council funding program has to date required 50:50 co-funding. This co-funding has been taken from the Revolving Energy Fund. To allow for the City to apply for a Waterwise Council grant in 2016/17 $10,000 should be set aside for this purpose in the 2016/17 financial year, from the Fund. If grant funding is not offered or the City is unsuccessful this money will be used to implement further actions to retain our Waterwise Council status.

Saving water also reduces the City's operating costs.

ASSET MANAGEMENT IMPLICATIONS:

Water efficiency often requires the replacement of older less efficient assets with newer more efficient ones. Any asset replacement has, and will continue to be undertaken with the input of the Asset Management team to ensure the newer assets provide adequate performance and minimise maintenance issues.

ENVIRONMENTAL IMPLICATIONS:

Efficient water use is one of the most pressing environmental issues faced by South West Australia. A drying climate and overuse has meant that surface and groundwater reserves are being depleted. Wetlands and bushland areas that depend on these water sources are facing significant drought stress. By conserving water the City is doing it's part to ensure that water is available for environmental purposes.

STRATEGIC/SOCIAL IMPLICATIONS:

The Waterwise Council program assists the City to meet Objective 3.5 in the Strategic Community Plan: Encourage and exercise best practice water management.

RISK IMPLICATIONS:

Acting on water conservation reduces the risk of the City breaching its groundwater licence conditions. It prepares the City for a drier future where the security of groundwater allocation to the City may be uncertain. It also prepares the City for potential future scheme water price rises.

COUNCIL DECISION

119

MOVED CR W COOPER **SECONDED CR D WOOD**

That the City of Kwinana to become a party to the Waterwise Council Memorandum of Understanding (as per Attachment 2) with the Water Corporation and the Department of Water.

CARRIED
7/0

ATTACHMENT 1

Waterwise Council Program

What is the Waterwise Council Program?

The Water Corporation and the Department of Water launched the Waterwise Council Program in 2009 to build a cooperative working relationship with local governments to improve water use efficiency in local government and their communities.

What are the benefits of becoming a Waterwise Council?

- A better understanding of water use in council operations and the community,
- Potential water and financial savings through improved efficiency,
- Access to free waterwise training for staff,
- Access to waterwise materials to promote water conservation to the community,
- Access to Waterwise Council branding to promote the council as a sustainable water manager,
- Opportunities to participate in funded and co-funded water efficiency initiatives,
- Access to services such as data logging.

How to become a Waterwise Council

The Waterwise Council Program is free to join and is open to all councils within Western Australia.
To be endorsed as a Waterwise Council, a council must fulfil the following four steps:

Criteria 1 – Council commitment

1.1 Council to sign a Memorandum of Understanding confirming the council's commitment to participate in the Waterwise Council Program.

1.2 Nominate an employee position as a point of contact for the Program and establish a water management team. The water management team is not required to be a formal body but is intended to identify staff working on water management activities across council operations.

Criteria 2 – Review council water consumption and create a water efficiency action plan for potable and non-potable water sources for all council operations and the community.

2.1 Review council's water consumption over the last 3 years and identify the top water using buildings and grounds owned by the council.

- Council scheme water and community water use reports are available upon request from the Water Corporation. Contact water.efficiency@watercorporation.com.au
- Information on groundwater use available from Department of Water. Contact efficiency@water.wa.gov.au

2.2 Set goals to improve water efficiency. For example:

Council aims to achieve a 5 per cent reduction in water consumption within the town site (per capita population) based on 2013/14 consumption data by the year 2017 and to ensure no net increase in consumption of the same period, based on current developments within the Town.

2.3 Establish a water efficiency action plan that outlines current and future actions to meet water efficiency goals. Action plans to be endorsed by council.

Criteria 3 - Ensure that appropriate staff members complete free waterwise training

All relevant staff must complete each training module as appropriate. This includes all new staff employed during the Council's participation in the Program.

- Waterwise Auditing – provides an understanding of the water auditing process. This session is appropriate for staff responsible for building and facility management.
- Waterwise Gardening and Irrigation – provides an understanding of best practice waterwise garden and irrigation principles and practices. This session is appropriate for grounds keepers, parks and maintenance staff as well as customer service and administration staff.

Criteria 4 - No breaches of groundwater licence terms or conditions set by the Department of Water, and no breaches of scheme water usage issued by Water Corporation in the past 12 months. This includes permanent water efficiency measures.

The Department of Water and Water Corporation will verify there have been no breaches as part of the assessment process.

Once the above criteria have been met a council will be eligible to be endorsed as Waterwise.

Retaining Waterwise Council endorsement

Criteria 5 - Report annually to retain Waterwise Council endorsement

5.1 Quantify actions to demonstrate progress towards goals in water efficiency action plan.

5.2 No breaches of water licence terms or conditions or breaches of scheme water usage in the past 12 months. The Department of Water and Water Corporation will verify there have been no breaches as part of the re-endorsement process.

Should a council fail to meet the above criteria, the Department of Water and Water Corporation may remove the council's right to use the program logo and promotional material.

Recognition

The Waterwise Council Program recognition scheme provides additional recognition for endorsed councils that have achieved significant progress towards best practice water efficiency in council operations and the community.

There are two levels of recognition with winners to be announced at the annual Waterwise Council forum.

Gold Waterwise Council Recognition

To attain this level of recognition a council must provide evidence of significant progress towards, or achievement of, a further five actions per annum, above and beyond those required for endorsement. A list of actions is included in the Water Efficiency Action Plan template for consideration.

Waterwise Council of the Year (Platinum Waterwise Council)

A Waterwise Council of the Year will be announced annually at the Waterwise Council Forum.

Platinum recognition is awarded to a council demonstrating innovation and best practice techniques to improve water efficiency in facilities and in public open space.

In order to be eligible for this award a council must be an endorsed (or eligible for) Gold Waterwise Council and address the following as part of the annual re-endorsement process:

- How your council has contributed towards the efficient and sustainable use of water, focussing on the past year.
- An estimate of the total volume of water your council was responsible for saving each year (from baseline year).
- Evidence of work undertaken in the community or in council operations to reduce water use over the last year.
- Evidence of work undertaken that could be employed by other councils to reduce water use.

For more information on the Waterwise Council Program and how your council can participate, please contact the Program Manager at water.efficiency@watercorporation.com.au.

Memorandum of Understanding

This document represents an agreement between
Water Corporation, the **Department of Water** and **City of Kwinana**

Purpose

The purpose of this Memorandum of Understanding (MOU) is to outline the City of Kwinana's commitment to the Waterwise Council Program (the Program) and detail the organisation's commitment to build a cooperative working relationship to improve water use in the City of Kwinana area and increase awareness of the importance of water efficiency and conservation in the community.

Term

This MOU will guide the working relationship between the parties to achieve the MOU intent for a period from the date of its signing until either party decides it no longer wishes to participate in the Program. At that time, the working relationship between the parties will be reviewed.

Background

Water Corporation and the Department of Water launched the Waterwise Council Program in 2009 to build a cooperative working relationship with local government to improve water use efficiency in their operations and their communities.

Population and economic growth combined with the changing climate are placing additional pressures on those planning, managing and using our water resources. In response, the State Government is creating a portfolio of options to meet our future water demands highlighting the importance of water use efficiency.

The partnership with local government is an essential component in achieving water savings in our communities. The Program will assist local government to improve water management of potable and non-potable sources for public open space and facilities. The Program also supports behavioural changes in the community by encouraging the use of products and services designed to reduce water demand.

Water Corporation and the Department of Water:

- Will present the council with an official acknowledgement of achievement on completion of the program criteria. Additional recognition will be provided to endorsed councils that have achieved significant progress towards best practice water efficiency in council operations and the community.
- Will provide the council with branding to promote the council as Waterwise.
- Will promote the council as Waterwise through any relevant advertising campaigns and on both the Corporation and Department's websites.
- Will provide access to Waterwise training including all training materials at no charge to councils participating in the Program.

City of Kwinana:

- Will work with Water Corporation and the Department of Water to improve water management and champion water efficiency, take part in appropriate promotional activities and encourage all appropriate staff to undertake relevant waterwise training.

- Will commit to meeting the Program criteria as detailed below:

    1. Council commitment – sign this Memorandum of Understanding confirming the council's commitment to participate in the Waterwise Council Program.

    2. Review council water consumption and create a Water Efficiency Action Plan for potable and non-potable water sources for all council operations and the community.

    3. Ensure that appropriate staff members complete Waterwise training.

    4. No breaches of groundwater licence terms or conditions set by the Department of Water and no breaches of scheme water usage in the past 12 months. (This includes permanent water efficiency measures)

    5. Report annually to retain Waterwise Council endorsement. Evidence to demonstrate compliance with the Program criteria will be requested every year. Should a council fail to meet the criteria, Water Corporation and the Department of Water may remove the council's endorsement status. If endorsement is withdrawn this automatically removes the council's right to use the Program branding.

- Will recognise the partnership with Water Corporation and the Department of Water through promotion where appropriate on the council's website, on materials and at events.

Future Commitments

1. The parties commit to:

    1. Recognise and protect the intellectual property that parties may invest in the preparation of any promotion or offer.

    2. Ensure logos used on all promotional materials are used in accordance with the organisation's guidelines and that the appropriate approvals are received prior to use.

    3. Nominate a point of contact at each organisation that will be responsible for overseeing progress towards the purpose of this MOU.

2. The parties will not disclose, advertise, or publish the details of this MOU without the prior written consent of the other parties, unless required to do so under law.

No Obligations

The parties agree that in working towards the purpose of this MOU they will deal with each other and conduct themselves in accordance with good commercial business and industrial practice.

The relationship between the parties is limited to carrying out the purpose of the MOU.

This MOU does not preclude either organisation from developing similar mutually beneficial understandings with other parties.

Date of Effect

For Water Corporation

By: _____

Name:

Title:

Date:

For Department of Water

By: _____

Name:

Title:

Date:

For City of Kwinana

By: _____

Name:

Title:

Date:

15 Reports – Built Infrastructure

15.1 Adoption of Amended Local Development Plan No. 1 – Honeywood Rise – Wandi South Local Structure Plan

SUMMARY:

A request to amend Local Development Plan (LDP) No.1, of the Honeywood Rise Estate, Wandi has been received for the consideration of Council under the City of Kwinana Town Planning Scheme No. 2 (Scheme) (refer Attachments A and B). The LDP was originally adopted by Council at its Ordinary Meeting held on the 26 November 2014, and has since undergone two subsequent amendments with the most recent being adopted by Council at its Ordinary Meeting held on the 25 November 2015 (refer Attachment C).

The proposed amendment to this LDP was required as a condition of subdivision. The amendment seeks to update the LDP to include the proposed 6 strata lots to be created on Lot 2117 Darling Chase (WAPC Reference 475-15) (Refer Attachment D). The amendment will serve to update the lot configuration on the LDP to reflect the conditionally approved subdivision.

The lots created as a result of this subdivision have lot frontages of 7.5m to 16m wide and hence an additional provision has been included on the LDP requiring noise provisions for the narrow lots. These provisions specify quiet house design requirements to mitigate noise transfer between buildings on narrow lots. The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots. There are no 5m wide lot frontages as part of this LDP.

The additional noise provisions specifically applies to the new lots and does not retrospectively apply to similar narrow lots in the area which have already been sold and have dwellings already constructed or under construction (these noise provisions have been developed since the original LDP was endorsed in 2014). There are no existing lots in this LDP area that are 7.5m wide or less that have not yet been built on or have had building permits issued. All the other provisions on the current LDP relating to Bush Fire Attack Levels (BAL) and primary street setbacks remain unchanged.

Council Officers are of the opinion that an amendment to the approved LDP to include the additional lots and additional noise provisions would provide for consistency in the built form across the estate. In this regard, the amendment to this LDP in lieu of adopting a new LDP covering the lots subject to the abovementioned subdivision approval will ensure that consistent design provisions and objectives are applied throughout the wider subdivision of Honeywood Rise.

The amended LDP (refer Attachment B) has been assessed and is supported by City Officers. It is recommended that Council approves the amended LDP in accordance with Clause 6.17.6.1(c)(i) of the Scheme.

15.1 ADOPTION OF AMENDED LOCAL DEVELOPMENT PLAN NO. 1 – HONEYWOOD RISE – WANDI SOUTH LOCAL STRUCTURE PLAN

OFFICER RECOMMENDATION:

That Council takes the following action:-

1. Approves the amended Local Development Plan No. 1 for Honeywood Rise, Wandi in accordance with Clause 6.17.6.1(c)(i) of City of Kwinana's Town Planning Scheme No. 2 subject to the following provision being added to the LDP:
   i. All dwellings on Lots 4, 5, 6, 7 and 8 shall be constructed with the following minimum quiet house design requirements;
      a. Walls shall be double leaf cavity brickwork, such as two leaves of 90mm thick bricks with 50mm air gap. Any alternatives shall achieve a minimum Rw50 acoustic rating.
      b. Windows shall be minimum 4mm laminated glazing in a high quality residential grade frame to achieve a minimum Rw+Ctr23 acoustic rating.
      c. Roof/Ceiling – to be minimum 10mm thick plasterboard with R2.0 insulation between ceiling joists. Combined with roof, acoustic performance to be minimum Rw42.
      d. Eaves are to be enclosed using a minimum 4mm thick compressed cement sheeting or equivalent.
      e. Air conditioning units, or the like must be selected on the basis of quiet operation and units shall be roof mounted on appropriate anti-vibration mounts, or be no more than 1.5m above ground level.
      f. Any alternative construction methods shall be supported by a report undertaken by a suitably qualified acoustic consultant.

2. Requires that within 10 days of the date of this resolution, a copy of this approved Local Development Plan be sent to the Western Australian Planning Commission in accordance with Clause 6.17.6.1(e) of the Scheme.

DISCUSSION:

Land Status

Metropolitan Region Scheme:	'Urban' Zone
Town Planning Scheme No. 2:	Residential R40

The LDP was originally adopted by Council at its Ordinary Meeting held on the 26 November 2014, and has since undergone two subsequent amendments with the most recent being adopted by Council at its Ordinary Meeting held on the 25 November 2015 (refer Attachment C). The subdivision of Lot 2117 Darling Chase (WAPC Reference 475-15) was granted conditional approval on 5 August 2015. The approval included a condition requiring the applicable LDP to be amended to include the proposed 6 strata lots. The amendment serves to update the lot configuration on the LDP to reflect the conditionally approved subdivision.

The lots created as a result of this subdivision have frontages ranging in width from 7.5m to 16m. There are no 5m wide lot frontages as part of this LDP. The draft amended LDP specifies quiet house design provisions to mitigate noise transfer between buildings on narrow lots. The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots.

The additional noise provision specifically applies to the new lots and does not retrospectively apply to similar narrow lots in the area that have already been sold and have dwellings already constructed or under construction. There are no existing lots in this LDP area that are 7.5m wide or less that have not yet been built on or have had building permits issued.

All the other provisions on the current LDP relating to BALs and primary street setbacks remain unchanged.

It is considered that the LDP will be a single point of reference that will provide clarity and certainty to builders, property owners and City Officers with respect to development on the lots subject to the LDP.

The City of Kwinana's Officers have assessed the provisions and requirements of the amended LDP and are supportive.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering financial or impartiality interests, the land owner is Chegan Investments Pty Ltd and the applicant is Mr Jordan Ennis.

The following strategic and policy based documents were considered in assessing the application;

- City of Kwinana Town Planning Scheme No. 2
- State Planning Policy No. 3.1 (*Residential Design Codes of Western Australia*)
- State Planning Policy No. 3.7 (*Planning in Bushfire Prone Areas)*
- *Liveable Neighbourhoods Operational Policy*
- WAPC *Planning for Bushfire Protection Guidelines (Edition 2)* (2010)
- Local planning and other related policies

FINANCIAL/BUDGET IMPLICATIONS:

There are no financial or budget implications as a result of this application.

ENVIRONMENTAL IMPLICATIONS:

Noise is an important issue for residential areas. These amendments are seeking to ensure that noise management is addressed as best as possible in the Honeywood Rise Estate area.

STRATEGIC/SOCIAL IMPLICATIONS:

LDPs allow for variations to the Scheme and R-Codes which take into account specific site characteristics and configuration of lots, particularly smaller lots. The use of such mechanisms is common practice, and is encouraged to allow for the most optimal form of urban development to occur.

15.1 ADOPTION OF AMENDED LOCAL DEVELOPMENT PLAN NO. 1 – HONEYWOOD RISE – WANDI SOUTH LOCAL STRUCTURE PLAN

RISK IMPLICATIONS:

Council approves development under its Town Planning Scheme to meet its statutory obligations and facilitate proper and orderly development of the municipality. The draft amended LDP seeks to ensure the provisions on LDPs are appropriate and LDPs facilitate development.

COUNCIL DECISION

120

MOVED CR B THOMPSON **SECONDED CR R ALEXANDER**

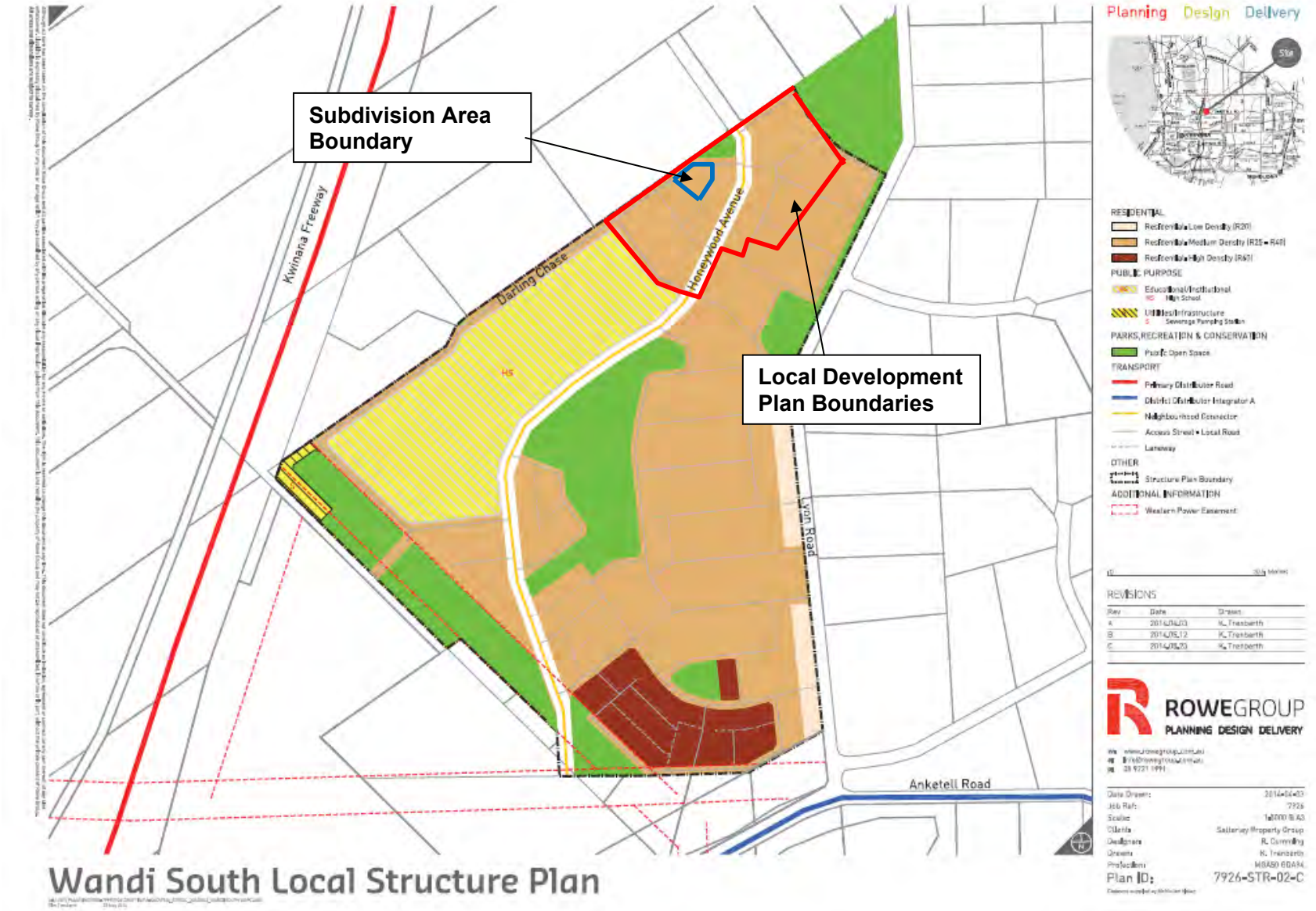
That Council takes the following action:-

1. **Approves the amended Local Development Plan No. 1 for Honeywood Rise, Wandi in accordance with Clause 6.17.6.1(c)(i) of City of Kwinana's Town Planning Scheme No. 2 subject to the following provision being added to the LDP:**
    i. **All dwellings on Lots 4, 5, 6, 7 and 8 shall be constructed with the following minimum quiet house design requirements;**
        a. **Walls shall be double leaf cavity brickwork, such as two leaves of 90mm thick bricks with 50mm air gap. Any alternatives shall achieve a minimum Rw50 acoustic rating.**
        b. **Windows shall be minimum 4mm laminated glazing in a high quality residential grade frame to achieve a minimum Rw+Ctr23 acoustic rating.**
        c. **Roof/Ceiling – to be minimum 10mm thick plasterboard with R2.0 insulation between ceiling joists. Combined with roof, acoustic performance to be minimum Rw42.**
        d. **Eaves are to be enclosed using a minimum 4mm thick compressed cement sheeting or equivalent.**
        e. **Air conditioning units, or the like must be selected on the basis of quiet operation and units shall be roof mounted on appropriate anti-vibration mounts, or be no more than 1.5m above ground level.**
        f. **Any alternative construction methods shall be supported by a report undertaken by a suitably qualified acoustic consultant.**

2. **Requires that within 10 days of the date of this resolution, a copy of this approved Local Development Plan be sent to the Western Australian Planning Commission in accordance with Clause 6.17.6.1(e) of the Scheme.**

CARRIED
7/0

ATTACHMENT A - LOCATION PLAN



honeywood rise

Make a natural connection.

All areas and dimensions are subject to survey

The following provisions apply to lots depicted:

R-Coding	R25
Minimum Open Space	40%
Site Cover	60%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street	3.0	5.0
Secondary Street	1.0	-
Primary Street - Lots 2061 and 2042 only	2.0	5.4

- No average setbacks apply.

The following provisions apply to lots depicted:

R-Coding	R30
Minimum Open Space	35%
Site Cover	65%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street - Lots 2134, 2135,2136, 2118, 2119 only	6.0	-
Primary Street - All other lots	3.0	5.0
Secondary Street	1.0	-

- No average setbacks apply.

The following provisions apply to lots depicted:

R-Coding	R40
Minimum Open Space	35%
Site Cover	65%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street (rear vehicle access)	2.0	-
Primary Street (front loaded)	3.0	5.0
Darling Chase - Lots 2115, 2116, 2117 only	6.0	-
Primary Street - Lots 2090 to 2099 only	2.0	-
Primary Street - Lot 2100 only	2.0	5.4
Secondary Street	1.0	-
Rear Laneway	0.5	-
Side Laneway	1.0	-

- No average setbacks apply.

This Local Development Plan has been approved by Council under the provisions of the City of Kwinana. Town Planning Scheme No.2 and the Wandi South Local Structure Plan.

Principal Planner: _____

Date: _____

Planning Design Delivery

LEGEND

- Lots subject to this Local Development Plan (Stage 1 Boundary)
- Minimum 6m Building Setback Line
- Minimum 3m Building Setback Line
- Minimum 2m Building Setback Line
- Minimum 1m Building Setback Line
- Minimum 0.5m Building Setback Line
- Nil Setbacks permitted to both side boundaries
- No Vehicle Access
- Future High School Site
- Public Open Space
- R25
- R30
- R40
- Designated Garage Location
- Primary Dwelling Orientation
- Bushfire Attack Level 12.5
- Bushfire Attack Level 19
- Bushfire Attack Level 29
- Grouped Housing Site
- Protected Courtyard
- Lots subject to reassessment of BAL rating where an incursion (including minor incursions) into the building setback area is proposed.

0 100 Metres

REVISIONS

Rev	Date	Drawn
G	2015.10.26	M. Sullivan
H	2015.12.02	M. Sullivan
I	2015.12.23	M. Sullivan
J	2016.01.11	W. Clements

ROWEGROUP
PLANNING DESIGN DELIVERY

w: www.rowegroup.com.au
e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-11-03
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley Property Group
Designer:	R. Cumming
Drawn:	K. Trenberth
Projection:	PCG 94
Pla	-06-J

ATTACHMENT B

Local Development Plan 1

Stage 1 (Plan 1 of 2)
Honeywood Rise

N:\TOWN PLANNING\7000-7999\7926\DRAFTING\A-CAD\7926_LDP06J_20160111_WANDI SOUTH (STAGE 1).DWG
William Clements 11 January 2016

honeywood rise

Make a natural connection.

This Local Development Plan (LDP) applies to all lots within Stage 1 of the Honeywood Rise Estate, Wandi South. Unless otherwise defined on this LDP, all development shall be in accordance with the City of Kwinana Town Planning Scheme No. 2, the Residential Design Codes, and the Wandi (south) Local Structure Plan.

Unless otherwise varied on this LDP, the relevant density code provisions of the Residential Design Codes (R-Codes) apply to all lots subject to this LDP. The Residential Design Codes do not apply where varied below.

Compliance with the provisions of this LDP negates the need for planning approval for lots of 260m² or less.

General Provisions

Minimum Open Space and Outdoor Living

1. Site cover may be increased to 60% (for R25 Lots) subject to the provision of a 30m² of outdoor living area with a minimum dimension of 4 metres, two thirds of this area uncovered and located behind the street setback area.

2. Site cover may be increased to 65% (for R30 Lots) subject to the provision of a 24m² of outdoor living area with a minimum dimension of 4 metres, two thirds of this area uncovered and located behind the street setback area.

3. Site cover may be increased to 65% (for R40 Lots) subject to the provision of a 20m² of outdoor living area with a minimum dimension of 4 metres, two thirds of this area uncovered and located behind the street setback area.

*NOTE: Site Coverage includes the floor area of all buildings.

Garages

4. Garages are not to be forward of the dwelling alignment. Garages may be aligned with the dwelling provided they do not exceed the dwelling setback line.

5. Where a lot abuts a rear laneway, vehicle and/or garage access must be from the rear laneway unless otherwise indicated on this LDP.

6. All garages shall be enclosed with a door.

7. Garages may be forward of the dwelling alignment to a maximum of 1m for two storey dwellings where the following requirements are met:

   a. The garage alignment complies with the primary setback;
   b. A balcony with a minimum depth of 1.5m is provided to the front facade of the dwelling; and
   c. A veranda or portico feature is provided to the front facade of the dwelling which extends in front of the garage.

Setbacks

8. For all lots, a nil side setback is permissible to one side boundary behind the primary street setback line to a minimum of 4 metres from the rear boundary, unless otherwise designated on the LDP or where this boundary is to a secondary street. Where possible, nil setbacks should be positioned on the boundary that maximises solar access to the dwelling. The City of Kwinana may vary the location of the nil setback line where appropriate to achieve specific design outcomes. This provision does not apply to lots 2101 to 2109. These lots are permitted to have a nil setback for the full extent of the lot boundary, provided the dwelling complies with the R-Codes and this LDP for all other requirements.

9. Garages are permitted to have a nil side setback to one boundary. The garage nil side setback is not required to be on the same nil side setback boundary as the dwelling.

10. For lots with a frontage of 11 metres or less or where otherwise designated on this LDP, nil setbacks are permitted to both side boundaries simultaneously.

11. Where a nil side setback is permissible but not proposed, side setbacks shall conform to the requirements of the R-Codes.

12. For corner lots, where the major dwelling entry (front door) is oriented toward the secondary street, secondary street setbacks still apply. Primary street setbacks apply to the other street, as designated on this LDP.

13. Setbacks may be varied at the discretion of the Manager - Planning and Development, for corner lots or where otherwise the configuration of the lots limits compliance with setback requirements.

14. For lots with rear access, outdoor living areas may be situated within the building setback area provided they have a minimum length and width of 4 metres, and remain open and uncovered for a minimum of 2 metres from the lot boundary.

15. For Lots 2090 to 2100, sheds and outbuildings shall not be located within the setback to Cordata Avenue.

16. A porch, balcony, veranda or the equivalent may project not more than 1m into the street setback area, provided that the total of such projections does not exceed 50% of the frontage at any level.

Streetscape

17. Where lots have a frontage of 12 metres or less, garages may exceed 50% of the primary lot frontage to a maximum of 60% of the primary lot frontage.

18. Where garages exceed 50% of the primary lot frontage, they shall comply with the following:

   a. A clear indication of the dwelling entrance.
   b. The dwelling entrance shall be the dominant feature of the facade, and shall include a projecting portico or veranda with a minimum depth of 1.5 metres.
   c. Garages are to be set back at least 0.5 metres behind the dwelling alignment, with the exception of rear laneways (6 metres), two storey dwellings and lot 2100 only.

19. Fencing abutting public open space shall be uniform and visually permeable above 1.2 metres.

Design Elements

20. Where sheds and outbuildings do not match the construction materials and colours of the dwelling they are to be screened from public view.

21. For lots with an area of 260m² or less, storage areas with a minimum internal area of 4m² and with a minimum dimension of 1.5 metres are to be provided at the time of construction of the dwelling. Storage areas shall be constructed under the main roof of the residence or garage, and shall be accessible from either the exterior or within the garage.

22. For all lots identified as 'protected courtyard', at least one outdoor living area to be located along the most protected facade or protected by a minimum 2.0 metre high solid fence (e.g. Hardifence, pinelap or Colorbond).

Fire Management

23. Dwellings constructed on lots identified as being at risk of bushfire attack under the approved Fire management Plan, or within 100 metres from any bushland greater than 1 hectare in area, shall be constructed to the appropriate BAL rating in accordance with Australian Standard 3959.

24. This LDP shall be read in conjunction with the approved Fire Management Plan.

25. A proposed change to the nominated BAL rating for any development will require a planning application for consideration. The submission is to include the detailed method for determining Bushfire Attack Level - Method 2 from AS 3959 supporting the lower rating demonstrating compliance with AS 3959, WAPC Guidelines for Bushfire Protection Policy.

26. For those lots identified on this LDP, where an incursion (including minor incursions such as a porch, balcony, verandah) into the building setback area is proposed, a reassessment of the Bushfire Attack Level is required.

27. A minimum 6 metre building setback from Darling Chase applies to lots 2134, 2135, 2136, 2118, 2119, 2116, 2117 and 2115, to facilitate a suitable building protection zone from the vegetation on the northern side of Darling Chase, in accordance with an approved Fire Management Plan.

Noise Protection

28. All dwellings on Lots 4, 5, 6, 7 and 8 Darling Chase with a frontage of 7.5m or less shall be constructed with the following minimum quiet house design requirements;

   a. Walls shall be double leaf cavity brickwork, such as two leaves of 90mm thick bricks with 50mm air gap. Any alternatives shall achieve a minimum Rw50 acoustic rating.
   b. Windows shall be minimum 4mm laminated glazing in a high quality residential grade frame to achieve a minimum Rw+Ctr23 acoustic rating.
   c. Roof/Ceiling - to be minimum 10mm thick plasterboard with R2.0 insulation between ceiling joists. Combined with roof, acoustic performance to be minimum Rw42.
   d. Eaves are to be enclosed using a minimum 4mm thick compressed cement sheeting or equivalent.
   e. Air conditioning units, or the like, must be selected on the basis of quiet operation and units shall be roof mounted on appropriate anti-vibration mounts, or be no more than 1.5m above ground level.
   f. Any alternative construction methods shall be supported by a report undertaken by a suitably qualified acoustic consultant.

Local Development Plan 1

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William Clements 11 January 2016

Stage 1 (Plan 2 of 2)
Honeywood Rise

Planning Design Delivery

This Local Development Plan has been approved by Council under the provisions of the City of Kwinana. Town Planning Scheme No.2 and the Wandi South Local Structure Plan.

Principal Planner: _____

Date: _____

REVISIONS

Rev	Date	Drawn
G	2015.10.26	M. Sullivan
H	2015.12.02	M. Sullivan
I	2015.12.23	M. Sullivan
J	2016.01.11	W. Clements

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PLANNING DESIGN DELIVERY

w: www.rowegroup.com.au
e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-11-03
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley Property Group
Designer:	R. Cumming
Drawn:	K. Trenberth
Projection:	PCG 94
F	06-J

ATTACHMENT B

honeywood rise

Make a natural connection.

All areas and dimensions are subject to survey

The following provisions apply to lots depicted:

R-Coding	R25
Minimum Open Space	40%
Site Cover	60%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street	3.0	5.0
Secondary Street	1.0	-
Primary Street - Lots 2061 and 2042 only	2.0	5.4

- No average setbacks apply.

The following provisions apply to lots depicted:

R-Coding	R30
Minimum Open Space	35%
Site Cover	65%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street - Lots 2134, 2135,2136, 2118, 2119 only	6.0	-
Primary Street - All other lots	3.0	5.0
Secondary Street	1.0	-

- No average setbacks apply.

The following provisions apply to lots depicted:

R-Coding	R40
Minimum Open Space	35%
Site Cover	65%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street (rear vehicle access)	2.0	-
Primary Street (front loaded)	3.0	5.0
Darling Chase - Lots 2115, 2116, 2117 only	6.0	-
Primary Street - Lots 2090 to 2099 only	2.0	-
Primary Street - Lot 2100 only	2.0	5.4
Secondary Street	1.0	-
Rear Laneway	0.5	-
Side Laneway	1.0	-

- No average setbacks apply.

This Local Development Plan has been approved by Council under the provisions of the City of Kwinana. Town Planning Scheme No.2 and the Wandi South Local Structure Plan.

Principal Planner: ___

Date: 27/11/2015

Planning Design Delivery

LEGEND

- Lots subject to this Local Development Plan (Stage 1 Boundary)
- Minimum 6m Building Setback Line
- Minimum 3m Building Setback Line
- Minimum 2m Building Setback Line
- Minimum 1m Building Setback Line
- Minimum 0.5m Building Setback Line
- Nil Setbacks permitted to both side boundaries
- No Vehicle Access
- Future High School Site
- Public Open Space
- R25
- R30
- R40
- Designated Garage Location
- Primary Dwelling Orientation
- Bushfire Attack Level 12.5
- Bushfire Attack Level 19
- Bushfire Attack Level 29
- Grouped Housing Site
- Protected Courtyard
- Lots subject to reassessment of BAL rating where an incursion (including minor incursions) into the building setback area is proposed.

0 100 Metres

REVISIONS

Rev	Date	Drawn
D	2015.03.17	K. Trenberth
E	2015.04.30	M. Sullivan
F	2015.07.01	M. Sullivan
G	2015.10.26	M. Sullivan

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e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-11-03
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley Property Group
Designer:	R. Cumming
Drawn:	K. Trenberth
Projection:	PCG 94
Pla	-06-G

Local Development Plan 1

Stage 1 (Plan 1 of 2)
Honeywood Rise

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Matt Sullivan 26 October 2015

ATTACHMENT C

honeywood rise

Make a natural connection.

Planning Design Delivery

This Local Development Plan (LDP) applies to all lots within Stage 1 of the Honeywood Rise Estate, Wandi South. Unless otherwise defined on this LDP, all development shall be in accordance with the City of Kwinana Town Planning Scheme No. 2, the Residential Design Codes, and the Wandi (south) Local Structure Plan.

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25. A proposed change to the nominated BAL rating for any development will require a planning application for consideration. The submission is to include the detailed method for determining Bushfire Attack Level - Method 2 from AS 3959 supporting the lower rating demonstrating compliance with AS 3959, WAPC Guidelines for Bushfire Protection Policy.

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*NOTE: Site Coverage includes the floor area of all buildings.

This Local Development Plan has been approved by Council under the provisions of the City of Kwinana. Town Planning Scheme No.2 and the Wandi South Local Structure Plan.

Principal Planner _____

Date: 27/11/2015

REVISIONS

Rev	Date	Drawn
D	2015.03.17	K. Trenberth
E	2015.04.30	M. Sullivan
F	2015.07.01	M. Sullivan
G	2015.10.26	M. Sullivan

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PLANNING DESIGN DELIVERY

w: www.rowegroup.com.au
e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-11-03
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley Property Group
Designer:	R. Cumming
Drawn:	K. Trenberth
Projection:	PCG 94
Plan ID:	7926-LDP-06-G

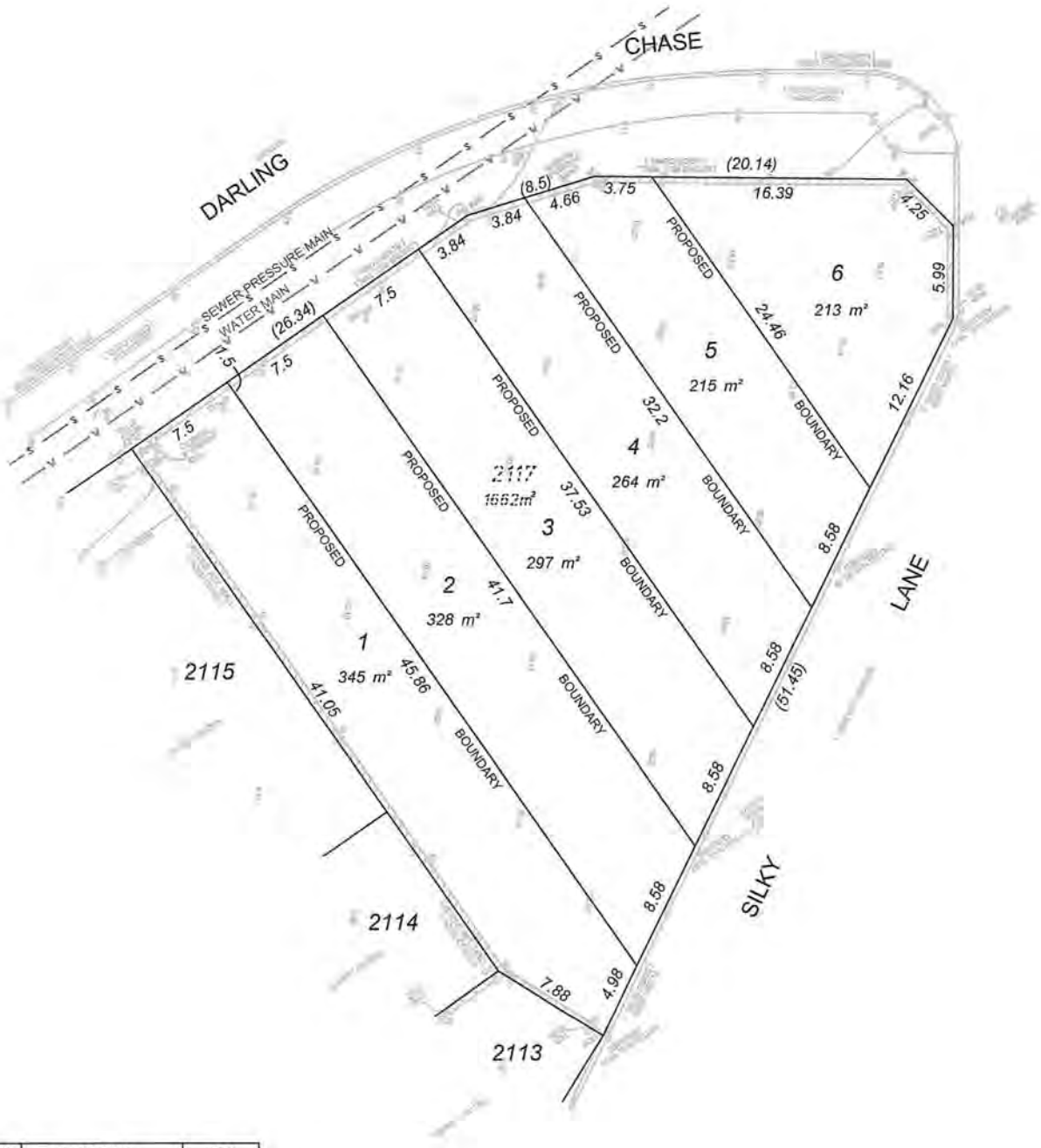
Local Development Plan 1

Stage 1 (Plan 2 of 2)
Honeywood Rise

ATTACHMENT C

N:\TOWN PLANNING\7000-7999\7926\DRAFTING\A-CAD\7926_LDP06G_20151026_WANDI SOUTH [STAGE1].DWG
Matt Sullivan 26 October 2015

LOCAL AUTHORITY: CITY OF KWINANA
LOCALITY: WANDI



LOT	DESCRIPTION	AREA
2117	ORIGINAL LOT	1662m²
1	PROPOSED LOT	345m²
2	PROPOSED LOT	328m²
3	PROPOSED LOT	297m²
4	PROPOSED LOT	264m²
5	PROPOSED LOT	215m²
6	PROPOSED LOT	213m²

DEPARTMENT OF PLANNING

DATE	FILE
29/04/2015	475-15

NOTE: LOT IS VACANT

ATTACHMENT D

REV	DESCRIPTION	BY	DATE
A	LOTS AMENDED	LF	17/4/2015

WARNINGS:
1. LOT NUMBERS, DIMENSIONS AND AREAS SUBJECT TO WAPC APPROVAL, SURVEY AND LANDGATE AUDIT.
2. SEWER INFORMATION TAKEN FROM WATER CORPORATION AS CONSTRUCTED SHEETS.
3. ALL ABOVE & BELOW GROUND SERVICES MAY NOT HAVE BEEN LOCATED - CHECK WITH RELEVANT AUTHORITIES BEFORE COMMENCING ANY WORKS.

0m 3m 6m 9m 12m 15m

PROPOSED SURVEY STRATA OF
LOT 2117 ON DEPOSITED PLAN 403449
3 DARLING CHASE,
WANDI

SCALE 1:300
APRIL 2015
CHEGAN INVESTMENTS
DATUM : ASSUMED

SCANLAN SURVEYS PTY LTD
LICENSED SURVEYORS
P O BOX 429 MIDLAND 6936
PH: 08 9250 2261 FAX: 08 9274 6206
Email : bill@scanlansurveys.com.au

DRAWING (A3)	REVISION
7544/15/1	A
DRAWN BY :	LF
APPROVED :	WS

15.2 Proposed Structure Plan for part of Lot 502 Tamblyn Place, Wellard - Consideration of submissions and recommendation to the Western Australian Planning Commission

SUMMARY:

A proposed Structure Plan for part of Lot 502 Tamblyn Place, Wellard (Attachment A and H) has been lodged with the City of Kwinana, in accordance with clause 16(3) of the *Planning and Development Regulations 2015* (P&D Regulations). The Structure Plan was presented at a Councillor Forum held on Monday 21 December 2015.

The Structure Plan has been prepared for that part of Lot 502 zoned 'Urban' in the Metropolitan Region Scheme (MRS) and 'Development' in Town Planning Scheme No. 2 (TPS 2) (Attachment B). The Structure Plan includes 4.4 hectares (ha) of land situated to the east of Bollard Bulrush Swamp and to the west of Tamblyn Place, Wellard and proposes creating approximately 65 residential lots of varying sizes, 3,786m^2 of Public Open Space (POS) areas and 7,387m^2 of conservation areas (wetland buffer) (Attachment C).

There is currently a single dwelling and associated outbuildings situated on Lot 502, which will be removed as part of future subdivision.

The following reports have been prepared, on behalf of the proponent, to support the proposed Structure Plan:

- *Servicing Report* (PDC, October 2015)
- *Bushfire Hazard Assessment* (Fire Plan, August 2014)
- *Combined Local Water Management Strategy* and Urban Water *Management Plan* (PDC, August 2015)
- *Bollard Bulrush East Flora and Vegetation Assessment* (ENV, July 2011)
- *Bollard Bulrush Fauna Assessment* (ENV, July 2011)
- *Bollard Bulrush Swamp Flood Modelling* (ENV, December 2011)
- *Landscape Concept Plan*

The City advertised the Structure Plan for 28 days, between the 16 November and 11 December 2015, in accordance with clause 18 of the P&D Regulations. Submissions were received from five State government agencies during the advertising period. Submissions were also received from the owners of Lots 500 and 501. These lots are situated to the north of the proposed Structure Plan for Lot 502 Tamblyn Place (Attachment D).

The submissions, and the City's comments on the submissions, are summarised in the *Schedule of Submissions* (Attachment E) in accordance with clause 20(2) of the P&D Regulations.

The Western Australian Planning Commission (WAPC) requires that structure plans be prepared in accordance with objectives and requirements of *Liveable Neighbourhoods* (WAPC, 2009). The proposed Structure Plan has been assessed, by the City, against the following elements of *Liveable Neighbourhoods*:

Element 1- Community Design
Element 2 - Movement Network
Element 3 - Lot Layout
Element 4 - Public Parkland
Element 5 - Urban Water Management

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

Element 6 - Utilities
Element 7 - Activity Centres and Employment
Element 8 - Schools

The proposed Structure Plan has also been assessed in accordance with a number of other relevant City and State planning policies, including the following:

- *State Planning Policy 3.7 - Planning in Bushfire Prone Areas* (WAPC, 2015)
- *Acid Sulfate Soils Planning Guidelines* (WAPC, 2008)
- *City of Kwinana Public Open Space Policy*
- *Draft Local Planning Policy 1: Landscape and Tree Retention and Protection in Development Areas*

The City is satisfied that the proposed Structure Plan meets the objectives and relevant requirements of *Liveable Neighbourhoods* and is largely consistent with City and State government legislation and policies, subject to the following issues being resolved:

a) Modification of the structure plan where required to ensure that the significant trees situated in Tamblyn Place road reserve, as determined by the City of Kwinana, are retained (Attachment I). The City notes that retention of the significant trees may require the current width of the Tamblyn Place road reserve to be maintained at 20 metres rather than being reduced to 16 metres as proposed, or retained in a strip of public open space.
b) Modifications of the *Subdivision Concept Plan* so that lots with frontage to Tamblyn Place, where the significant trees are situated, are realigned to enable alternative road access.
c) Modification of the *Subdivision Concept Plan* (Attachment C) to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.
d) Submission of a *Bushfire Management Plan* in accordance with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* and associated guidelines to be endorsed by the City of Kwinana.

The City considers that the following matters can be resolved by the City at subdivision stage:

a) Urban Water Management Plan
b) Wetland Management Plan
   - To determine the future vesting of the open space buffer area surrounding Bollard Bulrush Swamp
   - To coordinate the alignment and specifications of a Dual Use Path (DUP) and recreational facilities in the POS surrounding Bollard Bulrush
c) Acid Sulfate Soils Management Plan
d) Mosquito Management Plan
e) Landscape Management Strategy

The City is of the view that the proposed Structure Plan is suitable to be forwarded to the WAPC in accordance with clause 20 of the P&D Regulations subject to the recommended modifications.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

POS Concept Plan

The City has appointed Emerge Associates to prepare a concept plan for the proposed POS that will flank the east side of Bollard Bulrush Swamp. The purpose of the plan is to coordinate the location and design of facilities on a number of landholdings and structure plans. Without a POS concept plan, it will be difficult for the City to coordinate recreation facilities (such as a dual use path circuit) to a consistent design and standard. The City notes that it is also important that infrastructure (roads and streetscape, lighting, POS landscaping) be consistent across the various landholdings and structure plans.

A Structure Plan for part of Lots 503 – 505, 507 and 900 Johnson Road (adjoining Lot 502) was presented to Council at its meeting on the 18 January 2016. Council supported the structure plan and advised the WAPC accordingly.

Finally, the City is recommending that Council request the WAPC to amend the MRS in order to transfer that part of Bollard Bulrush Swamp that is currently zoned 'Rural' to 'Parks and Recreation' reserve.

OFFICER RECOMMENDATIONS:

That Council:-

1. Forward this Ordinary Council Meeting Report, Council's recommendations and the *Schedule of Submissions* (Attachment E) to the Western Australian Planning Commission (WAPC) pursuant to clause 20 of the *Planning and Development Regulations 2015.*

2. Advise the WAPC that the Council supports the Structure Plan for part of Lot 502 Tamblyn Place, Wellard subject to the following issues being resolved:
   a) Modification of the Structure Plan where required to ensure that the significant trees situated in Tamblyn Place road reserve, as determined by the City of Kwinana, are retained (Attachment I). The City notes that retention of the significant trees may require the current width of the Tamblyn Place road reserve to be maintained at 20 metres rather than being reduced to 16 metres as proposed, or retained within a strip of public open space.
   b) Modification of the Structure Plan to include a statement that lot frontages of 7.5m or less will not be included in the future subdivision designs.
   c) Modifications of the *Subdivision Concept Plan* so that lots with frontage to Tamblyn Place, where the significant trees are situated, are realigned to enable alternative road access.
   d) Modification of the *Subdivision Concept Plan* (Attachment C) to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.
   e) Submission of a *Bushfire Management Plan* in accordance with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* and associated guidelines to be endorsed by the City of Kwinana. Any modifications to the Structure Plan that arise from the recommendations of the *Bushfire Management Plan* are to be made and resubmitted to the City for assessment.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

3. Advise the WAPC that the following management plans should be prepared to the City's satisfaction as part of the subdivision application process:
   a) Wetland Management Plan
   b) Urban Water Management Plan
   c) Acid Sulfate Soils Management Plan
   d) Mosquito Management Plan
   e) Landscape Management Strategy

4. Request the WAPC that the 50 metre buffer to the boundary of the Conservation Category Wetland (situated within the 'Development' zone), be ceded free of cost to the Crown as a condition of subdivision approval.

5. Request the WAPC to initiate an amendment to the *Metropolitan Region Scheme* to transfer all of Bollard Bulrush Swamp that is zoned 'Rural' to 'Parks and Recreation' reserve.

6. Note that the City of Kwinana has appointed Emerge Associates to prepare a concept plan for the public open space (POS) that will flank the east side of Bollard Bulrush Swamp. The purpose of the plan is to coordinate the location and design of facilities across a number of landholdings and structure plans.

7. Ensure that the *Landscape Management Strategy* prepared at the subdivision stage is consistent with the *POS Concept Plan* currently being prepared by Emerge Associates.

8. Notify the proponent that lot frontages between 5m and 7.5m will not be supported by the City.

BACKGROUND:

Sub-Regional Planning Framework and District Structure Planning
The Structure Plan is generally consistent with the regional and district planning documents that set out the framework for land use planning in Wellard. These documents include the:

a) *Wellard Indicative Structure Plan* (Rowe Group, 2009) (Attachment F) - prepared to support Amendment 1188/57 to the MRS to rezone land on the eastern side of Bollard Bulrush Swamp to 'Urban Deferred'.

b) *Wellard Concept Plan* (Rowe Group, 2014) (Attachment G) - prepared in response to the Environmental Protection Authority's (EPA) requirement that the alignment of the 'Urban Deferred' zone boundary be modified to protect the Conservation Category Wetland.

c) *Draft South Metropolitan Peel Subregional Planning Framework* (WAPC, 2015)

Metropolitan Region Scheme Amendment 1188/57 and EPA Assessment
The WAPC initiated Metropolitan Region Scheme (MRS) Amendment 1188/57 to rezone land on the eastern side of Bollard Bulrush Swamp from 'Rural' to 'Urban Deferred' (Attachment B). The, then, Town of Kwinana supported the initiation of Amendment 1188/57 in 2008.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

A portion of Lot 502 was situated within Amendment 1188/57. The balance of Lot 502 is situated within Bollard Bulrush Swamp and was not included in Amendment 1188/57. This land is still zoned 'Rural' in the MRS and 'Rural A' in TPS 2.

The *Wellard Indicative Structure Plan* (Attachment F) was prepared to support MRS Amendment 1188/57 to the MRS to rezone land on the eastern side of Bollard Bulrush Swamp to 'Urban Deferred'.

The EPA decided to formally assess Amendment 1188/57 under section 48A of the *Environmental Protection Act 1986* due to the potential for future residential development to directly impact on Bollard Bulrush Swamp. Bollard Bulrush Swamp is identified as a Conservation Category Wetland (CCW) in the Department of Parks and Wildlife's *Geomorphic Wetlands Swan Coastal Plain* dataset and parts of the CCW boundary were situated within Amendment 1188/57. In essence, the purpose of the EPA's assessment was to determine which areas on the eastern side of Bollard Bulrush Swamp could be developed and which areas should be conserved.

The EPA provided its report to the Minister for Environment in January 2014, recommending that Amendment 1188/57 be approved (EPA Report 1500, January 2014). The alignment of the proposed 'Urban Deferred' zone boundary (adjacent to Bollard Bulrush Swamp) was modified during the EPA's formal assessment so that future development did not directly impact on the CCW. Therefore, the EPA concluded that Amendment 1188/57 could be managed to meet the EPA's environmental objective without the requirement for environmental conditions and further modifications to Amendment 1188/57.

The *Wellard Concept Plan* (Attachment G) was prepared in response to the EPA's requirement that the alignment of the 'Urban Deferred' zone boundary be modified to protect the CCW.

The EPA noted in its report to the Minister for the Environment, the Department of Water's (DoW) advice that surface water and ground water impacts can be managed through the preparation and implementation of district, local and urban water management plans (UWMP).

The EPA advised that it would support the reservation of the Bollard Bulrush as 'Parks and Recreation' reserve to provide a consolidated wetland conservation area. The City supports the EPA's recommendation to reserve Bollard Bulrush as 'Parks and Recreation' and to cede the land to the Crown free of cost for conservation purposes.

The City also recommends that:

a) Council request the WAPC to amend the MRS in order to transfer all of Bollard Bulrush Swamp currently zoned 'Rural' to 'Parks and Recreation' reserve.

b) the 50 metre buffer to the boundary of the CCW (situated within the 'Development' zone) be ceded free of cost to the Crown as a condition of subdivision approval.

The Minister for Planning approved Amendment 1188/57 on 12 March 2014 (Statement 961). The eastern side of Bollard Bulrush Swamp was then rezoned from 'Rural' to 'Urban Deferred'.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

The lifting of urban deferment was approved by the WAPC (MRS Amendment 1296/27) on 31 March 2015 following the DoW's approval of the District Water Management Strategy (DWMS).

TPS 2 was amended concurrently with the lifting of urban deferment, resulting in land situated outside the CCW boundary being zoned 'Development' and land within the CCW remaining in the 'Rural A' zone (Attachment B & G). The Structure Plan has been prepared for that part of Lot 502 that is now zoned 'Urban' in the MRS and 'Development' in TPS 2.

CONSIDERATION OF SUBMISSIONS:

The proposed Structure Plan was advertised for a period of 28 days, between the 16 November 2015 and 11 December 2015. Public advertising was carried out 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 one (1) sign on site;
- A notice was placed in the *Weekend Courier* for two weeks over the course of the advertising period; and
- Copies of the proposed Structure Plan and relevant documents were made available for inspection at the City's Administrative Offices 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 Education
- Department of Fire and Emergency Services
- Department of Health
- Department of Parks and Wildlife
- Department of Transport
- Department of Water
- Main Roads WA
- Public Transport Authority
- Water Corporation
- Western Power

Five submissions were received from State government agencies during the advertising period. Two submissions were also received from owners of nearby properties situated within the east Bollard Bulrush urban cell. The submissions and the City's comments are summarised in the *Schedule of Submissions* (Attachment C) in accordance with clause 20(2) of the P&D Regulations.

There was only one matter raised in the submissions warranting a modification to the proposed development. In response to this matter the City is recommending that the Subdivision Concept Plan for Lot 502 (Attachment C) be modified to provide an additional road connection between Lot 502 and 501, so that there will be two roads connecting these lots.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

ASSESSMENT OF THE STRUCTURE PLAN

Liveable Neighbourhoods
The proposed Structure Plan has been assessed, by the City, in accordance with the objectives and requirements of each element of *Liveable Neighbourhoods* (WAPC, 2009) as described below:

Element 1 - Community Design
The Structure Plan report states that a range of lot sizes are intended to be provided. The density codes shown on the Structure Plan are Residential 25 and 50.

The subdivision concept plan (Attachment C) proposes a yield of 65 lots. This equates to 14.6 lots per gross 'Urban' zoned hectare or 38.8 lots per net site hectare. The yield falls short of the requirement of *Direction 2031* which requires 15 dwellings per gross hectare, but exceeds the requirement of *Liveable Neighbourhoods* which requires 22 dwellings per net hectare. The City is satisfied with the lot yield on the basis that a considerable portion of the site is being allocated to conservation.

Element 2 - Movement Network
Submissions from the owners of Lots 500 and 501 Tamblyn Road were received by the City during the advertising period. Lots 500 and 501 are situated to the north of the proposed Structure Plan (Attachment D).

The two submissions raised concerns that there is only one road connection between Lot 501 and 502 shown in the Subdivision Concept Plan (Attachment C). The submissions consider this to be inadequate and that there should be additional road access between Lot 501 and Lot 502 and/or Bertram Road. It is also noted in one of the submissions that having only one point of access/egress will be inadequate in the event of a bush fire in Bollard Bulrush Swamp.

The proponent does not support the provision of a second access road because it will reduce the lot yield of the proposed Subdivision Concept Plan.

The City agrees that an additional road connection between Lot 501 and Lot 502 should be shown in the Subdivision Concept Plan.

The City will also request the WAPC to impose a condition on future subdivision approvals requiring that Tamblyn Place to be upgraded to an urban standard. The Structure Plans proposes reducing the width of Tamblyn Place from 20m to 16m. The City notes that retention of significant trees in the road reserve may require the current width of the Tamblyn Place road reserve to be maintained at 20m rather than being reduced to 16m as shown in the proposed Structure Plan. Alternatively, the trees maybe retained in a strip of public open space.

Main Roads advised in its submission that a Traffic Impact Assessment is required in order to assess the traffic impacts of the Structure Plan on intersections of Kwinana Freeway with Bertram/Mortimer Road and Thomas Road. The City (Engineering Department) is of the view that the Structure Plan will not generate sufficient traffic to impact on intersections with Kwinana Freeway. This view will be relayed to the DoP so that it can be raised with Main Roads.

Element 3 - Lot Layout
The Structure Plan has been designed to:

- orientate roads to achieve views of Bollard Bulrush Swamp from within the subdivision; and
- orientate lots north/south to facilitate solar access.

A variety of lot sizes are depicted in the *Subdivision Concept Plan* (Attachment C) included in the Structure Plan ranging from 312.5m^2 to 450m^2, with the narrowest lot being 12.5m wide. The proposed residential densities (up to R50) in the structure plan do allow for narrower and smaller lots which may be pursued at the subdivision stage however for the purpose of the Structure Plan, the *Subdivision Concept Plan* demonstrates an appropriate lot yield and layout of the dimensions mentioned above.

Nonetheless, to ensure that Council's view on narrower lots is clear (specifically lots with a frontage of 7.5m of less), it is recommended that the City recommends that the Structure Plan be modified to include a statement (page 9, Subdivision and Development Requirements) to the effect that lot frontages of 7.5m or less will not be included in the future subdivision designs. The City will also liaise with applicant prior to the lodgement of a subdivision application to ensure that Council's view is made clear.

The matter of narrow single house lots affects not only this Structure Plan area but other developing urban areas within the City. The City will consider statutory mechanisms, such as Scheme and/or policy provisions, to implement Council's viewpoint in future Structure Plans and subdivision applications, and will report back to Council on the options available.

Element 4 - Public Parkland
The Structure Plan provides 0.3786ha (10%) of POS in accordance with *Liveable Neighbourhoods* and 0.7387 ha (19.5%) for conservation (wetland buffer).

The POS in the Structure Plan has been situated adjacent to Bollard Bulrush Swamp in order to create a community focal point for recreational activity. POS is situated within a 400m walkable catchment of all residential lots.

The City has appointed Emerge Associates to prepare a concept plan for the proposed POS flanking the east side of Bollard Bulrush Swamp. The purpose of the plan is to coordinate the location and design of facilities across the POS in a number of structure plans on the east side of Bollard Bulrush Swamp. Without a coordinated POS concept plan, it will be difficult to coordinate the provision recreation facilities (such as a dual use path circuit) to a consistent design as part of the subdivision approval process.

The Structure Plan states that a Landscape Management Strategy will be prepared at the subdivision stage to guide the development of the open space. The City will ensure that the strategy is consistent with POS concept plan being prepared by Emerge Associates.

Element 5 - Urban Water Management
The following water management plans and strategies have been prepared for the Structure Plan area. These strategies include:

- *Jandakot Drainage and Water Management Plan No.3 (JDWMP)- Peel Main Drain Catchment* (DoW, 2009)

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

- *Wellard Urban Precinct (East) District Water Management Strategy* (DWMS) (Emerge, October 2014)
- *Combined Local Water Management Strategy and Urban Water Management Plan (PDC, August 2015)*

These plans address water management across the Structure Plan area providing a greater level of detail at each successive stage of the planning process. Due to the limited size of the Structure Plan, the City agreed that a combined Local Water Management Strategy (LWMS) and Urban Water Management Plan (UWMP) could be prepared.

The DoW has advised that further information is required and requested that a revised LWMP and UWMP be resubmitted. The additional information requested by the DoW is as follows:

a) discharge peak flow rates from the 100 year Average Recurrence Interval (ARI) event to the wetland and Peel Main Drain area of inundation for the 100 year ARI event should be provided;

b) identify groundwater levels in Figures 4.3, 4.4 and 5.1;

c) landscape concept drawings for the proposed POS;

d) modify the invert levels for the subsoil pipes in the rain gardens; and

e) identify where slotted pipe infrastructure will discharge to within the POS

The City is liaising with the proponent and the DoW to resolve these issues and recommends that an Urban Water Management Plan be prepared to the City's satisfaction at subdivision stage.

Element 6 - Utilities
The Structure Plan area is able to be connected to water, sewer, electricity, gas and telecommunications services. It is normal practice for the WAPC to impose subdivision conditions requiring that these services be provided to an urban standard.

Servicing agencies did not raise any concerns with servicing the Structure Plan area.

Element 7 - Activity Centres and Employment
There are no Activity Centres proposed within the east Bollard Bulrush urban cell or within the Structure Plan area. There is a small Local Centre located nearby, at Emerald Park, which can be readily accessed by residents.

Element 8 – Schools
The Department of Environment (DoE) has advised that the Structure Plan will increase the number of lots within the catchment area of the future Wellard West Primary School and put pressure on the capacity of the school.

DoE has explained that residential lot yields were not provided by the WAPC at the time the eastern Bollard Bulrush urban cell was rezoned as part of MRS Amendment 1118/57. At that time, DoE assumed that students would attend the future Wellard West Primary School, and, it would be unfeasible to develop an additional primary school in the area.

The DoE advised in its submissions that because lot sizes are now smaller than originally anticipated, it is estimated that more than 3,000 residential lots will eventually be situated within the catchment of the future Wellard West Primary School. There is now a sufficient number of lots to justify two primary school sites in Wellard in accordance with the WAPC's School Sites policy (DC 2.4) and *Liveable Neighbourhoods*.

DoE wishes to discuss with the City a location on the west side of Bollard Bulrush Swamp that DoE considers to be suitable for an early childhood centre. DoE advise that early childhood centres are typically 1-2ha in area and may accommodate pupils from Kindergarten to Year 3. It would be appropriate for the City to liaise with the DoE, WAPC and affected landowners prior to the lifting of the current urban deferred zoning on the western side of Bollard Bulrush Swamp.

Other matters assessed by the City
In addition to *Liveable Neighbourhoods,* the City has also assessed the Structure Plan against the following matters:

Biodiversity (Vegetation, Flora & Fauna)
The portion of Lot 502 that is zoned 'Urban' in the MRS and 'Development' in TPS2 has been substantially cleared and used for various rural pursuits. The balance of the lot is zoned 'Rural' in the MRS and 'Rural A' in TPS 2 and is situated within Bollard Bulrush Swamp which is classified as a CCW due to its significant environmental values.

A 50m buffer to the wetland boundary ('Rural' zone boundary) has been identified in the Structure Plan. This was required as part of the EPA assessment of MRS Amendment 1188/57.

The Structure Plan document states that a Wetland Management Plan will be prepared at subdivision stage. The Department of Parks and Wildlife (DPaW) has advised that the Management Plan should address re-vegetation in the buffer consistent with DPaW's guidelines for the preparation of wetland management plans. DPaW also advise that appropriate building setbacks and all bushfire protection requirements should be provided within the development area and not impose on the management of the wetland or wetland buffer, nor place limitations on the management of surface water flow and re-vegetation within the buffer required to protect the wetland.

On 16 December 2015, the draft *Local Planning Policy 1: Landscape and Tree Retention and Protection in Development Areas (LPP1)* was adopted by Council for advertising. The proposed Structure Plan for Lot 502 was lodged with the City prior to the draft LPP1 being advertised and the LPP1 was still being advertised while this report was being prepared. Nevertheless, the City has assessed the vegetation on Lot 502 against the draft LPP1 and the City is of the view that there are a number of mature Tuart trees situated in the Tamblyn Place road reserve (Attachment I) that are 'significant' and suitable for protection as part of the future development of the Structure Plan area. The City notes that retention of the Tuart trees may require the Structure Plan to be modified so that the current width of the Tamblyn Place road reserve is maintained at 20m rather than being reduced to 16m as proposed. Alternatively the trees could be retained in a strip of public open space.

The *Concept Subdivision Plan* will also need to be modified so that lots with frontage to Tamblyn Place, where the significant trees are situated, are realigned to enable alternative road access.

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There are several other trees situated on Lot 502 that would require the structure plan to be significantly modified and substantially reduce the lot yield if they were to be retained. The City (Environment and Planning Departments) does not consider this to be an optimal outcome and does not consider that the trees are so significant as to warrant the structure plan being modified to that extent.

Bushfire Management
The WAPC recently released *State Planning Policy 3.7 – Planning in Bushfire Prone Area*s (SPP 3.7) (WAPC 2015) and *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2015). These are the predominant documents that are to be used by decision making authorities and referral agencies during the consideration of strategic planning proposals, subdivisions and development applications.

The SPP 3.7 states that structure plans should be accompanied by a *Bushfire Management Plan* which includes a *Bushfire Hazard Level* assessment or *BAL Contour Map* for those areas identified as bushfire prone.

The Structure Plan area is identified as a Bushfire Prone Area in the *Map of Bushfire Prone Areas* (2015) recently published by the State Government therefore a *Bushfire Management Plan* is required to support the structure plan.

The Guidelines state that the following matters should be addressed in the *Bushfire Management Plan:*

- Location of bushfire prone areas
- Avoidance of land use and development intensification extreme hazards areas
- Existing fire fighting infrastructure
- Existing and proposed road network and its effectiveness in a bushfire emergency
- Integration of biodiversity protection in a bush fire management plan

The City is of the view that the bushfire assessment document submitted by the proponent does not meet the requirements for a *Bushfire Management Pla*n as set out in the Guidelines. The City acknowledges that the Structure Plan was lodged prior to the publication of the Guidelines, however, it is recommended that a Bushfire Management Plan be prepared in accordance with SPP 3.7 for endorsement by the City. Any modifications to the Structure Plan that arise from the recommendations of the *Bushfire Management Plan* are to be made and resubmitted to the City for assessment.

Acid Sulfate Soils
The DoE's *Acid Sulfate Soil Risk Mapping* identifies the majority of the Structure Plan area as having a 'high' risk of Acid Sulfate Soils (ASS) within 3 metres of the surface. Conditions are likely to be imposed by the WAPC on the subdivision requiring that ASS is managed in accordance with the WAPC's Guidelines.

Consistency of Infrastructure Standards across Multiple Development Sites
The City will require a consistent standard of infrastructure (roads and streetscape, lighting, POS landscaping) to be provided within the various landholdings in the east Bollard Bulrush urban cell.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

Conclusion

The City is satisfied that the Structure Plan meets the objectives and requirements of:

- *Liveable Neighbourhoods* (WAPC, 2009)
- *State Planning Policy 3.7 – Planning in Bushfire Prone Areas (WAPC 2015)*
- *Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015)*
- *Draft Local Planning Policy 1: Landscape and Tree Retention and Protection in Development Areas*
- Other relevant State and City policies

The City recommends that the WAPC be advised that Council supports the Structure Plan for part of Lot 502 Tamblyn Place, Wellard subject to the following issues being resolved:

a) Modification of the Structure Plan where required to ensure that the significant trees situated in Tamblyn Place road reserve, as determined by the City of Kwinana, are retained.
b) Modification of the Concept Subdivision Plan so that lots with frontage to Tamblyn Place, where the significant trees are situated, are realigned to enable alternative road access.
c) Modification of the Structure Plan to include a statement that lot frontages of 7.5m or less will not be included in the future subdivision designs.
d) Modification of the Subdivision Concept Plan for Lot 502 to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.
e) Submission of a Bushfire Management Plan in accordance with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* and associated guidelines to be endorsed by the City of Kwinana. Any modifications to the Structure Plan that arise from the recommendations of the Bushfire Management Plan are to be made and resubmitted to the City for assessment.

LEGAL / POLICY IMPLICATIONS:

For the purposes of Council considering a financial or impartiality interest only, the land owner is Ascari Developments Pty Ltd and the structure plan was prepared by Development Works.

Legislation

- *Planning and Development Act, 2005*
- *Metropolitan Region Scheme*
- *Planning and Development (Local Planning Schemes) Regulations 2015*
- *City of Kwinana Town Planning Scheme No. 2*

Policies and Strategies

- *Draft South Metropolitan Peel Sub-Regional Planning Framework* (WAPC, 2015)
- *District Water Management Strategy – Wellard Urban Precinct (East), Perth WA* (Emerge, 2014)
- *State Planning Policy 3.7 - Planning for Bushfire Risk Management (Draft)* (WAPC, 2015)
- *State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning,* Perth WA (WAPC, 2009)
- *Development Control Policy 1.1 Subdivision of Land (WAPC, 2004)*

- *Development Control Policy 1.7 Residential Road Planning (WAPC, 1998)*
- *Development Control Policy 2.3 Public Open Space in Residential Areas (WAPC, 2002)*
- *Development Control Policy 2.4 School Sites* (WAPC, 1998)
- *Better Urban Water Management* (WAPC, 2008)
- *Residential Design Codes* (WAPC, 2013)
- *Structure Plan Guidelines* (WAPC, 2012)
- *Jandakot Drainage and Water Management Plan Peel Main Drain Catchment* (DoW, 2009)
- *Liveable Neighbourhoods (Edition 3)* (WAPC, 2009
- *Guidelines for Planning in Bushfire Prone Areas* (WAPC, 2015)
- *Map of Bushfire Prone Areas*

Other

- *Report and recommendations of the Environmental Protection Authority – Metropolitan Region Scheme Amendment 1188/57 – Wellard Urban Precinct* (EPA Report 1500) (EPA, January 2014)
- *Statement that a scheme may be implemented (pursuant to the provisions of Division 3 of Part IV of the Environmental Protection Act 1986)* (Ministerial Statement 961) (12 March 2014)
- *Stormwater Management Manual for WA* (DoW, 2007)

FINANCIAL / BUDGET IMPLICATIONS:

The City will be financially responsible for:

a) maintaining POS and possibly that part of the 50 metre wetland buffer abutting Bollard Bulrush Swamp situated within the Structure Plan.

b) managing bushfire fuel loads in POS and the wetland buffer in accordance with the requirements for low threat vegetation listed in *Australian Standard S39459.*

ENVIRONMENTAL IMPLICATIONS:

The EPA formally assessed Amendment 1188/57 under section 48A of the *Environmental Protection Act 1986* due to the potential for future residential development to impact on Bollard Bulrush Swamp which is recognised as an environmentally significant CCW.

The EPA provided its report and recommendation to the Minister for Environment, in January 2014, recommending that Amendment 1188/57 be approved (EPA Report 1500, January 2014).

The EPA's report concluded that Amendment 1188/57 could be managed to meet the EPA's environmental objective without the requirement for environmental conditions because the alignment of the proposed 'Urban' zone boundary (adjacent to Bollard Bulrush Swamp) had been modified during the EPA's formal assessment to satisfy the EPA's environmental objectives.

15.2 PROPOSED STRUCTURE PLAN FOR PART OF LOT 502 TAMBLYN PLACE, WELLARD - CONSIDERATION OF SUBMISSIONS AND RECOMMENDATION TO THE WESTERN AUSTRALIAN PLANNING COMMISSION

On 16 December 2015, the draft Local Planning Policy 1: Landscape and Tree Retention and Protection in Development Areas (LPP1) was adopted by Council for advertising. The proposed Structure Plan for Lot 502 was lodged with the City prior to the draft LPP1 being advertised and the LPP1 was still being advertised while this report was being prepared. Nevertheless, the City has assessed the vegetation on Lot 2 against the draft LPP1 and the City is of the view that there are a number of mature Tuart trees situated in Tamblyn Place (Attachment I) that are 'significant' and suitable for protection as part of the future development of the Structure Plan area.

STRATEGIC / SOCIAL IMPLICATIONS:

The City is of the view that the Structure Plan for part of Lot 502 Tamblyn Place, Wellard addresses the future strategic and social requirements of the locality.

RISK IMPLICATIONS:

Council approves development under its Scheme to meet its statutory obligations and facilitate proper and orderly development of the municipality to accommodate development in accordance with the objectives of Council's Strategic Plan. Development approvals, scheme amendments, subdivision and structure planning allows land use to change over time, in order to meet Council and State Government policies and practices, community values and provide protection to the environment.

COUNCIL DECISION

121

MOVED CR D WOOD **SECONDED CR P FEASEY**

That Council:-

1. **Forward this Ordinary Council Meeting Report, Council's recommendations and the *Schedule of Submissions* (Attachment E) to the Western Australian Planning Commission (WAPC) pursuant to clause 20 of the *Planning and Development Regulations 2015.***

2. **Advise the WAPC that the Council supports the Structure Plan for part of Lot 502 Tamblyn Place, Wellard subject to the following issues being resolved:**

a) **Modification of the Structure Plan where required to ensure that the significant trees situated in Tamblyn Place road reserve, as determined by the City of Kwinana, are retained (Attachment I). The City notes that retention of the significant trees may require the current width of the Tamblyn Place road reserve to be maintained at 20 metres rather than being reduced to 16 metres as proposed, or retained within a strip of public open space.**

b) **Modification of the Structure Plan to include a statement that lot frontages of 7.5m or less will not be included in the future subdivision designs.**

c) Modifications of the *Subdivision Concept Plan* so that lots with frontage to Tamblyn Place, where the significant trees are situated, are realigned to enable alternative road access.
d) Modification of the *Subdivision Concept Plan* (Attachment C) to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.
e) Submission of a *Bushfire Management Plan* in accordance with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* and associated guidelines to be endorsed by the City of Kwinana. Any modifications to the Structure Plan that arise from the recommendations of the *Bushfire Management Plan* are to be made and resubmitted to the City for assessment.

3. Advise the WAPC that the following management plans should be prepared to the City's satisfaction as part of the subdivision application process:
a) Wetland Management Plan
b) Urban Water Management Plan
c) Acid Sulfate Soils Management Plan
d) Mosquito Management Plan
e) Landscape Management Strategy

4. Request the WAPC that the 50 metre buffer to the boundary of the Conservation Category Wetland (situated within the 'Development' zone), be ceded free of cost to the Crown as a condition of subdivision approval.

5. Request the WAPC to initiate an amendment to the *Metropolitan Region Scheme* to transfer all of Bollard Bulrush Swamp that is zoned 'Rural' to 'Parks and Recreation' reserve.

6. Note that the City of Kwinana has appointed Emerge Associates to prepare a concept plan for the public open space (POS) that will flank the east side of Bollard Bulrush Swamp. The purpose of the plan is to coordinate the location and design of facilities across a number of landholdings and structure plans.

7. Ensure that the *Landscape Management Strategy* prepared at the subdivision stage is consistent with the *POS Concept Plan* currently being prepared by Emerge Associates.

8. Notify the proponent that lot frontages between 5m and 7.5m will not be supported by the City.

CARRIED
7/0

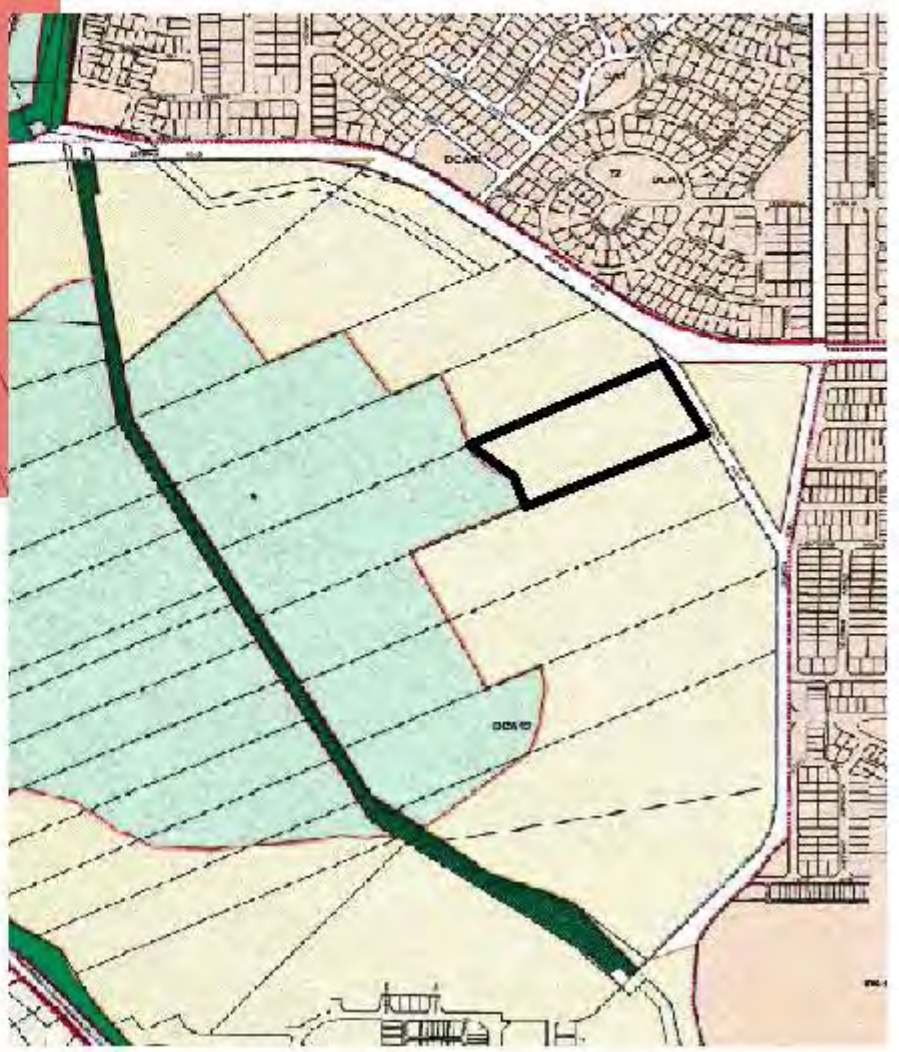
LOCAL STRUCTURE PLAN

Attachment A
Structure Plan
for
Part of Lot 502 Tamblyn Place, Wellard

Attachment B

Metropolitan Region Sceme

Town Planning Scheme 2



Attachment C

Legend

- Subject Site Area (10.7428ha)
- Amalgamated Land from Road Closure (434m²)
- 50m Wetland Buffer
- Existing Vegetation
- Existing Buildings

Lot Summary

LOT TYPE	NO. LOTS
SQUAT	
12.5m x 25m (312.5m2)	11
15m x 25m (375m2)	12
TRADITIONAL	
12.5m x 30m (375m2)	18
15m x 30m (450m2)	23
TOTAL LOTS	**64**

Total Area Lots	2.5237ha
Average Lot Size	394m²
Area Roads	0.9158ha
Total POS Area	1.0418ha
POS Unrestricted Area	0.3031ha
Wetland Buffer Area	0.7387ha
Urban Zoned Area	4.4378ha

Subdivision Concept Plan

Lot 502 Tamblyn Place, WELLARD

NORTH

Scale 1:1500 @ A3

0 10 20 30 40 50m

DATE:	03/08/2015	**REVISED:**	
GRID:	PCG94 ZONE 50	**DATUM:**	AHD
DRAWING:			MONWEL001

Attachment D

Attachment E

SCHEDULE OF SUBMISSIONS
Proposed Structure Plan for Lot 502 Tamblyn Place, Wellard

	SUBMITTER AND ADDRESS	NATURE AND SUMMARY OF SUBMISSION	CITY COMMENT
	Department of Education (DoE) 151 Royal Street East Perth WA 6004 Contact: Stephen Muldoon Senior Consultant Strategic Asset Planning	**NO OBJECTION TO STRUCTURE – COMMENTS / RECOMMEDATION PROVIDED** a) The structure plan is situated within the catchment for the future Wellard West Primary School located along Johnson Road. b) DoE is concerned that the proposed additional residential development surrounding the Bollard Bulrush Swamp will significantly increase the number of lots within the catchment area for the future school. At full development there is likely to be accommodation pressure on this school. c) DoE request that the City of Kwinana liaise with DoE to identify a location in the north west sector for an early childhood centre. These centres are typically 1 - 2ha in area and may accommodate students from Kindergarten to Year 3.	It would be appropriate for the City to liaise with the DoE, WAPC and landowners prior to the lifting of the current urban deferred zoning on the western side of Bollard Bulrush Swamp.
	Main Roads WA (MRWA) PO Box 6202 East Perth WA 6892 Contact: Lynne Wrigglesworth Road Planning	**CONCERNS RAISED IN RELATION TO THE STRUCTURE PLAN** Main Roads provided the same advise for Lot 502 as it did for the adjoining structure plan for Lot 503-505,507 and 900 Johnson Road, Wellard. Main Roads advised that in order to be able to properly assess the traffic impacts of the structure plan on intersections of Kwinana Freeway with Bertram/Mortimer Road and Thomas Road, a traffic impact assessment is required.	The City is of the view that the Structure Plan will not generate sufficient traffic to impact on intersections with Kwinana Freeway and that this matter is best negotiated between the WAPC and Main Roads.
	Department of Water (DoW) PO Box 332 Mandurah WA 6210 Contact: Jane Sturgess & Brett Dunn Urban Water Management Peel Region	**COMMENTS PROVIDED** The Department of Water has advised that further information is required and requested that the LWMP & UWMP be revised and resubmitted. The additional information requested by the DoW is as follows: a) discharge peak flow rates from the 100 year ARI event to the wetland and Peel Main Drain area of inundation for the 100 year event should be provided; b) identify groundwater levels in Figures 4.3, 4.4 and 5.1; c) landscape concept drawings for the proposed POS; d) modify the invert levels for the subsoil pipes in the rain gardens; and e) identify where will slotted pipe infrastructure discharge to within POS	The City is liaising with the proponent and the DoW to resolve these issues and recommends that an Urban Water Management Plan be prepared to the City's satisfaction at subdivision stage.
	Department of Fire and Emergency Services (DFES) PO Box 1174 PERTH WA 6844 Contact Adrian Hamill	**NO OBJECTION – COMMENTS PROVIDED** The proponent's application should include an assessment of the level of bush fire hazard to support their applications and if the level of bush fire hazard is moderate or extreme or the bush fire attack level is between BAL-12.5 and BAL-FZ, the proponent should complete and submit the checklist contained in Appendix 4 of *Planning for Bush Fire Protection Guidelines* (edition 2) before the DFES can consider the application further.	The City is satisfied that the procedures set out in the *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* and *Guidelines for Planning in Bushfire Prone Areas* will ensure that development within the Structure Plan area will meet required construction standards for the BAL rating in this area. Submission of a Bushfire Management Plan in accordance with

	A/District Officer Cockburn Sound		State Planning Policy 3.7 – Planning in Bushfire Prone Areas and associated guidelines is to be endorsed by the City of Kwinana. Any modifications to the Structure Plan that arise from the recommendations of the Bushfire Management Plan are to be made and resubmitted to the City for assessment.
	Department of Parks and Wildlife (DPaW) Locked Bag 104 BENTLEY DELIVERY CENTRE WA 6983 Contact Lyndon Mutter	**NO OBJECTION – COMMENTS PROVIDED** a) DPaW expects the City of Kwinana and the DoW to assess the adequacy of the LWMS and UWMS. b) A Wetland Management Plan should be prepared as a condition of subdivision. The Wetland Management Plan should address revegetation in the buffer consistent with DPaW's guidelines for the preparation of wetland management plans. Appropriate setbacks and all bushfire protection requirements should be provided within the development land and not place reliance or impositions on the management of the wetland or wetland buffer, nor place limitations on revegetation within the buffer required to protect the wetland core and manage surface water flow through the buffer.	The City recommends that the Western Australian Planning Commission be requested to impose a subdivision condition requiring that a wetland management plan be prepared to the City's satisfaction as part of the subdivision application process.
	Department of Transport (DoT) Level 8, 140 Williams Street PERTH WA 6000 Contact Nabil Rahman	The DoT advised that it has no comment to make on the structure plan	Noted
	Mark Smith Bollard WA Pty Ltd PO Box 479 SOUTH PERTH WA 6951	**CONCERNS RAISED IN RELATION TO THE STRUCTURE PLAN** a) Concerned that there is only one road connection between Lot 501, Tamblyn Place and Betram Road and/or Lot 502. b) There should be an additional road access between Lot 501 and Lot 502 and/or Betram Road. c) The proposed lots on Lot 500 and 501 will only have once point access/egress. This may be dangerous in the event of fire in Bollard Bulrush Swamp.	The City recommends that the subdivision concept plan be modified to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.
	MH & JP van Asselt 202 Bertram Road WELLARD WA 6170	**CONCERNS RAISED IN RELATION TO THE STRUCTURE PLAN** a) Concerned that there is only one road connection between Lot 501, Tamblyn Place and Betram Road and/or Lot 502. b) There should be an additional road access between Lot 501 and Lot 502 and/or Betram Road	The City recommends that the subdivision concept plan be modified to provide an additional road connection between Lot 502 and 501, so that there are two roads connecting these lots.

Attachment F

7.0 INDICATIVE STRUCTURE PLAN

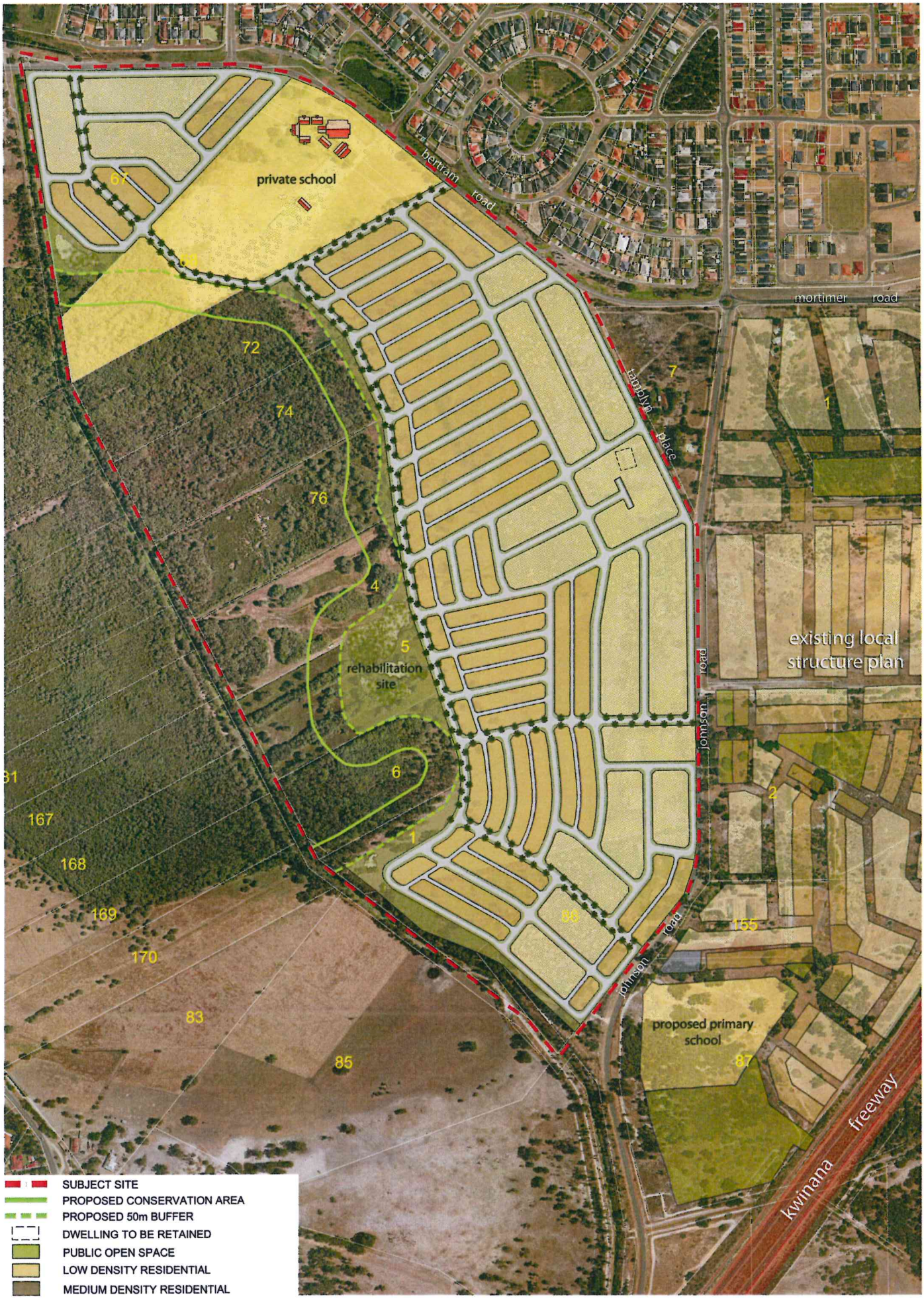


FIGURE 10: INDICATIVE STRUCTURE PLAN

Attachment G

CONCEPT STRUCTURE PLAN

WELLARD

1. Movement network and key intersections to reflect existing and proposed development.
2. Bollard Bulrush CCW and associated buffer as defined through EPA environmental assessment process.
3. Road reserves provided in key location to allow for storage, treatment and conveyance of stormwater.
4. Multi-purpose open space 'nodes', providing both active and passive recreation opportunities.
5. Minimum 30m bush fire separate zone from edge of wetland buffer vegetation to dwelling frontage.
6. Public open space link to retain key stands of vegetation on site.
7. Residential density within proximity to the proposed Emerald Park Neighbourhood Centre.

LEGEND

- Public Open Space
- Wetlands
- Wetlands Buffer

CONCEPT RESIDENTIAL DENSITIES

- R25
- R30
- R40
- R60

ROWEGROUP
PLANNING DESIGN DELIVERY

LM366_CON07C_20140804_Wellard (Concept Plan A2)

Attachment H

LOCAL STRUCTURE PLAN

Lot 502 Tamblyn Place, Wellard

Prepared by Development Works for Ascari Developments Pty Ltd

25 September 2015

developmentworks

DOCUMENT CONTROL

Prepared by Development Works Pty Ltd
PO Box 6846 East Perth WA 6892
Phone: 0412 955 505

Revision	Author	Reviewer	Date
1	FF	FF	25.9.2015

ENDORSEMENT

This Structure Plan is prepared under the provisions of the **City of Kwinana Town Planning Scheme No. 2.**

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

TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Amendment Type	Date Approved by WAPC

EXECUTIVE SUMMARY

The preparation of this Local Structure Plan has been undertaken to fulfill the statutory obligations of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the *City of Kwinana Town Planning Scheme No. 2* for the subdivision and development of Lot 502 Tamblyn Place, Wellard (subject land).

The subject land is located within the City of Kwinana and situated within the suburb of Wellard. The land is a total of 10.7428ha in area, with approximately 4.4378ha zoned Urban under the Metropolitan Region Scheme. The balance of the land is zoned Rural. The land is predominantly cleared over the Urban zoned portion, with the majority of the Rural zoned portion forming part of the Bollard Bulrush Swamp wetland system.

The Local Structure Plan has been prepared for the Urban zoned portion of the land only to accommodate subdivision and development for residential purposes, including supporting areas of public open space and drainage.

The Local Structure Plan is consistent with the established strategic planning framework including the Western Australian Planning Commission's recently released *South Metropolitan Peel Sub-regional Planning Framework*; *Jandakot District Structure Plan*; and *City of Kwinana Eastern Residential Intensification Concept District Structure Plan*.

Local Structure Plan particulars:

Item	Data	Section number
Total area covered by the Structure Plan	4.4378 hectares	1.2 CTs – Appendix A
Area of each Land Use Zone • Residential Reserves • Road and Drainage • Public Open Space	 2.5237 hectares | 65 lots 0.9158 hectares 1.0418 hectares	3.3
Estimated Lot and Dwelling Yield	65-70 lots / dwellings	3.1 Subdivision Plan Concept – Figure 4
Estimated Residential Density (based on 65 lots) • Dwellings per gross hectare (as per Directions 2031) • Dwellings per site hectare (residential zoned land) (as per Liveable Neighbourhoods and Perth and Peel@3.5million)	 14.6 dwellings per gross hectare (includes wetland buffer) 38.8 dwellings per site hectare	3.3
Estimated Population	182 people @ 2.8 people/household	3.3
Estimated area and percentage of Public Open Space to be ceded: • Local Parks	 0.3031 hectares or 10.0% Creditable POS	3.3 POS Calculation Table / Figure 5

Item	Data	Section number
• Other Parks (wetland buffer)	0.7387 hectares or 16.54% (0.0755 hectares credited)	
Estimated percentage of natural area	1.0418 hectares or (23.47%)	3.3

Table of Contents

PART ONE – IMPLEMENTATION

STRUCTURE PLAN CONTENT

This Structure Plan comprises the following:

Part One – Implementation
This section is the implementation component of the Structure Plan which contains the Structure Plan Map and outlines the intent of the Structure Plan.

Part Two – Explanatory Section
This section is the explanatory component of the Structure Plan that contains the background and explanation of the Structure Plan, including design methodology, relevance and compliance with the planning framework at the State and local levels.

Appendices
Includes all specialist consultant reports and documentation used in the preparation of, and to support, the land use outcomes of the Structure Plan.

STRUCTURE PLAN AREA

The Structure Plan shall apply to the Urban zoned portion of Lot 502 Tamblyn Place, Wellard; being the land contained within the inner edge of the line denoting the Structure Plan boundary on the Structure Plan Map.

The Structure Plan is identified as the Lot 502 Tamblyn Place Wellard Local Structure Plan (LSP).

OPERATION

The LSP commences operation on the date it is adopted by the Western Australian Planning Commission (WAPC).

SUBDIVISION AND DEVELOPMENT REQUIREMENTS

Decisions relating to the future subdivision and development of the land within the Structure Plan area shall have due regard to the detail contained within the LSP including the technical appendices.

The approved LSP will be normalised into the *City of Kwinana Town Planning Scheme No. 2* as part of a future Scheme Amendment.

Land use zones and reserves

The LSP consists of the following zones and reserves:

Zones	Applicable Density Codes	Reserves	Percentage
Residential	R25 & R50	Public Open Space	Minimum 10% unrestricted land consistent with Liveable Neighbourhoods

Protection of environmental features

A 50m wetland buffer is to be provided within Public Open Space (POS) from the western edge of the Urban zone boundary as recommended by the Environmental Protection Authority as part of its

assessment of MRS Amendment No. 1188/57. The wetland buffer will provide protection to mapped geomorphic wetlands (i.e. Conservation Category and Resource Enhancement).

Staging

Subdivision is likely to occur in a single stage extending from the eastern portion of the land which is provided with existing road access from Tamblyn Place, to the western portion of the land containing POS and the wetland buffer.

The subdivision of the land is reliant upon access to a new wastewater pump station to be constructed within Lot 503 Tamblyn Place, directly south of the subject land, by the adjoining landowner.

Interface to adjoining subdivisions and structure plans

The LSP will allow for a north-south road connection along the eastern edge of the identified POS, containing the wetland buffer. This will connect with the north-south road identified on the draft Structure Plan prepared by the adjoining landowner for Lot 503. This road will provide a connection and future extension through Lot 501 to the north creating a public road interface to the wetland buffer, which will also be applicable to the adjoining lots.

The remainder of the residential subdivision area will back onto the common boundaries to the north and south. Road access will be obtained from the existing Tamblyn Place.

Density targets

Strategy / Policy Document	Density Target	Provided (based on 65 lots)
Directions 2031 and beyond	15 dwellings per gross hectare	14.6 dwellings per gross hectare (includes wetland buffer)
Perth and Peel@3.5million	26 dwellings per residential site hectare	38.8 dwellings per site hectare
Liveable Neighbourhoods	22 dwellings per site hectare	

LOCAL DEVELOPMENT PLAN

A Local Development Plan will be prepared for all lots until such time as the WAPC's recently released RMD Codes can be applied. The main issues to be addressed include:

- Dwelling orientation to Public Open Space
- Boundary setbacks
- Private open space
- Access taking into consideration drainage infrastructure

OTHER REQUIREMENTS

Developer Contributions

The following Developer Contribution Plans are applicable to the subject land:

- Development Contribution Area 1 (DCA 1) relating to traditional infrastructure (hard); and

- Development Contribution Area 12 (DCA 12) – Wellard West relating to community infrastructure (soft).

Infrastructure upgrades

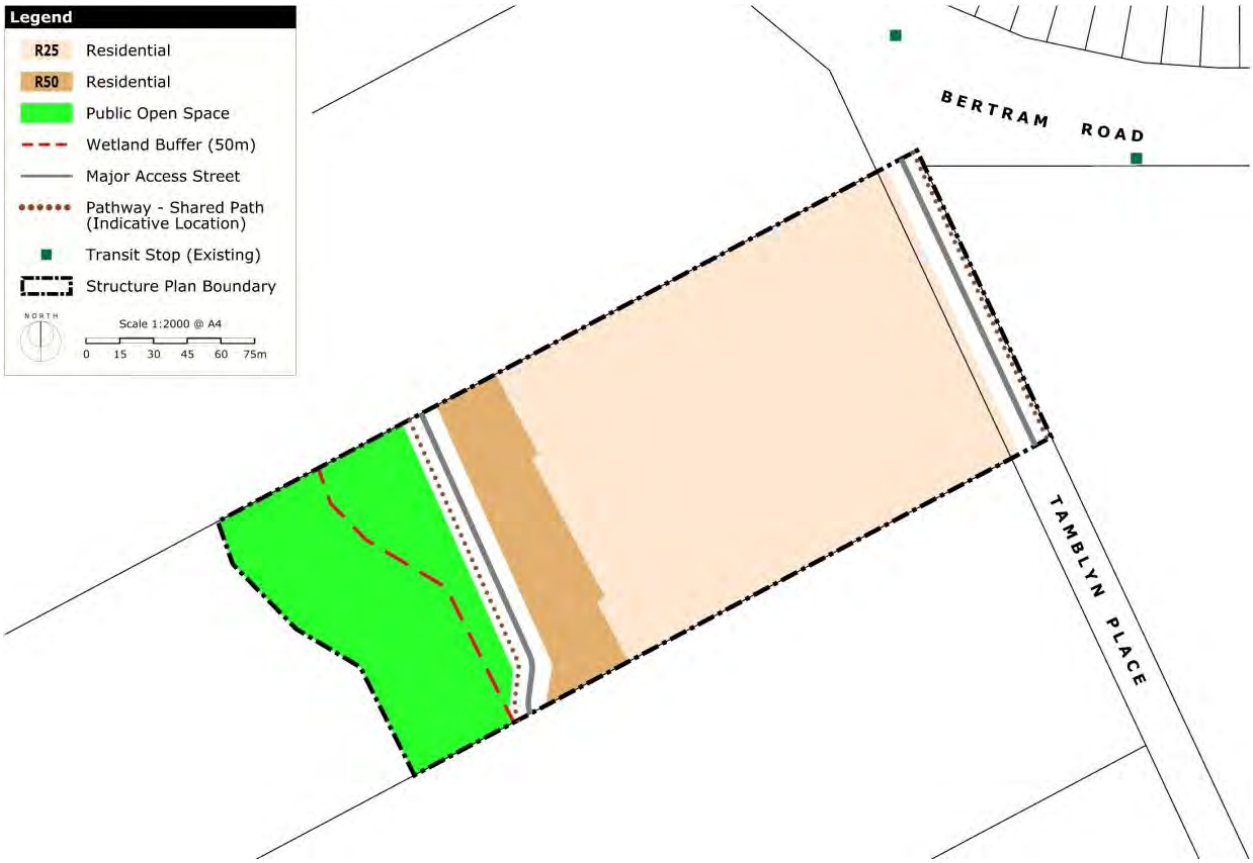
Access is required to a new wastewater pump station to be constructed within Lot 503, directly south of the subject land.

Tamblyn Place will be required to be upgraded to an urban standard (i.e. Major Access Street).

ADDITIONAL INFORMATION

Additional information to be provided as part of the approval process:

Additional information	Approval stage	Consultation required
Bushfire Management Plan	Subdivision (condition)	City of Kwinana
Acid Sulphate Soils Management Plan (if required)	Subdivision (condition)	DER
Mosquito and Midge Management Plan	Subdivision (condition)	City of Kwinana
Wetland / Landscape Management Plan	Subdivision (condition)	City of Kwinana



Local Structure Plan

PART TWO – EXPLANATORY SECTION

1 BACKGROUND

1.1 Introduction and purposes

The LSP has been prepared by Development Works on behalf of the contracted purchaser of the subject land, Ascari Developments Pty Ltd.

The LSP will cover the Urban zoned portion of the land which is located west of the wetland associated with the Bollard Bulrush Swamp, and extends to Tamblyn Place to the east.

The LSP will establish the guiding principles for the subdivision and development of the subject land for residential purposes. This will be in the form of a structure of Residential land use, Public Open Space (POS) and local roads, building on the established strategic planning framework under the WAPC's recently released South Metropolitan Peel Sub-regional Planning Framework; Jandakot District Structure Plan; and City of Kwinana Eastern Residential Intensification Concept District Structure Plan (ERIC).

The LSP addresses the requirements of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the *City of Kwinana Town Planning Scheme No. 2* (TPS 2). The LSP and associated report is prepared in accordance with the WAPC's Structure Plan Framework (August 2015).

Extensive technical reporting has been prepared over the land located west of the Peel Main Drain extending to Johnson Road in the east as part of the land's rezoning from Rural to Urban under the Metropolitan Region Scheme (MRS). This technical documentation has been used in support of the LSP and will be supplemented with a combined Local Water Management Strategy / Urban Water Management Plan (prepared by PDC) which will address drainage associated with the residential development of the land.

1.2 Land description

1.2.1 Location

The subject land is located east of the Peel Main Drain and west of Tamblyn Place in Wellard. Tamblyn Place connects with Bertram Road and Johnson Road with the former connecting into the Kwinana Freeway via the Mortimer Road intersection (Figure 1).

Surrounding the subject land is:

- Urban zoned land to the north, south and east which is similarly undeveloped and is currently being used for rural residential purposes.
- Land east of Johnson Road has been developed for residential purposes, including Emerald Park estate and smaller residential subdivisions undertaken by independent developers.
- Land west of the Peel Main Drain which is predominately associated with the Bollard Bulrush Swamp wetland system.

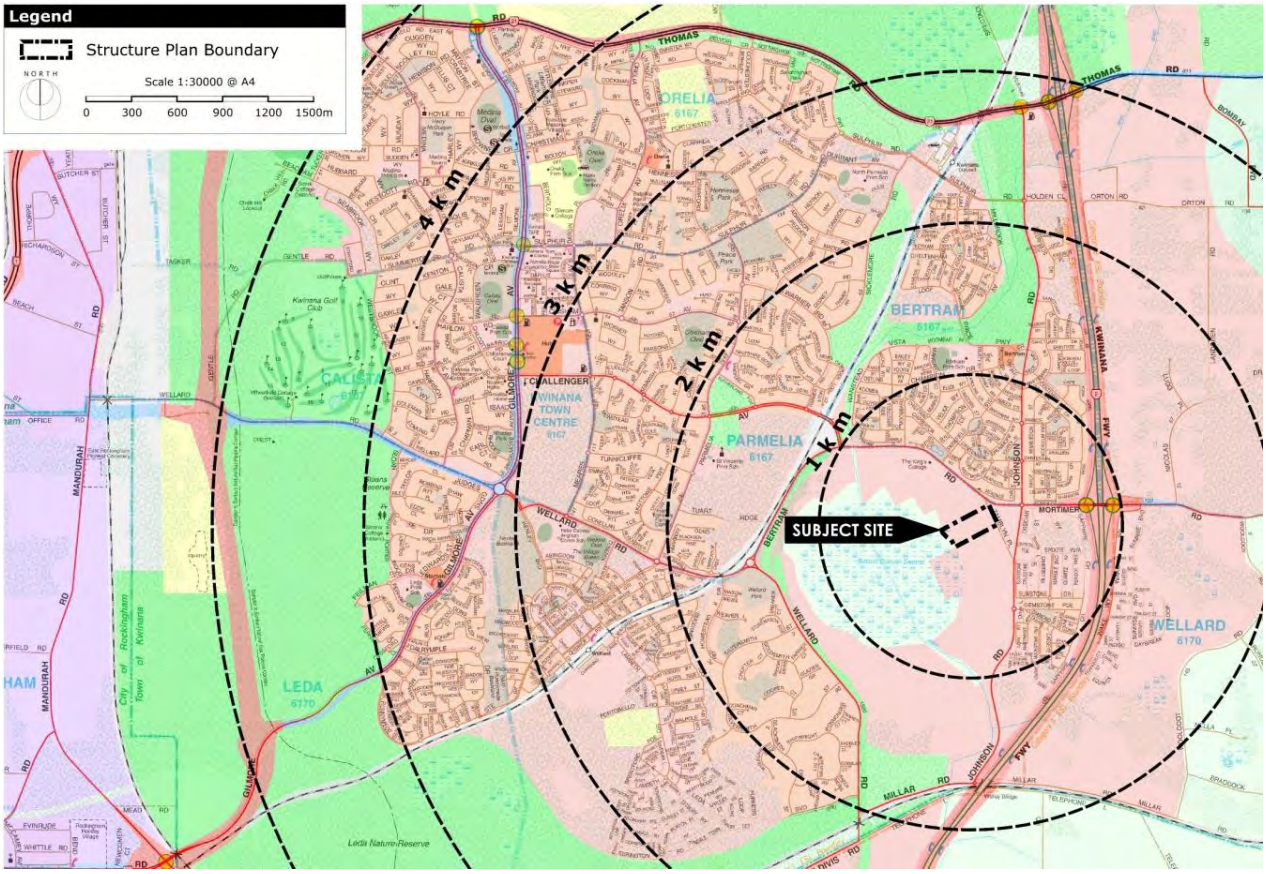


FIGURE 1: LOCATION

1.2.2 Area and land use

The subject land's overall area of 10.7428ha consists of 4.4378ha zoned Urban and 6.205ha zoned Rural. The subject land is predominantly cleared and has been grazed in the past. There is an existing dwelling located on it which is likely to be removed as part of future subdivision (Figure 2).

1.2.3 Legal description and ownership

The subject land is legally described as Lot 502 on Deposited Plan 70999, Volume 2796 Folio 131 (Appendix A).

The current registered proprietor is Maria McHenry; however, the land is under contract to purchase by Ascari Developments Pty Ltd. The sales contract provides the current landowner's consent for the preparation and lodgement of this LSP.

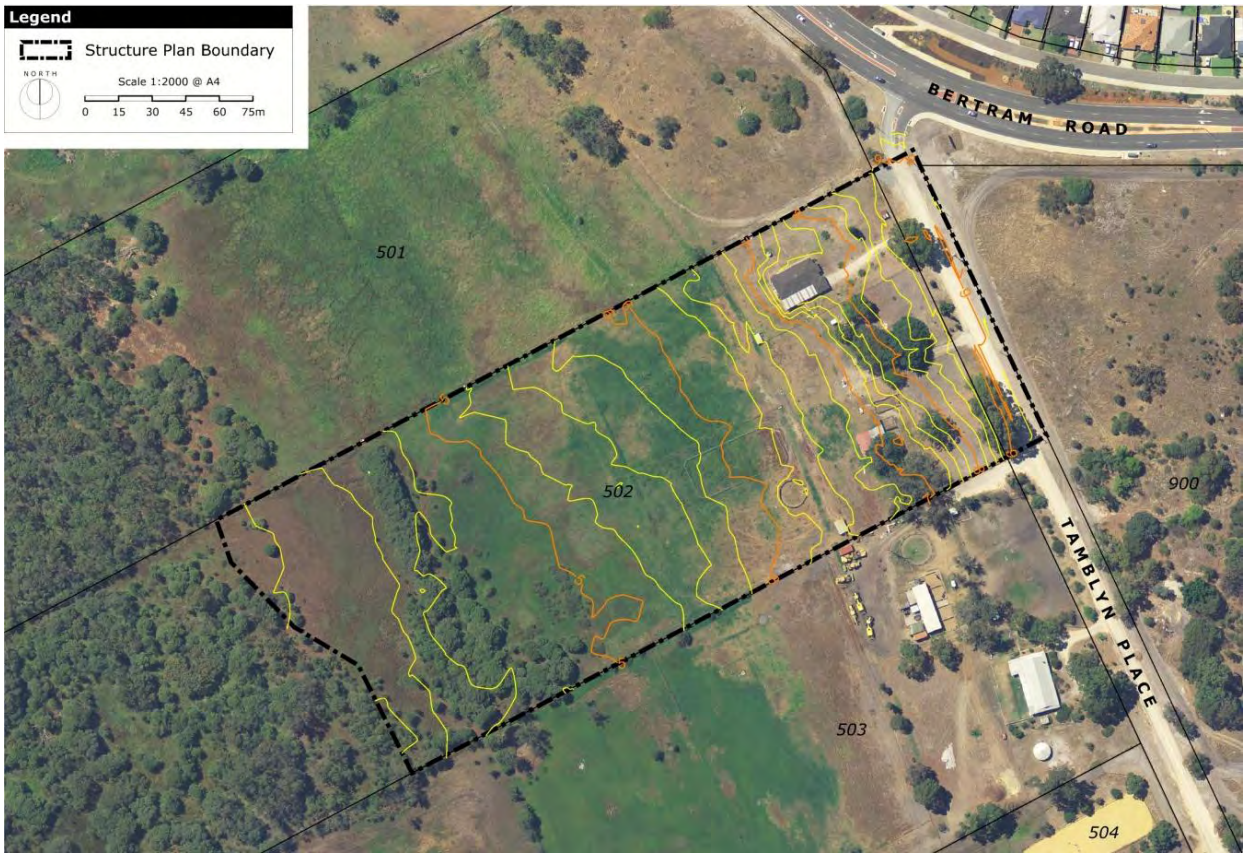


Figure 2: Subject Land

1.3 Planning framework

1.3.1 Zoning

Metropolitan Region Scheme

The subject land is zoned Urban and Rural and under the *Metropolitan Region Scheme* (MRS) (Figure 3). The delineation between the Urban and Rural zone was determined as part of MRS Amendment No 1158/57. As part of the Environmental Protection Authority's (EPA) environmental assessment, the extent of the developable area and wetland covering the western portion of the land were confirmed. The EPA's advice resulted in the WAPC determining the wetland be retained in the Rural zone with the Urban zone accommodating a 50m buffer to the wetland.

City of Kwinana Town Planning Scheme No. 2

Consistent with the MRS, the subject land is zoned Development and Rural under TPS 2.

Under TPS 2 the Development zone requires an LSP to be prepared prior to the subdivision and development of land; Clause 16.17.2.1 of TPS 2 states:

"Within the Development Zone or a Development Area, or the relevant portion of the Zone or Area, unless there is an adopted Structure Plan the Local Government is not to:

a) consider recommending subdivision; or
b) approve an application for Planning Approval."

This LSP has been prepared to fulfill the obligations under TPS 2 for the future subdivision and development of the land.

The other applicable requirements under TPS 2 relating to the future subdivision and development of the land include the subdivider meeting its obligations relating to Developer Contributions. In this regard, the subject land is included within:

- Development Contribution Area 1 (DCA 1) relating to traditional infrastructure (hard); and
- Development Contribution Area 12 (DCA 12) – Wellard West relating to community infrastructure (soft).

FIGURE 3: METROPOLITAN REGION SCHEME

Planning and Development (Local Planning Schemes) Regulations 2015

The WAPC has recently released the *Planning and Development (Local Planning Schemes) Regulations 2015* (the Regulations). The LSP will be considered by Council during a transition phase, awaiting the Regulations to come into effect on 19 October 2015. In this regard, the LSP will be considered by the WAPC and Council under the provisions of Schedule 2 Part 4 of the Regulations. The content of the LSP has been prepared in accordance with the Regulations, with its further consideration and approval to follow the deemed provisions under the Regulations.

1.3.2 Regional and sub-regional structure plans

Directions 2031 and Beyond

Directions 2031 and Beyond: Metropolitan Planning Beyond the Horizon provides the high level spatial strategic planning framework for the development and growth of the metropolitan Perth and Peel regions. Its primary purpose is to provide a framework which guides further planning and then the delivery of housing, infrastructure and services, necessary to accommodate a range of growth scenarios.

The subject land is contained within the south-west sub-region of Directions 2031 which has experienced considerable economic and population growth driven by its coastal locations. Directions 2031 suggests:

"Under the connected city scenario it is estimated that by 2031 the population of the south-west sub-region will have grown by 34 per cent to 278,000. The sub-region currently enjoys a relatively strong employment self-sufficiency rate of 60 per cent; however, with the intensification of Rockingham and progressive development of the Latitude 32 industrial area, Directions 2031 expects the sub-region to increase its employment self-sufficiency rate to 70 per cent, which will require 41,000 new jobs by 2031."

Perth and Peel@3.5 Million and South Metropolitan Peel Sub-regional Planning Framework

The Department of Planning recently released *Perth and Peel@3.5 Million* to engage the community on the expectations of what Perth should look like in the future and how the population's valued lifestyle can be maintained through the substantially increasing population. In addition to the primary document four draft sub-regional planning frameworks for the Perth and Peel metropolitan regions were released. These will be converted to Sub-regional Structure Plans as part of the approval process to guide the development of the regions into the future.

The subject land is contained within the *South Metropolitan Peel Sub-regional Planning Framework* with the eastern portion of the land identified as "*Urban*"; reflecting the Urban zone under the MRS. The Rural zoned portion of the land is identified as "*proposed open space – nature / passive recreation*".

1.3.3 Planning Strategies and Structure Plans

City of Kwinana Local Planning Strategy

The City of Kwinana's *Local Planning Strategy 2015* identifies the subject land as "*Future Residential Areas*". We understand the City of Kwinana is currently reviewing the Planning Strategy.

Jandakot Structure Plan

The *Jandakot Structure Plan* was adopted in 2007 and was prepared as a broad planning framework at the regional level. The Structure Plan addresses future land use and infrastructure planning and development expectations, while balancing environmental issues.

The Urban zoned portion of the land is identified under the Structure Plan as "*short-term urban*". Given the wetland considerations pertinent to the land and its surrounds, the Structure Plan also indicates "*further investigations to determine specific areas that may be available for future urban land uses*."

Significant investigative work was undertaken as part of locality's rezoning under the MRS which included environmental assessment by the EPA, culminating in a defined area agreed to as suitable for residential development.

City of Kwinana Eastern Residential Intensification Concept Plan

ERIC was prepared by the City of Kwinana as an additional level of strategic planning detail building on the recommendations of the Jandakot Structure Plan. ERIC identifies the subject land as part of a larger area subject to the Bollard Bulrush Swamp wetland system, identified specifically as *"Future urbanisation may be considered following full technical environmental review of impacts of urbanisation on wetland area (to be undertaken by landowner/developer in consultation with*

DoE).” As mentioned above, environmental review and assessment was undertaken as part of the locality's rezoning under the MRS.

Local Structure Plans

The subject land forms part of a larger area located west of Johnson Road which requires local structure planning. Contact has been made with representatives of the adjoining landowner who is undertaking the development of the land directly south of the subject land. They have advised that a Local Structure Plan has recently been submitted to the City of Kwinana for consideration. The subject LSP has been prepared to fit seamlessly with the Local Structure Plan to the south providing a north-south road connection along the eastern edge of the wetland buffer.

Contact has also been made with the landowners of Lots 500 and 501 to the north of the subject land, with an offer presented for a joint LSP to be prepared. However, this offer was declined and it is understood the adjoining landowners will prepare a separate LSP in the future. The land to the north will be able to connect with the subject land with the north-south road along the eastern edge of the wetland buffer.

1.3.4 Planning policies

State Planning Policy 2.1 – Peel-Harvey Coastal Plan Catchment

As a result of land use change from Rural to Residential over the subject land as will be accommodated under the LSP, the requirements of *State Planning Policy 2.1 – Peel-Harvey Coastal Plain Catchment* apply.

The objectives of this policy are to:

- Improve the social, economic, ecological, aesthetic, and recreational potential of the Peel-Harvey coastal plain catchment.
- Ensure that changes to land use within the catchment to the Peel-Harvey estuarine system are controlled so as to avoid and minimise environmental damage.
- Balance environmental protection with the economic viability of the primary sector.
- Increase high water-using vegetation cover within the Peel-Harvey coastal plain catchment.
- Reflect the environmental objectives in the draft Environmental Protection Policy (Peel-Harvey Estuarine System) 1992.
- Prevent land uses likely to result in excessive nutrient export into the drainage system.

Through the design of the LSP and the supporting drainage management, the objectives and requirements of State Planning Policy 2.1 are addressed.

State Planning Policy 3.7 – Planning for Bushfire Risk Management

Draft State Planning Policy 3.7 – Planning for Bushfire Risk Management has been prepared to assist in reducing the risk of bushfire to people, property and infrastructure by encouraging a conservative approach to strategic planning, subdivision, development and other planning decisions proposed in bushfire-prone areas. Specifically, the State Planning Policy:

- addresses land use planning elements of the Keelty report;
- elevates bushfire issues to be addressed by the highest level of planning policy available, giving it clear status and effect in the land use planning policy framework;
- emphasises the need to consider bushfire management measures in strategic level policy documents, including regional and local planning schemes, sub-regional and local planning strategies and structure plans, as well as during statutory planning processes for subdivision and development applications; and
- seeks to achieve the consistent implementation of bushfire management measures across the community.

State Planning Policy 3.7 will be addressed through the LSP design and implemented through the Bushfire Hazard Assessment, which has been prepared and forms part of this report, and the Bushfire Management Plan which will be prepared at the subdivision stage.

Liveable Neighbourhoods

Liveable Neighbourhoods has been adopted by the WAPC as operational policy, and is to be followed in the design and approval of urban development. Liveable Neighbourhoods applies to structure planning and subdivision for greenfield sites and for the redevelopment of large brownfield and urban infill sites. The requirements of Liveable Neighbourhoods have been applied in the preparation of the LSP through the design of the road network, location of public open space and application of residential densities.

2 SITE CONDITIONS AND CONSTRAINTS

Extensive environmental analysis and review has been undertaken as part of the locality's rezoning under the MRS which has included:

- Environmental Report prepared to support the land's rezoning under MRS Amendment 1188/57 (Appendix B).
- Environmental Assessment by the EPA as part of the rezoning process under MRS Amendment 1188/57 (Appendix C).
- Determination of the extent of Urban development area appropriate under MRS Amendment 1188/57, which included defining the extent of the wetland.
- District Water Management Strategy prepared as part of the lifting of Urban Deferred zone for the land rezoned under MRS Amendment 1188/57.

The EPA's assessment of the MRS Amendment clearly defined a developable area through analysis of the environmental conditions of the Bollard Bulrush Swamp and the surrounding land. The EPA's recommendation to the Minister for Environment was:

1. That the Minister notes that the scheme amendment being assessed proposes to rezone the site from 'Rural' to 'Urban Deferred' under the Metropolitan Region Scheme.

2. That the Minister considers the report on the key environmental factor and principles as set out in Section 3.

3. That the Minister notes that the EPA has concluded that Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East can meet the EPA's environmental objective for Inland Waters Environmental Quality.

4. That the Minister notes that the EPA has not included in this report "conditions and procedures to which Metropolitan Region Scheme Amendment 1188/57 should be subject, if implemented", because the EPA holds the view that the amendment as proposed can meet the EPA's environmental objective.

5. That the Minister notes the EPA's other advice presented in Section 4 in relation to a future Metropolitan Region Scheme amendment to reserve the wetland area, the rehabilitation of the Resource Enhancement Wetland area, and Acid Sulfate Soils.

Of particular relevance, it was clearly identified that a 50m buffer from the wetland boundary, within the Urban zone, would be sufficient to protect the Conservation Category Wetland function and the wetland habitat.

The existing environmental reporting and determinations described above have been applied in the preparation of the LSP. The existing site conditions and constraints summarized below are referenced from the Environmental Report prepared by ENV as part of the Environmental Review for MRS Amendment 1188/57 (Appendix B) and the combined LWMS/UWMP prepared by PDC (Appendix D).

2.1 Biodiversity and natural area assets

2.1.1 Flora and vegetation

ENV's Environmental Report identifies the western extent of the Urban zoned portion of the land, extending into the wetland, as containing "*Scattered Melaleuca rhaphiophylla*"; with the majority of the wetland area consisting of "*Low Woodland Melaleuca rhaphiophylla, Eucalyptus rudis subsp. Rudis *Rubus anglocandicans,*Zantedeschia aethiopica,*Paspalum dilatatum,*Holcus lanatus, Centella asiatica, *Rumex crispus and Baumea articulate*".

The Urban zoned portion of the land has been mapped by ENV as "*Completely Degraded*" with the majority of the wetland identified as "*Good to Degraded*".

ENV found no Threatened or Priority species, nor Threatened or Priority Ecological Communities within the Urban zoned portion of the land.

2.1.2 Fauna

The only habitat contained on the subject land is "*Melaleuca Dampland*" which covers the majority of the wetland outside of the Urban zoned portion of the land. ENV suggest that the "Melaleuca Dampland" is degraded with limited midstorey and understorey and a high level of weed infestation. The remainder of the land is considered of low value given its cleared nature and previous use for grazing.

ENV undertook a search of State and Federal databases for the area which resulted in 28 conservation significant fauna species identified as potentially occurring.

Based on the ecological requirements, known distributions and the type and quality of fauna habitats, only two species listed were considered as "*Likely"* to occur within the subject land. These being bird species, including the Cattle Egret and Eastern Great Egret. These two bird species are unlikely to be impacted by future development as they are highly mobile and can easily move to other areas.

The Southern Brown Bandicoot was recorded on site, and there is a long historical presence of the species on the Swan Coastal Plain. The subject land is not considered to be capable of supporting a large population due to the lack of native understorey species and the inundation of low lying areas during rain events.

2.1.3 Wetlands

The subject land is contained within the Department of Parks and Wildlife geomorphic wetland system with the western portion categorised as a Conservation Category Wetland, corresponding with the Rural zoned portion of the land, and the eastern portion categorised as a Multiple Use Wetland, corresponding with the Urban zoned portion of the land. During the Environmental Assessment associated with MRS Amendment 1188/57 the wetland was reviewed resulting in reclassification from Resource Enhancement to Conservation Category.

As part of the environmental review a clearly defined boundary was set defining a developable area. The Conservation Category Wetland was to be retained in the Rural zone for protection with a 50m buffer. The resulting developable portion of the land was zoned Urban. The LSP adheres to the recommendations of the EPA.

2.2 Landform and soils

2.2.1 Topography, soils and geology

The land declines from Tamblyn Place in the east to the wetland area in the west. Tamblyn Place is approximately 9m AHD with the western portion of the land, near the wetland at approximately 4.2m AHD (Figure 1).

A geotechnical investigation has been undertaken by CMW Geosciences to review ground conditions and provide recommendations relating to a ground remediation strategy to achieve a Class A footing for future residential development. The geotechnical investigation is attached to the combined LWMS/UWMP document (Appendix D).

The eastern portion of the land is characterised by poorly developed sandy topsoils layer typically 0.2m thick, overlaying medium dense Bassendean sand interbedded with silt, sand and clay alluvium of the Guildford Formation (below 8m from existing ground level). Over the western portion of the land (below 6.5m AHD) the topsoil layer is dominated by clayey/peat to 0.5m thick. The Upper Bassendean sand across the land is loose to medium dense with relative density increasing with depth.

The majority of the land is mapped as a "*high risk area for ASS occurring within 3m of the natural surface*" by *The Perth Metropolitan Acid Sulphate Soils Map* (Department of Environmental Regulation).

2.3 Groundwater and surface water

The subject land's hydrology is influenced by its proximity to the Peel Main Drain, the low permeability topsoil and the gently inclined topography. The low permeability of the clayey / peaty topsoil results in low infiltration and high volumes of runoff in the form of sheet flow travelling towards the wetland.

Groundwater contours based on local and regional data over the Urban zoned portion of the land range from 4-5m+. There is a substantial set of existing data available for the subject land and surrounding area relating to groundwater levels with additional monitoring being undertaken specifically for the subject land by Ascari Development Pty Ltd. Sufficient clearance to groundwater will be provided as part of the development, with the finished lot levels based on providing suitable separation (0.5m) to the 100 year flood level of the Peel Main Drain (5.6m).

2.4 Bushfire hazard considerations

As part of the Urban Deferred lifting for the locality a Bushfire Hazard Assessment (BHA) was prepared by Fire Plan WA (Appendix E). The BHA was considered and approved by the Department of Fire and Emergency Services and the City of Kwinana in support of the locality's rezoning to Urban.

The BHA suggests that with the fire strategies recommended incorporated into the LSP a Fire Management Plan can be prepared that will be compliant with the current "*Planning for Bush Fire Protection*" guidelines, SPP 3.7 and "*Planning for Bushfire Risk Management Guidelines and Appendices*". The Bushfire Management Plan will be prepared at the subdivision stage with its requirement enforced as a likely condition of subdivision approval.

2.5 Aboriginal and European Heritage

A search of the Department of Aboriginal Affairs Aboriginal Inquiry System was undertaken on 24 September 2015 and no matches were recorded.

A search of the Heritage Council's inHerit database was undertaken with one match recorded for Bollard Bulrush Swamp. Given a defined developable area with a 50m buffer to the wetland was set through MRS Amendment 1188/57, this matter has been addressed.

3 LAND USE AND SUBDIVISION REQUIREMENTS

3.1 Local Structure Plan

The LSP has been prepared over the Urban and Development zoned portions of the land under the relevant Planning Schemes. As agreed with the City of Kwinana's town planning officers, the LSP will cover the subject land only. This approach is on the basis of fitting seamlessly with the Structure Plan prepared over the adjoining land to the south; and providing suitable connections to the land to the north, which a separate Structure Plan will be prepared over prior to subdivision and development.

3.1.1 Design response to site constraints

The main constraints and factors influencing the future subdivision of the land include:

- the location of the wetland and associated buffer over the western portion of the land;
- the land's topography and the resultant drainage strategy incorporating the treatment of stormwater in an east to west direction;
- the location of Tamblyn Place; and
- the north-south road connection from the abutting land to the south.

The LSP and accompanying Subdivision Concept Plan as will be detailed in section 3.1.2, respond to the site constraints by:

- incorporating a 50m buffer to the wetland into POS;
- an east to west road layout which will accommodate the treatment of stormwater, which will then overflow into POS and the wetland area;
- local road network connecting to Tamblyn Place; and
- north-south road connecting with the LSP layout for the land to the south whilst providing an opportunity for connection to the north. This road will also provide a public interface to the POS and wetland buffer continuing the approach required by Council surrounding the Bollard Bulrush Swamp wetland system.

3.1.2 Subdivision Concept Plan

A Subdivision Concept Plan (Figure 4) has been prepared to depict an indicative subdivision layout in support of the LSP, encompassing a hypothetically compliant subdivision. The Subdivision Concept Plan depicts:

- a grid road layout based on a predominately east to west configuration;
- 64 freehold lots;
- predominately north and south facing lots;
- major access street (17m wide) along the western edge of the subdivision area providing a continuous north-south link along the wetland buffer's edge;
- access streets of 15m wide;
- a lot typology which will accommodate a range of lot types all with access from the primary street, whilst providing opportunities for future refinement as part of the subdivision stage, if necessary. The lot typology, includes:
    - 12.5m x 25m
    - 15m x 25m
    - 12.5m x 30m
    - 15m x 30m
- a single, consolidated open space area comprising a 50m buffer to the adjoining wetland area and unrestricted open space area which will accommodate passive recreation uses.

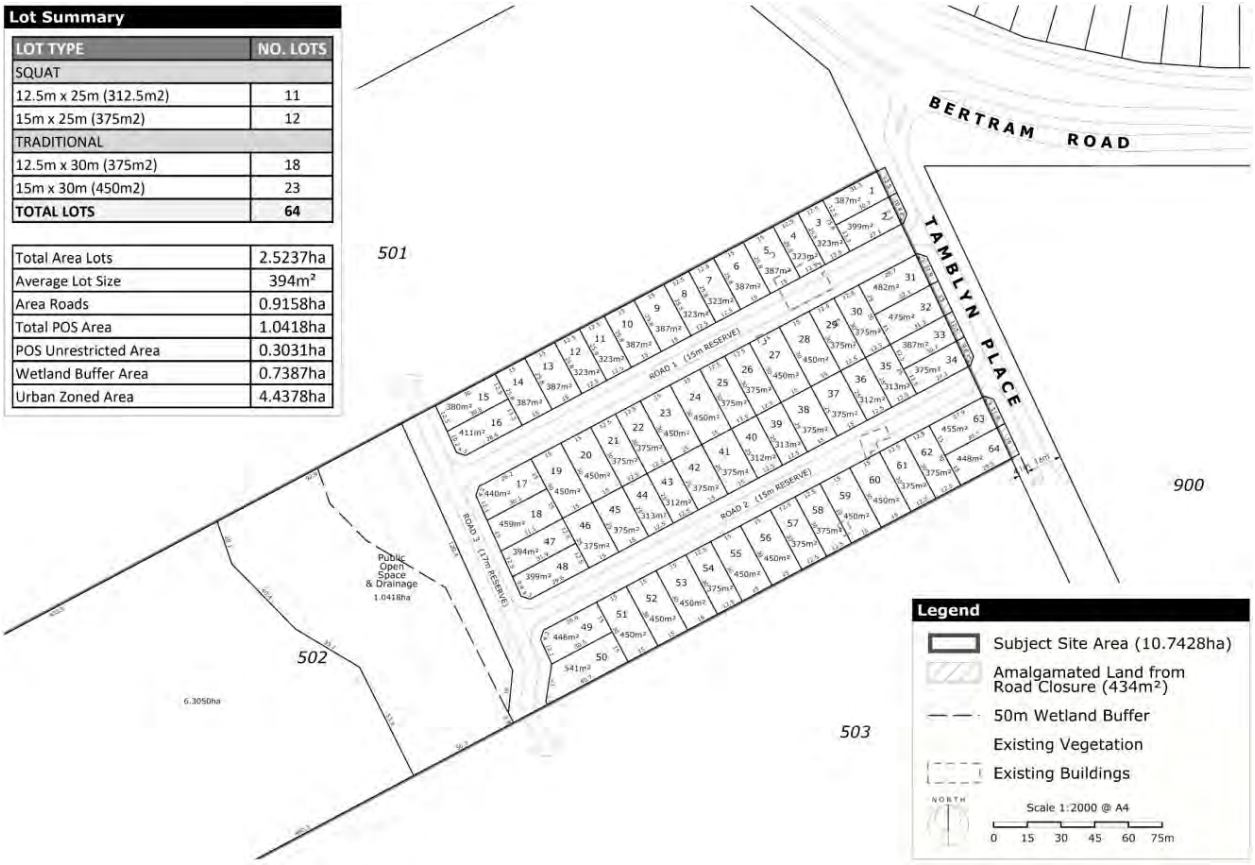


FIGURE 4: SUBDIVISION CONCEPT PLAN

3.2 Land Use

This LSP provides an extension of the Structure Plan prepared over the land to the south, which, with the land to the north, forms a residential urban cell located between Johnson Road, Bertram Road and the Bollard Bulrush Swamp wetland system. The land use structure is based on residential with a supporting open space network accommodating protection of the sensitive natural environment. The land use composition on the LSP consists of:

Land use	Area (ha)
Residential	2.5237
Public Open Space	1.0418
Road and Drainage	0.9158

3.2.1 Residential

The Residential zone will form the basis of the subdivision area and will include the R25 and R50 density codes to control future subdivision and built form. The R25 density code will be the predominate density code accommodating the lot typology as detailed on the Subdivision Concept Plan. The R50 density code has been applied for the first row of lots opposite the POS to take advantage of the amenity afforded to these lots. The R50 density code will allow for further subdivision and development of the applicable lots should subdivision be undertaken in accordance with the Subdivision Concept Plan. This will add further variety to the lot typology and potentially add to greater affordable housing opportunities.

As detailed under Part One, the density targets specified for new residential areas under key strategic documents such as Directions 2031 and Beyond; South Metropolitan Peel Sub-regional Structure Plan, under Perth and Peel@3.5million; and Liveable Neighbourhoods are addressed as follows:

Strategy	Density Target	Provided (based on 65 lots)
Directions 2031 and beyond	15 dwellings per gross hectare	14.6 dwellings per gross hectare (includes wetland buffer)
Perth and Peel@3.5million	26 dwellings per residential site hectare	38.8 dwellings per site hectare
Liveable Neighbourhoods	22 dwellings per site hectare	

A potential population of approximately 182 persons could be accommodated within the subdivision based on 2.8 people per household (65).

3.2.2 Public Open Space

The location of POS on the LSP has been determined by the location of the wetland and the need to accommodate a 50m buffer to this wetland in accordance with the EPA's recommendation as part of the assessment of MRS Amendment No. 1188/57. The wetland buffer will logically form part of the open space network surrounding the Bollard Bulrush Swamp through a local reserve managed and maintained by the City of Kwinana. For efficiencies and to accommodate a greater open space area, unrestricted open space has been located adjacent the wetland buffer, providing a consolidated POS area. POS in this location will also ensure additional fill is not required and will compliment the drainage strategy.

In accordance with the requirements of Liveable Neighbourhoods a POS calculation has been prepared which coincides with the areas depicted on the POS plan (Figure 5). As detailed in the table below, there is a small surplus of 11m^2 of land provided for POS. Further refinement of the open space network will be undertaken at the subdivision stage.

A Landscape management strategy will be prepared at the subdivision stage to guide the development of the open space areas, noting the minimum requirements of Liveable Neighbourhoods. It should also be noted that any re-vegetation works undertaken will be in accordance with AS3959-2009 relating to low threat vegetation so as to not create a further fire hazard.

Subject land	10.7428	
Gross Site Area		**10.7428**
Deductions		
Wetland / Rual zoned area determined by MRS 1188/57	6.3050	
Drainage Reserves - N/A as contained within road reserves		
Surplus Restricted Public Open Space	0.6630	
Total	**6.9680**	
Gross Subdivisible Area		**3.7748**
10% Required Public Open Space		**0.3775**
PUBLIC OPEN SPACE COMPOSITION		
Unrestricted (minimum 80% of total)	0.3020	
Restricted (maximum 20% of total)	0.0755	
Total		**0.3775**
PUBLIC OPEN SPACE PROVISION		
Unrestricted Public Open Space		
Formalised Public Open Space provided	0.3031	
Total		**0.3031**
Restricted Public Open Space		
Wetland Buffer	0.7387	
Total		**0.7387**
Total Credited Restricted Public Open Space		**0.0755**
Total Credited Public Open Space Provided		**0.3786**
Percentage of Public Open Space Provided		**10%**

Figure 5: Public Open Space

3.3 Movement Network

3.3.1 Road Network

The subject land is influenced by Tamblyn Place which connects to the existing district road network including Bertram Road (District Distributor B) and Johnson Road (Local Distributor). Whilst we understand a slight modification to the southern end of Tamblyn Place will occur as depicted on the adjoining landowner's LSP, this will not impact the traffic environment to the subject land as access will be taken from the northern section of Tamblyn Place where it intersects with Bertram Road.

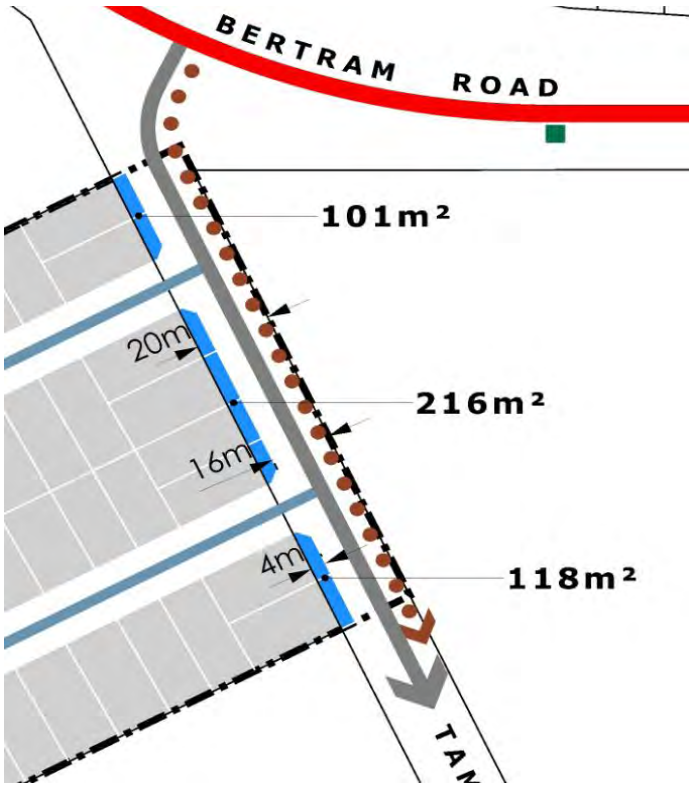
A localised network of streets will be applied to the future subdivision of the land with a Major Access Street (17m wide) depicted on the LSP along the edge of the wetland buffer / open space area, that will surround the Bollard Bulrush Wetland (Figure 6). Details relating to the cross section of this road are contained within the LWMS / UWMP. This road will form a public interface to the open space network and will join seamlessly with future subdivision to the north and south. This road will run parallel with Tamblyn Place, which is likely to form a similar Major Access Street function.

It is likely two access streets (15m wide) will connect the new Major Access Street and Tamblyn Place forming an efficient localised road network without impacting the subdivision of the adjoining land.

FIGURE 6: MOVEMENT NETWORK

3.3.2 Tamblyn Place Road Closure

Through discussions with the adjoining landowner and City of Kwinana, a reduction in the width of Tamblyn Place is being applied as the existing 20m wide road reserve is surplus to the infrastructure needs under the road hierarchy. Consequently, a 4m wide closure along the western side of Tamblyn Place will be undertaken to match that applied by the adjoining landowner along its Lot 503. A request to close the relevant portion of Tamblyn Place as detailed in Figure 6 will be lodged with Council in due course, to run concurrently with the LSP.



3.3.3 Path Network

A shared path is depicted along the new Major Access Street which will connect with the shard path to be provided within Lot 503. This path will then continue into the future development of Lot 501 to the north. We understand a shared path will be provided on the eastern side of Tamblyn Place to be constructed by the landowner as part of the subdivision of Lot 900.

Links to the shared path network which extend along Bertram and Johnson Roads will be provided by footpaths along the new access streets, constructed as part of the subdivision of the subject land.

3.3.4 Public Transport

There are two bus stops located 50-150m from the subject land on Bertram Road. One of these stops also provides a direct link to the Kwinana Train Station. Consequently, the subject land is well served by the public transport system which residents will be able to utilise via the path network.

3.4 Water Management

As a result of the localised nature of the subdivision of the subject land it was agreed with the Department of Water and City of Kwinana that a combined Local Water Management Strategy (LWMS) and Urban Water Management Plan (UWMP) be prepared (Appendix D). The drainage strategy provides management techniques to address the following:

- compliance with the design objectives in the DWMS;
- detailed stormwater management design including the size, location and design of public open space area, integrating flood management capability;
- specific structural and non-structural best management practices and treatment trains;
- management of groundwater levels;
- management of groundwater contamination and other specific site conditions;
- protection of waterways, wetlands (and associated buffers), remnant vegetation and ecological linkages;
- measures to achieve water conservation and efficiencies of use;

- management of subdivision works (to ensure no impact on conservation areas and management of dust);
- management of disease vector and nuisance insects (mosquitoes and midges);
- monitoring programme and / or contribution; and
- implementation including roles, responsibilities, funding and maintenance arrangements.

3.5 Education

The subject land is located approximately 1,000m from a planned primary school located to the south of *Emerald Park* on Johnson Road. The Department of Education has committed funding to this school to be completed by 2018. This school will form the primary education facility for future residents. The subject land is also located approximately 300m from a private high school to the north and there are other schooling opportunities within the suburbs of Bertram and Kwinana in close proximity to the subject land.

3.6 Activity centres and employment

The subject land is located approximately 1,000m to a planned Local Centre adjacent to the future primary school to the south of *Emerald Park*. Residents will utilise the Kwinana Town Centre for their major shopping needs. Neighbourhood and Local centres also exist in close proximity to the subject land at *The Village* in Wellard and within the suburbs of Wellard and Bertram.

3.7 Infrastructure coordination, servicing and staging

An engineering service report (Appendix F) has been prepared by PDC in support of the LSP, which provides a preliminary assessment of the engineering aspects required for servicing the subdivision of the subject land.

3.7.1 Road works

Tamblyn Place which is currently of an unsealed standard will require upgrading to accommodate vehicle and pedestrian access to the subject land.

3.7.2 Sewer

The subdivision of the subject land is reliant on a wastewater pump station 'M' being constructed within Lot 503 abutting the subject land to the south. This pump station is currently being considered by the Water Corporation following design and lodgement of a scoping report by the adjoining landowner. The pump station will be pre-funded and forms part of Water Corporation's five year capital works; programmed to be constructed by 2018.

Sewer will be delivered to the subject land and new lots as part of the Water Corporation's standard detailed design process.

3.7.3 Water

Water Corporation has advised that the subject land is located within the current boundary for the Water Supply Scheme and overall planning has made allowance for residential development within the area.

Water supply will be provided to the subject land and the new lots as part of the Water Corporation's standard design requirements, via a new connection to the future main in Tamblyn Place.

3.7.4 Power

A new switchgear unit and transformer will be required for the subdivision of the subject land and new lots.

3.7.5 Gas

To service the subdivision of the subject land and the new lots a medium pressure main extension will be required to be constructed in Tamblyn Place. The main extension will connect to the existing medium pressure network in Johnson Road. The medium pressure network has sufficient capacity to service the subdivision.

3.7.6 Telecommunications

NBN is not planned for the development area in the next 12 months. Therefore, Telstra is considered the 'Infrastructure Provider of Last Resort'.

3.7.7 Drainage

The proposed drainage strategy which is detailed under Section 3.4 addressing the LWMS/UWMP, has been prepared to follow Water Sensitive Urban Design principles to promote infiltration of stormwater at the source and to minimise the pit and pipe network. Roadside rain gardens are proposed to address these requirements in addition to providing aesthetic amenity for the development.

3.7.8 Summary

In summary, it is achievable and feasible to provide all essential servicing infrastructure to accommodate the subdivision and development of the subject land. This will occur through standard infrastructure extensions and upgrade of existing services through the relevant design and approval processes.

3.8 Consultation

The project team prior to and during the preparation of the LSP has engaged with the following stakeholders:

- City of Kwinana;
- Department of Water;
- Water Corporation;
- ATCO Gas; and
- Adjoining landowners.

APPENDICES

Appendix A – Certificate of Title

WESTERN AUSTRALIA

REGISTER NUMBER	
502/DP70999	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

RECORD OF CERTIFICATE OF TITLE

VOLUME 2796 FOLIO 131

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 502 ON DEPOSITED PLAN 70999

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

MARIA MCHENRY OF 14 TAMBLYN PLACE, WELLARD

(AF M016739) REGISTERED 10 AUGUST 2012

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. *I860657 MORTGAGE TO AUSTRALIA & NEW ZEALAND BANKING GROUP LTD REGISTERED 18.6.2004.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

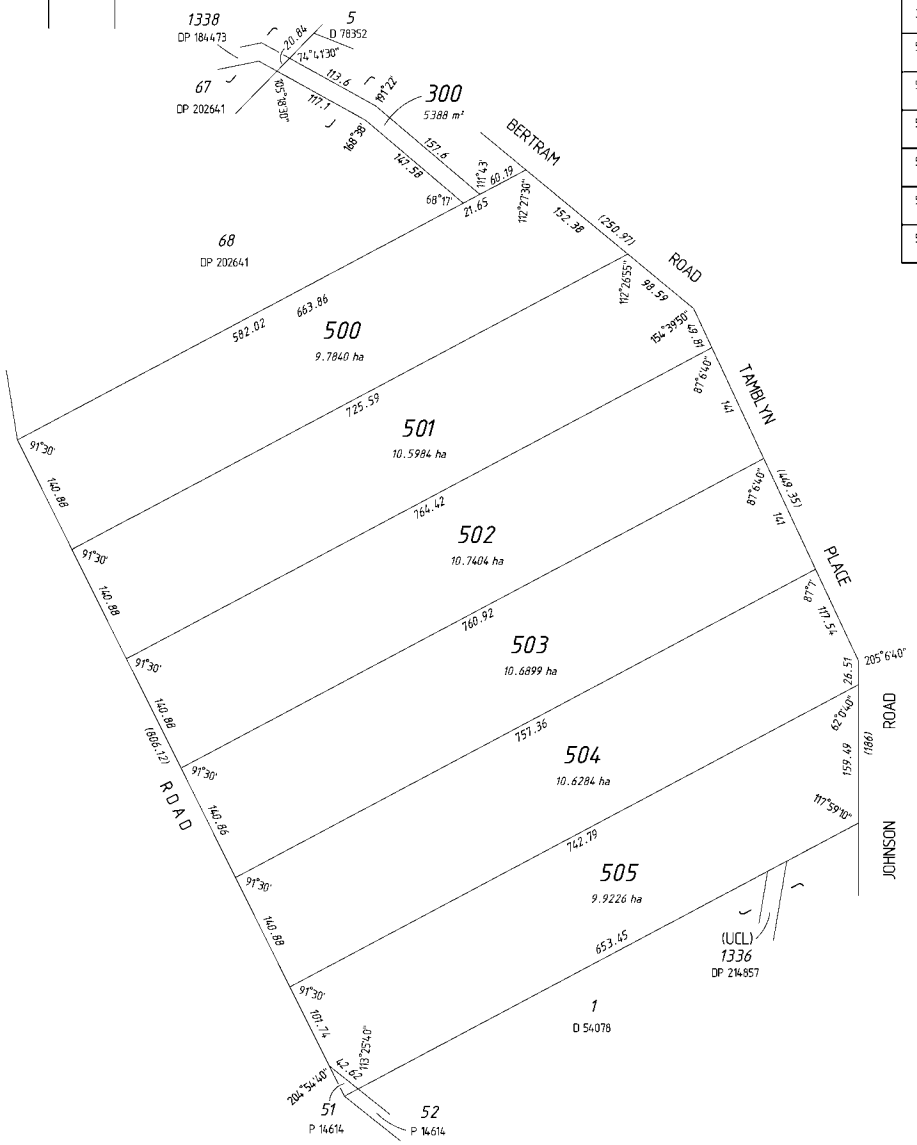
SKETCH OF LAND: DP70999.
PREVIOUS TITLE: 1304-280.
PROPERTY STREET ADDRESS: 14 TAMBLYN PL, WELLARD.
LOCAL GOVERNMENT AREA: CITY OF KWINANA.

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING I860657.

VER	AMENDMENT	AUTHORISED BY	DATE

LIMITED IN DEPTH TO 60.96 METRES

COMPILED FROM D 49377, D 54078, DP 66357, DP 202641, DP 214857 AND P 14614



LOT	FORMER TENURE	ON PLAN/DIA	TITLE
300	PT LOT 44 (UCL)	DP 202641	LR 3013/112
500	LOT 72 PT LOT 44 (UCL)	DP 202641 DP 202641	CT 1281/799 LR 3013/112
501	LOT 74 PT LOT 44 (UCL)	DP 202641 DP 202641	CT 1318/810 LR 3013/112
502	LOT 76 PT LOT 44 (UCL)	DP 202641 DP 202641	CT 1304/280 LR 3013/112
503	LOT 4 PT LOT 44 (UCL)	D 49377 DP 202641	CT 1659/529 LR 3013/112
504	LOT 5 PT LOT 44 (UCL)	D 49377 DP 202641	CT 1492/179 LR 3013/112
505	LOT 6 PT LOT 44 (UCL)	D 49377 DP 202641	CT 2019/98 LR 3013/112

TYPE: FREEHOLD

PURPOSE: CROWN LAND AMALGAMATION

PLAN OF

LOTS 300, 500, 501, 502, 503, 504 AND 505

DISTRICT: COCKBURN SOUND (PEEL ESTATE)

TOWNSITE

SSA: YES/NO

DPI FILE: 01617-1985

LOCALITY: WELLARD

LOCAL AUTHORITY: TOWN OF KWINANA

FORMER TENURE: SEE TABLE

INDEX: ON BG33 (2) 12.31, BG33 (5) 5.12, BG33 (5) 5.13

FIELD BOOK: COMPILED

SCALE 1 : 4000 @A2 (0, 40, 80, 120, 160, 200m)

ALL DISTANCES ARE IN METRES

SURVEYOR'S CERTIFICATE - Reg 54

I, , hereby certify that this plan is accurate and is a correct representation of the -

(a) "survey and/or

(b) "calculations from measurements, [delete if not applicable]

undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged

Licensed Surveyor — Date

SURVEYOR'S CERTIFICATE - Compiled

I, M. H. VAN ASSELT, hereby certify that this compiled plan -

(a) is a correct and accurate representation of the survey(s) of the subject land; and

(b) is in accordance with the relevant law in relation to which it is lodged.

Marko Van Asselt 2012.06.01 22:53:46 +08'00'

Licensed Surveyor — Date

SURVEY FIRM

WELLARD SURVEYS
Land and Engineering Surveyors
202 BERTRAM ROAD
WELLARD, 6170
Ph: 9419 4729 Fax: 9419 1808

LODGED	TYPE OF VALIDATION	APPROVED BY
DATE: 7-Jun-12	FULL AUDIT LEGAL COMPONENT: RL DOCKET PLAN/DIAGRAM: TRIM CERTIFIED CORRECT: 14-6-2012 I.S.C. F.S.C.	WESTERN AUSTRALIAN PLANNING COMMISSION FILE: EXEMPT FROM WAPC APPROVAL
FEE PAID: $661.00		DELEGATED UNDER S.16 P&D Act 2005 — DATE
ASSESS No: 10793957		

IN ORDER FOR DEALINGS

SUBJECT TO

Sec 87 LAA Amalgamation

14-6-2012

For INSPECTOR OF PLANS & SURVEYS / AUTHORIZED LAND OFFICER — DATE

APPROVED

10-8-2012

INSPECTOR OF PLANS & SURVEYS / AUTHORIZED LAND OFFICER — DATE

Landgate
Western Australian Land Information Authority

DEPOSITED PLAN

70999

SHEET 1 OF 1

VERSION 1

A2 ORIGINAL

HELD BY LANDGATE IN DIGITAL FORM ONLY.

dcs-fa ref : 1205-47

INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS

Appendix B – Environmental Report – ENV

ENVIRONMENTAL REVIEW

METROPOLITAN REGION SCHEME AMENDMENT 1188/57

WELLARD URBAN PRECINCT EAST

Invitation to make a submission

The Western Australian Planning Commission (WAPC) invites people to make a submission on this proposal. Both electronic and hard copy submissions are most welcome.

Wellard Landowners' Group proposes an amendment of the Metropolitan Region Scheme to Urban for land to the east of Bollard Bulrush Swamp. In accordance with the *Environmental Protection Act 1986* (EP Act), an Environmental Review (ER) has been prepared which describes this proposal and its likely effects on the environment. The ER is available for a public review period of 60 days from 18 June 2013 closing on 23 August 2013.

After receipt of comments from Government agencies and from the public, the WAPC will forward submissions to the Environmental Protection Authority (EPA). The EPA will prepare an Assessment Report with recommendations to the Government, taking into account issues raised in public submissions. Any environmental conditions, which may be set from this process, will be required to be incorporated into the MRS Amendment.

Why write a submission?
A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach.

It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the WAPC will be acknowledged. Submissions will be treated as public documents and may be quoted in full or in part in each report. Submissions may be fully or partially utilised in compiling a summary of the issues raised or where complex or technical issues are raised, a confidential copy of the submission (or part of it) may be sent to the proponent.

A summary of issues is normally included in the EPA's Assessment Report.

Why not join a group?
If you prefer not to write your own comments, it may be worthwhile joining a group interested in making a submission on similar issues.

Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information.

If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the ER or the specific proposal. It helps if you give reasons for your conclusions, supported byways to make the proposal more environmentally acceptable.

When making comments on specific elements of the Environmental Review:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable;
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the ER;
- if you discuss different sections of the ER, keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address; and
- date.

Please present your comments on the WAPC submission form (Form 57) provided. It is attached to this report, the planning Amendment Report, and is also available from the display locations and the PlanningWA internet site www.planning.wa.gov.au

Alternatively, written submissions can be posted to:

Secretary
Western Australian Planning Commission
Locked Bag 2506
PERTH WA 6001

or hand delivered to:

Secretary
Western Australian Planning Commission
140 William Street
PERTH WA 6000

The closing date for submissions is: 23 August 2013.

Planning and Development Act 2005

Section 57 Amendment (Minor)

Form 57

Submission

Metropolitan Region Scheme Amendment 1188/57

Wellard Urban Precinct (East)

OFFICE USE ONLY

SUBMISSION NUMBER
RLS/0388

To: Secretary
Western Australian Planning Commission
Locked Bag 2506
PERTH WA 6001

Name .....
(PLEASE PRINT CLEARLY)

Address ..... Postcode .....

Contact phone number ..... Email address .....

Submission (Please attach additional pages if required. It is preferred that any additional information be loose rather than bound)

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turn over to complete your submission

(Submission continued. Please attach additional pages if required)

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You should be aware that:

- The WAPC is subject to the *Freedom of Information Act 1992* and as such, submissions made to the WAPC may be subject to applications for access under the act.
- In the course of the WAPC assessing submissions, or making its report on these submissions, copies of your submission or the substance of that submission, may be disclosed to third parties.

To be signed by person(s) making the submission

Signature …… Date ……

Note: Submissions MUST be received by the advertised closing date, being close of business (5pm) on 23 August 2013. Late submissions will NOT be considered.

ENVIRONMENTAL REVIEW

METROPOLITAN REGION SCHEME AMENDMENT 1188/57

WELLARD URBAN PRECINCT EAST

Prepared for:

Wellard Landowner's Group

Prepared by:

ENV Australia Pty Ltd
Level 1, 503 Murray Street
PERTH WA 6000
Phone: (08) 9214 6100
Fax: (08) 9226 4109
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Job Number:	*10.127*
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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment 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 ENV. Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV 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, ENV 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. ENV 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 ENV.

Environmental Conclusions

In accordance with the scope of services, ENV 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.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Also it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling 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. ENV 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 ENV 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

ENV 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.

EXECUTIVE SUMMARY

ENV. Australia (ENV) was commissioned by Greg Rowe and Associates on behalf of the Wellard Landowners Group to undertake this Environmental Review in support of the rezoning of the subject land from Rural to Urban Deferred under the Metropolitan Region Scheme (MRS).

The application of the MRS Amendment (1188/57) was referred to the EPA where the level of assessment was set at a formal assessment with the following objectives identified:

- To maintain the integrity, ecological functions and environmental values of wetlands;
- To maintain the integrity, ecological functions and environmental values of fauna habitat; and
- To maintain the integrity, ecological functions and environmental values of waterways.

This report covers the following issues:

- Regional and local context;
- Flora, vegetation, fauna and habitat;
- Wetland value, functions and boundary;
- Groundwater and surface water quality and quantity; and
- Legislation and Planning.

The report identifies all environmental factors and their management in relation to potential impacts, management objectives and proposed mitigation and management actions. The Environmental Management Framework outlines the following necessary environmental plans:

- Construction Environmental Management Plan;
- Wetland Management Plan; and
- Water Management Plans.

1 INTRODUCTION

ENV. Australia (ENV) was commissioned by Greg Rowe and Associates on behalf of the Wellard Landowners Group to undertake this Environmental Review in support of the rezoning of the subject site from 'Rural' to 'Urban Deferred' under the Metropolitan Region Scheme (MRS).

1.1 LOCATION AND CURRENT LAND USE

The site is located in the suburb of Wellard in the Town of Kwinana, and is situated approximately 35 km south of the Perth CBD (see Figure 1). The land is located on the eastern side of Bollard Bulrush Swamp and is bound by Bertram Road and Tamblyn Place to the north, Johnson Road to the east, and the Peel Main Drain to the west and south.

The subject site consists of the following land parcels in Wellard:

- Lot 1 Johnson Road;
- Lot 6 Johnson Road;
- Lot 86 Johnson Road;
- Lot 4 Tamblyn Place;
- Lot 5 Tamblyn Place;
- Lot 74 Tamblyn Place;
- Lot 76 Tamblyn Place;
- Lot 67 Bertram Road;
- Lot 68 Bertram Road;
- Lot 72 Bertram Road;
- Lot 1338 Bertram Road;
- Unallocated Crown Land 44 in Wellard; and
- Unallocated Crown Land 1336 in Wellard.

The western portion of the site includes parts of Bollard Bulrush Swamp itself, and although the site is largely cleared, there are vegetated areas remaining within the wetland itself. The cleared areas are currently used predominantly for cattle grazing.

1.2 DESCRIPTION OF AMENDMENT

The site is zoned 'Rural' under both the MRS and the Town of Kwinana Town Planning Scheme No. 2 (TPS2) (see Figure 2). MRS Amendment 1188/57 proposes rezone the site from 'Rural' to 'Urban Deferred'. Following the eventual lifting of Urban deferment,

structure planning and subdivision approval will facilitate the ultimate urban development of the site.

Table 1: Key characteristics

AMENDMENT DETAIL	CHARACTERISTICS
Purpose	To develop the land for residential use
Land Area	Wetland Area: 32.3 ha Wetland Buffer: 9.4 ha Developable Area: 57.5 ha
Local Government	Town of Kwinana
Existing Land Uses	Farming and grazing
Existing Zoning	Rural
Proposed Zoning	Urban Deferred
Environmental Factors	Wetlands, fauna and water (surface and groundwater)
Proposed Environmental Management Measures	Preparation and implementation of the following management plans: • Construction Environmental Management Plan, • Wetland Management Plan, • District Water Management Strategy, • Local Water Management Strategy, and • Urban Water Management Plan,

1.3 PURPOSE OF THIS ENVIRONMENTAL REVIEW

The application for amendment of the MRS (Amendment 1188/57) was referred to the Environmental Protection Authority (EPA) under section 48A of the *Environmental Protection Act 1986* (EP Act) to set the level of assessment for the proposal.

The EPA concluded that this amendment should be formally assessed (Assessment 1830), and issued instructions under section 48C(1)(a) of the EP Act. The EPA identified the most relevant 'Environmental Factors' as identified in Table 2 (please note that the wetland management categories have been amended subsequently to the table of Environmental Factors being released).

Table 2: Environmental Factors Relevant to the Scheme

CONTENT		SCOPE OF WORK	
Factors	**Site Specific**	**EPA Objectives**	**Work required for the environmental review**
BIOPHYSICAL			
Wetlands	Bollard Bulrush Swamp	To maintain the integrity, ecological functions and environmental values of wetlands	*Regional and Local Context* Describe the extent of the relevant wetland suite. What is the significance (percentage and area representation) of the Bollard Bulrush Swamp in relation to the wetland suite? What is the ecological linkage value of Bollard Bulrush Swamp? *Wetland Value and Functions* The Bollard Bulrush Swamp is currently identified as *Conservation Category (UFI 15866), Resource Enhancement* (UFI 15867) and *Multiple Use* (UFI 13327) management category in the Department of Environment and Conservation's (DEC) *Geomorphic Wetlands Swan Coastal Plain* dataset. The Environmental Review should review the classification of Bollard Bulrush to ensure that the current attributes of the wetland reflect the management category. Confirm the wetland management category with DEC. This should be done in accordance with the *Protocol for proposing modifications to the Geomorphic Wetlands Swan Coastal Plain dataset* (2006). Map the boundary of the EPP 1992 boundary and hydric soils overlaying on an aerial photograph. A portion of Bollard Bulrush Swamp is protected from unauthorized activities under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (Lakes EPP 1992).* Map and describe vegetation types (overlaid on aerial photography) and condition (using the *Bush Forever* scale) in accordance with *Guidance Statement No 51. Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.*

CONTENT		SCOPE OF WORK	
Factors	**Site Specific**	**EPA Objectives**	**Work required for the environmental review**
			Wetland Boundary Identification of a wetland boundary is reliant upon hydrology, hydric soils and wetland vegetation. Wetland vegetation is a reliable indicator of a wetland boundary. When the vegetation has been cleared, hydric soils may be the only indicator remaining. *Determination of Buffer Width* The purpose of a wetland buffer is to safeguard and maintain the functions and processes of a wetland and protect the wetland from potential adverse impacts. The buffer around Bollard Bulrush Swamp should be based on the appropriate distance required to separate the environmental values (vegetation, roosting, summer refuge, nesting, nursery and feeding) from the land uses permitted by the proposed amendment. The EPA expects that a minimum 50 metre buffer be provided (Guidance Statement No 33). Matters to be considered in the Environmental Review should include: • Description of the potential direct and indirect impacts that may result from use or development, including use for drainage purposes, allowed by the Amendment; and • Determination of the appropriate buffer distance required to protect the environmental values and functions of Bollard Bulrush Swamp from these potential impacts using the EPA *Guidance Statement No. 33 Environmental Guidance for Planning and Development* (available from www.epa.wa.gov.au) and Western Australian Planning Commission's *Guidelines for the Determination of Wetland Buffer Requirements* (available at www.planning.wa.gov.au) .

CONTENT		SCOPE OF WORK	
Factors	**Site Specific**	**EPA Objectives**	**Work required for the environmental review**
			The Environmental Review should demonstrate how the proposed buffer will protect and maintain the values of Bollard Bulrush Swamp.
Fauna	Bollard Bulrush Swamp	To maintain the integrity, ecological functions and environmental values of fauna habitat	Fauna survey of Bollard Bulrush Swamp in accordance with the EPA's *Guidance Statement No. 56 Terrestrial Fauna for Environmental Impact Assessment in Western Australia* (available at www.epa.wa.gov.au). Use the outcomes of the fauna survey to determine the habitat values (roosting, summer refuge, nesting and feeding) and defining an appropriate buffer to determine the buffer requirements of Bollard Bulrush Swamp.
POLLUTION MANAGEMENT			
Water	Surface groundwater quality and quantity	To maintain the integrity, ecological functions and environmental values of waterways	*How will the Amendment ensure that surface and groundwater quality and quantity is not adversely affected as a result of any use or development allowed by the Amendment?* Demonstrate that the proposal complies with the *Jandakot Structure Plan* (Government of Western Australia; 2007) and the *Jandakot Water Resource Management Strategy* (Department of Water). Both policies require that future development within this catchment does not impact on the quality of water entering Jandakot water resources. Demonstrate that the proposal complies with the objectives of the EPA's "*Draft Water Quality Improvement Plan*" (WQIP) for the Peel Harvey Coastal Plain Catchment (2007). Document how stormwater management will be implemented in accordance with the Department of Water's *Stormwater Management Manual* including the following: • Provide a site specific profile of the maximum groundwater level across the wetland and details of site drainage. • Assess the impact of residential development will have on local surface and ground water quality, including the risk of acid sulfate soils, salinity problems, and surface and groundwater quantity.

CONTENT		SCOPE OF WORK	
Factors	**Site Specific**	**EPA Objectives**	**Work required for the environmental review**
			Detail measures proposed to: • Ensure the quality and quantity of surface and ground water is maintained so that existing and potential uses, including ecosystem maintenance are protected; and • Management impacts. Describe management measures, including: • Effluent disposal; and • Drainage and nutrient management, to be implemented to reduce the quantity of drainage runoff from the site and to prevent impacts on water quality.

The purpose of this report is to fulfil the instructions of the EPA in the investigation, definition and proposal of management measures for the environmental constraints to development of the site. The commitments outlined in this document will become statutory obligations for the client to ensure that long term environmental protection and management of the site is fulfilled.

2 LEGISLATIVE AND POLICY CONTEXT

2.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth legislation relating to the protection of the environment and the conservation of biodiversity. The EPBC Act defines Matters of National Environmental Significance (NES), which include World and National Heritage sites, wetlands of international importance, threatened species and communities, migratory species and Commonwealth marine areas. Proposals which may have a significant impact on Matters of NES should be referred to the federal Department of Sustainability, Environment, Water, Populations and Communities. Proposals deemed to be Controlled Actions require assessment and approval under the EPBC Act.

2.1.1 THREATENED SPECIES OF FLORA AND FAUNA PROTECTED UNDER THE EPBC ACT

Section 179 of the EPBC Act identifies the categories for threatened flora and fauna species, as listed in Table 3 below.

Table 3: Federal Threatened Flora and Fauna Categories

CATEGORY	DESCRIPTION
Extinct	There is no reasonable doubt that the last member of the species has died
Extinct in the Wild	Either the species: • 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.
Critically Endangered	The species is facing an extremely high risk of extinction in the wild in the immediate future
Endangered	The species is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future
Vulnerable	The species is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium term future
Conservation Dependent	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

2.1.2 THREATENED ECOLOGICAL COMMUNITIES

Threatened species and ecological communities listed under the EPBC Act are recognised as Matters of NES. Therefore, any actions that are likely to significantly impact on a listed species or community will require an environmental assessment and approval process.

2.1.3 MIGRATORY SPECIES

All migratory species protected under the Bonn Convention, the Japan-Australia Migratory Bird Agreement, the China-Australia Migratory Bird Agreement, or any other approved international agreement, are protected under the EPBC Act.

2.2 ENVIRONMENTAL PROTECTION ACT 1986

The *Environmental Protection Act 1986* (EP Act) empowers the EPA to act to prevent, control or abate pollution and environmental harm, and to ensure the conservation, preservation, protection, enhancement and management of the environment.

Part V of the EP Act also provides for the declaration of Environmentally Sensitive Areas (ESA's) for which there is a presumption against clearing of native vegetation. Values such as Declared Rare Flora (DRF), habitat for Threatened Fauna, Threatened Ecological Communities (TEC's) and Conservation Category Wetlands are deemed to be Environmentally Sensitive Areas under the Act.

Clearing of native vegetation requires permission under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Exemptions for a clearing permit under the *Regulations* do not apply in an ESA.

2.3 WILDLIFE CONSERVATION ACT 1950

The *Wildlife Conservation Act 1950* (WC Act) provides for the conservation and protection of native flora and fauna, including rare flora and fauna, primarily through the gazettal of a DRF species list and a Specially Protected Fauna species list. Any action that will result in the 'taking' of a listed species must be licensed under the Act.

2.3.1 RARE FLORA

Section 23F of the act provides for the publishing of the W*ildlife Conservation (Rare Flora) Notice* in the Government Gazette. Rare Flora may fall under either of the following two categories described in Table 4.

Table 4: Management Categories for Flora Protected under the WC Act

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Schedule 1	**S1**	Taxa that are extant and considered likely to become extinct or rare
Schedule 2	**S2**	Taxa that are presumed to be extinct in the wild

2.3.2 SPECIALLY PROTECTED FAUNA

Section 14(2) of the WC Act provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* in the Government Gazette. Specially Protected Fauna may fall under any of the following categories described in Table 5.

Table 5: Management Categories for Fauna Protected under the WC Act

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Schedule 1	**S1**	Fauna that is rare or likely to become extinct
Schedule 2	**S2**	Fauna that is presumed to be extinct
Schedule 3	**S3**	Birds that are protected under an international agreement
Schedule 4	**S4**	Other fauna in need of protection

2.4 PRIORITY FLORA AND FAUNA LISTS - DEPARTMENT OF ENVIRONMENT AND CONSERVATION

The Department of Environment and Conservation (DEC) maintains lists of priority flora and fauna which are under consideration for inclusion in the formal WC Act lists, but are in need of further survey.

The priority levels of the flora species are defined in Table 6 below.

Table 6: Priority Flora Management Categories

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Priority 1	**P1**	Taxa with few (generally less than 5) occurrences which are under threat. These taxa are under consideration for declaration as Rare Flora, but are in urgent need of further study.
Priority 2	**P2**	Taxa with few (generally less than 5) occurrences, at least some of which are not under immediate threat. These taxa are under consideration for declaration as Rare Flora, but are in urgent need of further study.
Priority 3	**P3**	Taxa known from several populations which are not believed to be under immediate threat. These taxa are under consideration for declaration as Rare Flora, but are in need of further study.
Priority 4	**P4**	Taxa which have been adequately surveyed, and which while rare are not under current threat. These taxa require monitoring.

The priority levels of the fauna species are defined in Table 7 below.

Table 7: Priority Fauna Management Categories

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Priority 1	**P1**	Taxa with few, poorly known populations on threatened lands. They require urgent survey and evaluation.
Priority 2	**P2**	Taxa with few, poorly known populations on conservation lands. They require urgent survey and evaluation of conservation status.
Priority 3	**P3**	Taxa with several, poorly known populations, some on conservation lands. They require urgent survey and evaluation of conservation status.
Priority 4	**P4**	Taxa which have been adequately surveyed, and are usually represented on conservation lands. They are not under current threat, but could become threatened should circumstances change. These taxa require monitoring.
Priority 5	**P5**	Conservation dependent taxa which although not currently threatened, would become so within 5 years should their specific conservation program cease.

2.5 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES LISTS - DEPARTMENT OF ENVIRONMENT AND CONSERVATION

There is no mechanism available for the formal listing of ecological communities under the WC Act, however the DEC maintains a list of threatened and priority ecological communities, which are classified as described in Table 8 and Table 9, below.

Table 8: Threatened Ecological Communities Management Categories

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Presumed Totally Destroyed	**PD**	A community which has been adequately searched for, but for which no representative occurrences have been located.
Critically Endangered	**CR**	A community which has been adequately surveyed and found to be facing extremely high risk of extinction in the near future.
Endangered	**EN**	A community that has been adequately surveyed and found to be facing high risk of extinction in the near future.
Vulnerable	**VU**	A community which has been adequately surveyed and found to be facing high risk of total destruction or significant modification in the medium to long-term future.

Table 9: Priority Ecological Communities Management Categories

MANAGEMENT CATEGORY	Abbrev.	DESCRIPTION
Priority 1	**P1**	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation, for which current threats exist.
Priority 2	**P2**	Ecological communities that are known from few, small occurrences, all or most actively managed for conservation and not under imminent threat of destruction.
Priority 3	**P3**	Communities that are known from: • Several to many occurrences, a significant number of which are not under threat of habitat destruction or degradation; • A few widespread occurrences, which are large or in significant remaining habitat, in which other occurrences may survive, much of which is not under imminent threat; or • Large and/or widespread occurrences (that may or may not be represented in the reserve system) but are under threat of modification across much of their range.
Priority 4	**P4**	Communities that are adequately known, rare but not threatened, or meet the criteria for Near threatened, or have been recently removed from the threatened list.

2.6 GEOMORPHIC WETLANDS OF THE SWAN COASTAL PLAIN DATASET - DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Classifications and management objectives for wetlands of the Swan Coastal Plain (from Gingin to Dunsborough) have been identified and are held in a database maintained by the DEC. The wetland classification system defines wetlands in terms of their geomorphic character and inundation patterns (see Table 10), while the management category of a wetland is based on its condition and function, and defines objectives for their future management (see Table 11) (EPA 2008a).

Table 10: Geomorphic Wetland Classification System

WATER LONGEVITY	LANDFORM				
	Basin	**Channel**	**Flat**	**Slope**	**Highland**
Permanent inundation	Lake	River	-	-	-
Seasonal inundation	Sumpland	Creek	Floodplain	-	-
Intermittent inundation	Playa	Wadi	Barlkarra	-	-
Seasonal Waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

Table 11: Wetland Management Categories

MANAGEMENT CATEGORY	GENERAL DESCRIPTION	MANAGEMENT OBJECTIVES
Conservation	Wetlands which support a high level of attributes and functions	Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including: ▪ reservation in national parks, crown reserves, and State owned land, ▪ protection under Environmental Protection Policies, and ▪ wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.

MANAGEMENT CATEGORY	GENERAL DESCRIPTION	MANAGEMENT OBJECTIVES
Resource Enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring their wetland function, structure and biodiversity.
Multiple Use	Wetlands with few remaining important attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through land care.

2.7 ENVIRONMENTAL PROTECTION (SWAN COASTAL PLAIN LAKES) POLICY 1992

Environment Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP Lakes) is a policy under Part III of the EP Act which aims to protect the environmental values of lakes on the Swan Coastal Plain through the prevention of filling, excavation and discharge into these lakes (unless authorised by the EPA).

2.8 WETLANDS CONSERVATION POLICY FOR WESTERN AUSTRALIA

The Wetlands Conservation Policy for Western Australia (Government of Western Australia 1997) provides recognition of wetland values and commits the State Government to identifying, maintaining and managing the State's wetland resource, including the full range of wetland values, for the long term benefit of the people of Western Australia.

2.9 PLANNING AND DEVELOPMENT ACT 2005

The *Planning and Development Act 2005* is an Act to provide for a system of land use planning and development in Western Australia.

The Act establishes the framework for preparation, amendment and function of Regional Planning Schemes and Local Planning Schemes. It also provides statutory procedures for the preparation and adoption of State Planning Policies (SPPs) by the Western Australian Planning Commission. SPPs are developed by the State Government to provide strategic guidance in land use planning decision making.

2.10 METROPOLITAN REGION SCHEME

The Metropolitan Region Scheme (MRS) guides land use in the Perth Metropolitan Region, which consists of a number of local government areas, including the Town of Kwinana. The MRS defines the use of land, dividing it into broad zones and reservations.

2.11 TOWN OF KWINANA TOWN PLANNING SCHEME NO 2

The Town of Kwinana Town Planning Scheme No. 2 outlines reserving and zoning of land in the Town and provides for the control of land use and development for the purposes of orderly and properly planned use and development of land to occur.

The policy provides the framework for the mapping, classification and categorisation for the State's wetland resources.

3 EXISTING ENVIRONMENT

3.1 CLIMATE

Perth enjoys a warm Mediterranean climate, with an average maximum summer temperature of 28.3°C and an average minimum winter temperature of 10.9°C (BOM 2010). The region receives an average annual rainfall of 765.3 mm, with the majority of precipitation occurring in winter (see Figure 3, below) (BOM 2010).

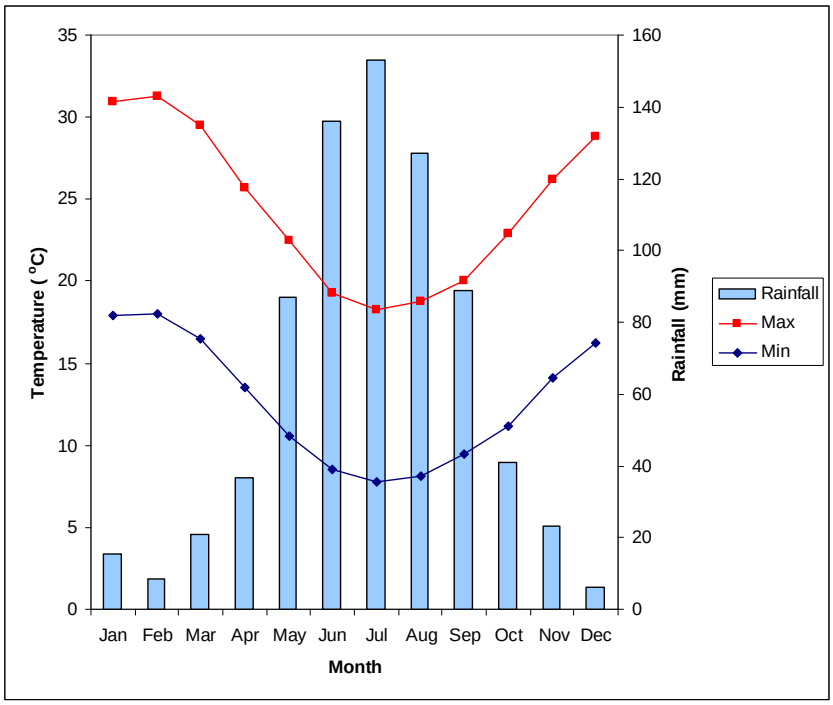

Figure 3: Temperature and Rainfall (BOM 2010)

3.2 SOILS AND GEOLOGY

Bollard Bulrush Swamp is part of the Beeliar Chain of Wetlands that represents the divide between the Bassendean Dune System to the east and the Spearwood Dune System to the west. Bassendean sands are generally white to grey, fine to medium-grained, quartz-based sands of an Aeolian origin, while Spearwood sands are calcareous and derived from Tamala limestone (Gozzard 1983). The sands have a yellowish to brown colour and a medium to coarse grain size.

The soils of the Beeliar Wetlands are of a lacustrine origin, being formed by sedimentation in lakes, and comprise of dark brownish-grey sandy silts with disseminated fine grains of quartz and variable organic matter content (Gozzard 1983).

3.3 ACID SULPHATE SOILS

The site is mapped almost entirely as 'high to medium risk of acid sulphate soils within 3m of the natural soil surface' (see Figure 4) (WAPC 2003).

3.4 ABORIGINAL HERITAGE SITES

The Department of Indigenous Affairs' Aboriginal Heritage Enquiry System identified a number of Aboriginal heritage surveys that have been conducted in the area encompassing the site. However, according to the enquiry system no Aboriginal Heritage Sites were found in the development area (DIA 2010).

3.5 FLORA AND VEGETATION

ENV was commissioned in 2010 to undertake a flora and vegetation assessment for the Bollard Bulrush East survey area. Included below is a summary of the Assessment, the complete Draft report is available in Appendix A.

3.5.1 METHODOLOGY

A thorough desktop review was conducted, including a DEC database search for Threatened Flora and the WA Herbarium (DEC 2010b), NatureMap (DEC 2010a), Department of Sustainability, Environment, Water, Population and Communities Protected Matters Search Tool (DSEWPAC 2010a) and previous flora surveys (completed by other consultants and the DEC). This was supplemented by a vegetation survey completed in September 2010 by an ENV botanist which included 10 m x 10 m quadrats, one relevé, photographs and samples (see Appendix A).

3.5.2 RESULTS

Vegetation Complex

Heddle *et al.,* (1978) mapped the area as containing one Swan Coastal Plain vegetation complex which is related to the underlying soil profile:

- Herdsman Complex: Vegetation consists of sedgelands and fringing woodland of Eucalyptus rudis - Melaleuca spp.

The EPA Guidance Statement 10 estimates the percentage of each mapped vegetation complex that remains on the Swan Coastal Plain compared to its pre-European extent. Complexes with 10-30% remaining are considered regionally significant, and complexes with 10% or less remaining in constrained areas may be formally assessed by the EPA (EPA 2006).

Across its extent 34.6% of the Herdsman Complex is estimated to remain (EPA 2006), with 31% remaining within protected Bush Forever sites across the Swan Coastal Plain (Government of Western Australia 2000). Based on the EPA Guidance Statement 10, the vegetation complex is unlikely to be considered regionally significant.

Flora

Sixteen families, twenty two genera and twenty three taxa were recorded in the survey area (seven native flora taxa and sixteen introduced)(see Appendix A for complete flora list). An average of thirteen species was recorded within each quadrat.

Vegetation Condition

The majority of vegetation onsite is considered to be Degraded, with a range of conditions from Completely Degraded to Good occurring on the site (Figure 5). This is in contrast to the condition of the other side of Bulrush Swamp as delineated in a 2008 survey undertaken for Dev-X Pty Ltd (shown in Appendix B).

Disturbances onsite include invasive weeds, livestock grazing and trampling and historical clearing. The high level of disturbance within the subject site and the high diversity and cover of invasive species indicates that the native species have been displaced.

Vegetation Unit

One vegetation unit was identified within the survey area:

MpEr Low Woodland of *Melaleuca rhaphiophylla, Eucalyptus rudis* subsp*. rudis*, **Rubus anglocandicans, *Zantedeschia aethiopica,*Paspalum dilatatum, *Holcus lanatus, Centella asiatica, *Rumex crispus* and *Baumea articulata.*

In addition, stands of native trees including *Eucalyptus rudis* subsp*. rudis* and *Melaleuca preissiana* were recorded (Figure 6). No native understorey species were recorded under these trees and thus, they have not been discussed as vegetation units.

Floristic Community Type

Due to the low native species diversity and the degraded condition of the site, ENV is unable to confidently infer a specific Floristic Community Type (FCT). The vegetation has been assessed as representing a highly disturbed example of FCT SCP 17 '*M. rhaphiophylla – Gahnia trifida* seasonal wetlands' as several common and typical species of FCT SCP 17 are absent from the site.

The species richness recorded at the subject site has been influenced by the high diversity of introduced species recorded (which incorporated 69% of the total taxa recorded). Introduced species dominate the middle storey and understorey.

Protected Flora

A database search of the Wellard area resulted in ten Declared Rare and eight Priority Flora species being identified as potentially occurring in the subject area. Additionally the desktop search identified five Threatened Ecological Communities and three Priority Ecological Communities within a 5km radius of the site, also identifying these as potentially occurring on the site (Appendix A).

No Threatened species pursuant to the EPBC Act, no plant taxa gazetted as Declared Rare pursuant to the WC Act and no Priority Flora listed by the DEC were recorded in the survey area.

Climatic factors may have influenced the emergence of flora, such as annuals. However ENV considers it to be very unlikely that the subject site supports flora of conservation significance or provides the appropriate habitat for conservation significant flora and that, as such, the potential for Threatened, Declared Rare or Priority Flora is low.

The vegetation has been assessed as representing a highly disturbed example of FCT SCP 17 '*M. rhaphiophylla – Gahnia trifida* seasonal wetlands' as several common and typical species of FCT SCP 17 are absent from the site. This FCT is not representative of any TEC or PEC complexes.

Introduced Species

The field survey identified sixteen dominant weed species listed in the Environmental Weed Strategy for Western Australia. The majority of these are common agricultural, bushland or wetland weeds in the region, but three of them are rated as High by the Environmental Weed Strategy for Western Australia (CALM 1999) (refer to Appendix A for ranking criteria). These are *Cortaderia selloana*, *Typha orientalis*, and *Zantedeschia aethiopica*.

Two of these species are listed as Declared Plants on the Swan Coastal Plain (DAFWA 2010); Arum Lily (**Zantedeschia aethiopica*); and Blackberry (**Rubus anglocandicans*). The level of infestation of both species was considered to be high, as a result of the wide distribution and high number of individuals within the survey area (see Figure 7). Arum Lily and Blackberry are both listed as Priority 1 for the whole State and require management strategies to reduce their distribution.

3.6 FAUNA

The EPA's instructions defined the fauna habitat values of the site as a factor to be assessed in this Environmental Review. In accordance with Guidance Statement 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA 2004), ENV was commissioned in June 2010 to undertake a Level One fauna and fauna habitat

assessment, including targeted trapping, for the subject site. Included below is a summary of the assessment, the complete (draft) report is available in Appendix C.

3.6.1 METHODOLOGY

A thorough desktop review was conducted and included a DEC database search for Threatened and Priority Fauna (DEC 2010c), Western Australian Museum (WAM) & NatureMap (DEC 2010a), DSEWPaC Protected Matters Search Tool (DSEWPaC 2010a), Birds Australia's Birdata (Birdata 2010), previous surveys/reports (from ENV, other consultants and DEC reports) and discussions with important stakeholders. This was supplemented with a field survey conducted by a qualified Zoologist on the 30th September 2010. During the assessment only vegetated areas were assessed for fauna habitat, and fauna were opportunistically observed and recorded including scats, tracks, burrows and other evidence of animal presence. Conservation significant species were located and coordinates recorded with a GPS. Refer to Appendix C for a detailed methodology.

3.6.2 RESULTS

Habitat

One potential habitat type was identified onsite: *Melaleuca* Dampland, which covered approximately 22.7 ha (32%) of the site (Figure 8). The remaining of the site is in Degraded or Completely Degraded condition, and is considered to provide limited or no habitat value for fauna species.

The *Melaleuca* Dampland is characterised by Swamp Paperbark (*Melaleuca rhaphiophylla*), Flooded Gum (*Eucalyptus rudis* subsp. *rudis*), **Paspalum dilatatum*, Yorkshire Fog (**Holcus lanatus*), *Centella asiatica*, Curled Dock (**Rumex crispus*) and Jointed Rush (*Baumea articulata*). The Dampland is in Good-to-Degraded Condition however the midstorey and understory are heavily disturbed and dominated by weed species such as Blackberry and Arum Lily.

The *Melaleuca* Dampland within the subject site is degraded with limited midstorey and understorey species and a high level of weed infestation; consequently it is considered unlikely to support any species of conservation significance. The remainder of the site is considered to be of low value to fauna due to the lack of microhabitats and clearing of the site for grazing domestic animals creating a highly fragmented habitat.

Ecological Linkage

Ecological connectivity facilitates many life-history functions of fauna, and the ability to utilise connected habitats is integral to the life histories of a broad spectrum of species, with connectivity between habitats being crucial to important functions such as

breeding. Where undeveloped areas provide ecological connectivity, this can increase their ability to support fauna species.

Although the wetland on the site comprises only half of Bollard Bulrush Swamp, the link to the western side is disjointed partially by the Peel Main Drain running through the centre of the wetland. The wetland as a whole remains within a highly fragmented setting, with little habitat connectivity with the surrounding area. This reduces the value and functionality of the survey area to fauna, particularly those that require larger areas or home ranges.

Despite the nearby occurrence of Bush Forever Site 349 (Leda and adjacent bushland) to the south-west of the survey area, the site remains relatively isolated from other similar habitats in the local vicinity. This is largely due to its location between residential housing to the west and pastoral land to the east.

Fauna

In previous surveys two hundred and eleven species of fauna have been recorded in the vicinity of the subject site. During the Level One fauna survey conducted by ENV in 2010, 29 terrestrial vertebrate fauna were recorded. A summary of both is detailed below (for complete lists refer to the full Fauna Report in Appendix C):

- One amphibian species;
- One reptile species;
- 25 native bird species and one introduced bird species; and
- One native mammal species and one introduced mammal species.

All fauna identified during the field survey are commonly encountered on the Swan Coastal Plain.

Conservation Significant Fauna

A search of State and Federal databases for the area resulted in 28 conservation significant fauna species identified as potentially occurring.

Based on the ecological requirements, known distributions and the type and quality of fauna habitats, only two species listed were considered as 'Likely' to occur within the subject site. These being bird species, the Cattle Egret and Eastern Great Egret. These two bird species may not be impacted by potential development as they are highly mobile and can easily move to other areas.

The Southern Brown Bandicoot was recorded on site, and there is a long historical presence of the species on the Swan Coastal Plain. The survey area is not considered to be capable of supporting a large population due to the lack of native understorey species and the inundation of low lying areas during rain events.

3.7 WETLANDS - BOLLARD BULRUSH SWAMP

The subject site includes part of the eastern portion of Bollard Bulrush Swamp, extending as far west as the Peel Main Drain, which bisects the Swamp. This wetland is identified in both the Geomorphic Wetlands Swan Coastal Plain dataset, and the Environmental Protection (Swan Coastal Plains Lakes) Policy, discussed below.

The wetland is one of the 19 wetlands that form the Bibra Suite, which occur in depressions of the Spearwood and Bassendean Dunes (Hill *et al* 1996). Bollard Bulrush swamp comprises an area of 185.9 ha according to Hill *et al* (1996), out of a total area of 696 ha of sumplands in the Bibra Suite (26.7%). Its environmental values at the time of the Hill *et al* (1996) assessment led to it being assigned a percentile ranking of 58, indicating that it is below the 60th percentile of examples of Bibra suite sumplands. It is also indicated that Bollard Bulrush Swamp is in the bottom 20% of Bibra Suite sumplands on the basis of vegetation cover (percentile ranking 16). It should be noted that the condition and extent of the wetland represented in the Hill *et al* report is 16 years old, and may not reflect the current status of the wetland.

Hydric soils analysis of soil profiles at groundwater bore locations show that three of the locations display hydric properties (evidence of soil features produced under waterlogged conditions) and three do not (see Appendix D and Figure 9). However, while hydric soil properties demonstrate that an area is a wetland, or has been one in the past, they do not contribute to an assessment of management category. Given that most of the site is classified as wetland (Conservation category, Resource Enhancement and Multiple Use), it is to be expected that a large area of the site display hydric soils properties. The construction of the Peel Main Drain through the centre of this wetland, also means that it is likely that there are relic soils present on the site from a time prior to this major alteration of the hydrological regime, unrelated to the current regime.

Historically the site has been farmed since the 1920's, and large areas have previously been cleared. From 1973 until the present, grazing has occurred throughout the wetland. Vegetation has regenerated in recent years in the central part of the wetland as stock has been less frequently permitted to graze the wetland. The wetland habitat type is considered to be of low value to fauna within the survey area.

3.7.1 GEOMORPHIC WETLANDS SWAN COASTAL PLAIN DATASET

The DEC maintains a database of wetlands on the Swan Coastal Plain which includes:

- location and boundary of the wetland;
- wetland type / geomorphic classification (see Table 10); and
- management category (see Table 11).

Bollard Bulrush Swamp is classified by the DEC geomorphic wetland system as a Sumpland, which means that its character is that of a basin, and it is seasonally inundated with water.

Bollard Bulrush Swamp has areas classified under three of the management categories described by the DEC; the central area of the wetland is classified as a Conservation category wetland area (Unique Feature Identifier 15866), a small area is classified as Resource Enhancement Category wetland (Unique Feature Identifier 15867), and the outer area is classified as a Multiple Use Category wetland (Unique Feature Identifier 13327) (see Figure 10).

Management objectives for Conservation category wetlands is preservation of the wetland attributes and functions – these are the highest priority wetlands. Resource Enhancement category wetlands objectives encourage their management, restoration and protection with the aim of achieving Conservation category status. The management objectives of Multiple Use category wetlands allows for development within them, provided that planning for the development incorporates ecologically sustainable design principles. This may include such measures as nutrient, sediment and drainage management; fire management; and weed control.

Recent Vegetation Assessment

The three wetland areas currently identified by the DEC Geomorphic Wetlands Swan Coastal Plain dataset as occurring within the survey, support vegetation that is regarded as representative of wetland communities. However, the condition of this vegetation varies. The Conservation category and Resource Enhancement wetland areas within the survey area represent the core of the wetland vegetation. The high level of disturbance has reduced the ecological value of the vegetation in the area identified as Multiple Use wetland - it is Completely Degraded, as this area has been cleared and utilised for agricultural purposes.

3.7.2 ENVIRONMENTAL PROTECTION (SWAN COASTAL PLAINS LAKES) POLICY 1992

Bollard Bulrush Swamp is also protected under the *Environment Protection (Swan Coastal Plain Lakes) Policy 1992* (Lakes EPP) (see Figure 11). The Lakes EPP aims to protect the environmental values of lakes on the Swan Coastal Plain and does not allow filling with materials, clearing, excavation or discharge into lakes (amongst other activities) (EPA 1992).

The mapped boundaries of the Geomorphic Wetlands Swan Coastal Plain dataset do not correspond with the mapped EPP lake boundary.

Interpretation of Wetland Boundary in relation to the Environmental Protection (Swan Coastal Plain Lakes) Policy, 1992

Under the 1992 Lakes EPP, a lake was identified if it contained an area of standing water of more than 1000 square metres as at 1 December 1991. Evidence in the form of historical photographs suggests the original EPP policy criteria of standing water no longer applies to Bollard Bulrush Swamp, and has not applied for many years, even at the key date in 1991.

A photograph taken of Bollard Bulrush Swamp when the EPP Lakes Policy came into effect is shown in Figure 12. The photograph was taken 22 November 1991 which is closest to the 1 December 1991 that Landgate (Western Australian Land Information Authority) could supply. Figure 13 has the 1991 aerial with the EPP Lakes boundary overlayed. No standing water is observable in the aerial photograph, and the EPP boundary extends far beyond the vegetated wetland area.

While Bollard Bulrush Swamp is a wetland, the boundary of the EPP Lake appears to be inaccurate; it does not represent standing water in the aerial photography at the time of the Policy's inception. Appendix E contains historical aerial photographs of Bollard Bulrush Swamp starting from 1953 and continuing on through to the present year. These photographs clearly show the years when the area is inundated with water. Table 12 below lists the years the photographs were taken and if open water was present.

Table 12: Historical Aerial Photograph Inventory for Appendix E

Photograph Year	Month	Water Present
1953	November	Yes
1965	March	No
1974	September	Yes
1977	June	No
1981	August	No
1985	June	No
1991	November (Figure 12)	No
1995	February	No
2000	February	No
2001	January	No
2003	January	No
2004	December	No
2006	March	No
2008	July	No
2010	November	No

On this basis, it can be reasonably concluded that the EPP mapping is incorrect in this case. Hence, a case exists for the EPP delineation to be amended to a more reasonable boundary. Strategies for the future management of the wetland in light of these issues are discussed in Section 4.1.

3.8 GROUNDWATER

ENV has installed groundwater monitoring bores at six locations within the site to monitor groundwater levels and groundwater quality. Monitoring bore locations are shown on Figure 14. Water levels in the bores were first measured on the 3rd October 2006. An eighteen month water monitoring program including monthly monitoring of water levels and quarterly monitoring of water quality commenced on the 1st July 2010. To date, ENV has undertaken 10 occasions of groundwater levels monitoring and three occasions of groundwater quality monitoring, capturing two "winter" (peak water level) periods. The results of this monitoring undertaken to date are summarised below. More detailed analysis can be found in Appendix F, which contains a short letter report from December 2010 on the results of the monitoring program.

3.8.1 GROUNDWATER LEVELS

Average Annual Maximum Groundwater Levels (AAMGLs) have been calculated for the site using the water levels recorded from the bores on 3 October 2006 and the historical record of water levels for DoW bore T-250. The AAMGLs for each bore and the depth to AAMGL from ground surface are shown in Table 13 below.

Table 13: Average Annual Maximum Groundwater Levels (AAMGL) and Depth to AAMGL for each Bore.

Bore Name	AAMGL (m AHD)	Depth to AAMGL (m)
MW1-E	5.918	0.953
MW2-E	4.636	-0.227
MW3-E	5.737	0.645
MW4-E	4.362	-0.283
MW5-E	4.256	-0.390
MW6-E	4.332	0.463

The AAMGL for the site varied between 4.256 m AHD at MW5-E and 5.918 m AHD at MW1-E. The depth from the surface to AAMGL varied between -0.39m at MW5-E and 0.953 m at MW1-E. The negative depth to AAMGL at MW2-E, MW4-E and MW5-E indicates that these areas could expect to be waterlogged or inundated at the surface during winter in an average year. MW5-E is within the Conservation category area and is

consequently not being considered for development. The bores MW2-E and MW4-E roughly represent the lowest areas that will be developed under the current proposal. The AAMGLs in these areas are between 0.227 and 0.283 m above the natural surface. Groundwater contours for the site are shown in Figure 14.

Groundwater flow is expected to be generally south-westerly, towards the Peel Main Drain (DoW 2009) and this is confirmed by the recorded groundwater results from the site. However, groundwater levels and flow directions on the site will be affected by the Peel Main Drain. When the groundwater levels are higher than the drain, groundwater will flow towards the drain. When the water level in the drain is higher than the groundwater, the drain will recharge the groundwater.

3.8.2 GROUNDWATER QUALITY

The full set of groundwater quality results for the site is contained in Table 14.

Field pH measurements indicate groundwater was close to neutral (6.3 to 7.6) in all bores located within the site (Table 14). Some of the lower pH's recorded at the site are slightly below the ANZECC (2000) default trigger value for slightly disturbed wetlands (7.0 to 8.5). This may be due to the presence of tannins which can cause pHs as low as 4.5 in highly coloured wetlands (ANZECC 2000). Some of the higher pHs are slightly above the target range stated in the Jandakot Drainage and Water Management Plan (DWMP) (5.2 to 7.3) but within the ANZECC trigger values (DoW 2009).

Electrical conductivity (EC) levels measured in the bores indicate that groundwater at the site ranges from being fresh to brackish (307 to 1856 mg/L calculated TDS). Some of the higher salinities recorded at the site were slightly above the ANZECC (2000) trigger values (300 to 1500 us/cm EC) but were within the range stated in the Jandakot DWMP (up to 5 000 mg/L TDS). Higher salinities were generally recorded in early winter, closer to the drain and in areas with a shallow water table, indicating the likely cause of the brackish groundwater is the higher concentration of salts caused by evaporation and transpiration.

Water quality sampling indicates that nitrogen and phosphorus are elevated in groundwater below the site, probably due to the historical agricultural use at the site. Total Nitrogen (TN) levels were up to 13 times above the Swan Canning Cleanup Program (SCCP) Long-Term target of 1 mg/L in all of the samples collected. Total Nitrogen (TN) levels were also above the ANZECC (2000) trigger value of 1.5 mg/L in eight of the 12 of the samples collected (by up to 8.7 times). However, the TN levels recorded at the site were within the range of concentrations outlined in the Jandakot DWMP (DoW 2009) (<1 to 123.7 mg/L). Four of the 12 concentrations were greater than 3 mg/L, hence above typical values for the area. The breakdown of nitrogen in Table 14 indicates that the predominant form of nitrogen at groundwater at the site is organic nitrogen, as given by the low proportion of nitrate and nitrite (NOx).

Total Phosphorus (TP) levels were above both the Swan Canning Cleanup Program (SCCP) Long-Term target of 0.1 mg/L in just over three quarters of the samples collected, by up to 13 times. TP concentrations also exceeded the ANZECC (2000) trigger value of 0.06 mg/L in all but one of the samples collected, by up to 22 times. All TP levels recorded on the site were within the range of concentrations outlined in the Jandakot DWMP (DoW 2009) (0.01 to 34.7 mg/L). Five of the 12 concentrations were greater than 0.5 mg/L, hence above typical values for the area. In all of the bores, except MW1-E, phosphate (PO_4^{3-}) concentrations were negligible. This suggests that phosphorus in groundwater across most of the site exists predominantly in a particulate form and therefore is likely to present less of a risk to aquatic life.

Metals also occur in the groundwater at concentrations above ANZECC (2000) trigger values. For the July 2010 water quality sampling event only copper and zinc exceeded the trigger values of 0.0014 mg/L and 0.008 mg/L, by less than three times. Metal concentrations were higher in the October 2010 and January 2011 sampling rounds with arsenic, chromium, copper, lead, nickel, zinc and mercury all exceeding the trigger values by more than four times. In all bores aside from MW5, copper concentrations had increased by between ten and 100 fold and were up to 321 times higher than the trigger value. Lead and nickel concentrations also exceeded the NHMRC (2004) Australian Drinking Water Guidelines (ADWGs) of 0.01 mg/L and 0.02 mg/L by up to 18 and 5.5 times respectively. The source of the elevated metals could be infiltration of stormwater from the surrounding urban development which would explain the increase in concentrations from July to October. The historical agricultural use could also be a contributing source.

Table 14: Water Quality

Date	Bore ID	Field pH	Field EC uS/cm	Calculated TDS (mg/L)	Total N mg/L	TKN mg/L	NO3+NO2 mg/L	NO3-N mg/L	NO2-N mg/L	NH3-N mg/L	Total P mg/L	PO4 mg/L	Arsenic mg/L	Cadmium mg/L	Chromium mg/L	Copper mg/L	Lead mg/L	Mercury mg/L	Nickel mg/L	Zinc mg/L
8/07/10	MW1E	7.0	690	442	3.8	3.0	NA	0.72	0.039	0.02	1.3	0.25	0.001	<0.0001	<0.005	0.003	0.001	<0.0001	0.003	<0.01
	MW2E	7.4	1150	736	1.1	1.1	NA	0.01	<0.005	0.57	0.58	<0.005	<0.001	<0.0001	<0.005	0.003	0.001	<0.0001	0.002	<0.01
	MW4E	7.6	1620	1037	2.3	2.1	NA	0.14	0.023	0.53	0.46	<0.005	<0.001	<0.0001	<0.005	0.002	<0.001	<0.0001	0.003	<0.01
	MW5E	7.3	1690	1082	1.7	1.6	NA	0.07	0.036	0.37	0.38	<0.005	<0.001	<0.0001	<0.005	0.002	<0.001	<0.0001	0.004	<0.01
	MW6 (New)	6.8	2900	1856	13	10.0	NA	1.50	1.500	1.10	0.88	<0.005	0.002	<0.0001	<0.005	0.001	<0.001	<0.0001	0.007	0.003
	MW6	6.3	1570	1005	12	7.8	NA	4.00	0.220	0.28	0.38	<0.005	0.002	<0.0001	<0.005	0.004	<0.001	<0.0001	0.005	0.01
28/10/10	MW1E	6.6	480	307	1.3	1.2	0.092	NA	NA	0.02	1.3	0.3	<0.01	<0.002	0.04	0.057	0.067	0.003	0.006	0.02
	MW2E	7.2	1080	691	1.3	1.2	0.008	NA	NA	0.64	0.12	0.005	0.02	<0.002	0.028	0.033	0.013	<0.0001	0.006	<0.01
	MW4E	7.6	840	538	1.7	1.6	0.033	NA	NA	0.53	0.15	<0.005	0.1	<0.002	0.18	0.024	0.024	0.0004	0.05	0.02
	MW5E	7.1	580	371	1.3	1.3	0.031	NA	NA	0.19	0.12	0.008	<0.01	<0.002	0.006	<0.005	<0.001	<0.0001	<0.005	<0.01
	MW6 (New)	6.4	2190	1402	2.7	2.4	0.36	NA	NA	0.36	0.03	<0.005	0.07	<0.002	0.26	0.45	0.18	<0.0001	0.074	0.16
	MW6	6.4	580	371	3.3	3.1	0.18	NA	NA	0.56	0.07	<0.005	0.05	<0.002	0.12	0.046	0.086	0.0003	0.043	0.16
20/01/11	MW1E	6.5	670	429	3.7	0.9	2.8	NA	NA	0.05	0.79	0.17	0.004	<0.002	0.032	0.079	0.017	0.0002	<0.005	0.03
	MW2E	7.4	520	333	1.7	1.4	0.28	NA	NA	0.65	0.21	0.03	0.091	<0.002	0.048	0.059	0.004	0.0001	0.01	0.06
	MW4E	7.5	790	506	7.2	6.9	0.26	NA	NA	0.75	0.12	0.03	0.62	0.003	0.081	0.019	0.008	0.001	0.014	0.06
	MW5E	7.3	1400	896	7.2	6.9	0.31	NA	NA	1.00	0.3	0.03	0.41	0.006	0.35	0.13	0.02	0.0004	0.11	0.11
	MW6 (New)	7.5	1200	768	8.3	7.6	0.72	NA	NA	0.49	0.091	0.05	0.13	0.002	0.25	0.32	0.17	0.0002	0.063	0.14
	MW6	7.3	1700	1088	7.1	6.7	0.4	NA	NA	0.26	0.08	0.03	0.059	<0.002	0.047	0.036	0.014	0.0001	0.017	0.08
SCCP Long Term Target[1]					1						0.1									
ANZECC Trigger Value[2]		7.0 – 8.5	300 – 1500		1.5		0.1			0.04	0.06	0.03	0.024	0.0002	0.01	0.0014	0.0034	0.00006	0.011	0.008
Drinking Water Guideline[3]								11.3					0.007	0.002	0.05	2	0.01	0.001	0.02	3*

3.9 SURFACE WATER HYDROLOGY

Surface water exists seasonally at the site as Bollard Bulrush Swamp and as the Peel Main Drain, an artificial drainage line. The Peel Main Drain is a rural drain which runs through the Bollard Bulrush Swamp area and forms part of the regional drainage network. The drain is located within the catchment of the Serpentine River which eventually discharges into the Peel Harvey Estuary.

Coincident with the groundwater monitoring program outlined previously, ENV has undertaken eight occasions of surface water level measurement at four surface water monitoring locations. Inundation of Bollard Bulrush Swamp is monitored at two locations (SW1E and SW2E) and water levels in the Peel Main Drain upstream and downstream of the site is monitored at the other two locations (Culvert North and Culvert South).

Surface water quality monitoring of Bollard Bulrush Swamp could not be undertaken because the two surface water sites were dry throughout the monitoring period as detailed below.

3.9.1 SURFACE WATER LEVELS

Bollard Bulrush swamp inundation is caused by direct runoff from the local catchment area and tailwater conditions in the Serpentine River. During periods of high rainfall causing floodwaters from the Serpentine River flood the Peel Main Drain and in turn, inundate the surrounding low lying areas of Bollard Bulrush Swamp. Maximum Surface Water Levels (MSWL) recorded from the site are presented in Table 15, below.

Table 15: Maximum Surface Water Levels

MONITORING LOCATION	MSWL (m AHD)
SW1	dry
SW2	dry
Culvert North	7.19
Culvert South	3.95

The results indicate that surface water inundation did not occur to the east of the main drain during the monitoring period. It is likely that this is due to below average rainfall during this time. Water levels in the Peel Main Drain at the time of sampling were over 0.7 m below the 10 Year ARIs presented in Table 16.

3.9.2 ESTIMATED FLOOD CHARACTERISTICS

As shown on Figure 15 the site is partially located within the flood fringe of the Peel Main Drain (DoW 2009). The floodway, or area of fast flowing water, is limited to the Peel Main Drain itself.

The Jandakot DWMP (DoW 2009) provides flood levels for the Peel Main Drain at Bollard Bulrush. These are summarised in Table 16 below.

Table 16: Peel Main Drain Flows (DoW 2009)

Location	Peak Flows (m3/s)		Peak levels (m AHD)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Road	3.25	3.82	7.9	8.2
Bollard Bulrush Swamp (the site)	3.38	4.00	4.82	5.61
Peel Main Drain at Millar Rd	4.38	5.06	4.70	5.59

The 1 in 100 year Average Recurrence Interval (ARI) flood level for Bollard Bulrush Swamp is given as 5.6 m AHD in the DWMP (DoW 2009). Approximately 1,900 ML of storage is currently provided within Bollard Bulrush's flood fringe in the 1 in 100 year flood level (DoW 2009). Bollard Bulrush Swamp is the largest storage location in the northern part of the Peel Main Drain. The total flood area at Bollard Bulrush is estimated at 149 Ha. Of this, less than 10 ha (or 10%) is considered to be within the subject site.

3.9.3 WATER BALANCE

An estimate of the pre-development quantity of water that either drains from the site or infiltrates was made based on an infiltration rate of 15% of rainfall. This value was compared to an estimate of the post-development drainage and infiltration quantities. The post-development values were determined using standard water use figures for each of the land uses in the development. This information is provided in Table 17 and shows that post-development, there will be a 250% increase in discharge. This is typical of developments of this density.

Table 17: Pre and Post-Development Water Balance

Pre-Development	Drainage and Infiltration (ML/yr)
Pre Development	**92.59**

Post-Development	Drainage and Infiltration (ML/yr)
Groundwater Input	
Low Density	131.89
Medium Density	126.54
School recharge from rainfall &irrigation	25.50
POS recharge from rainfall &irrigation	17.62
Drainage areas and roads	54.05
Total Input	**355.61**
Groundwater Extraction	
Low Density	-29.31
Medium Density	0.00
Groundwater for School irrigation	0.00
Groundwater for POS irrigation	0.00
Total Extraction	**-29.31**

Total recharge to groundwater and drainage leaving site	**326.29**

Extra volume recharge/outlfow	**233.71**

% increase of recharge/outflow	**252%**

4 ENVIRONMENTAL FACTORS AND MANAGEMENT

The instructions from the EPA on the scope and content of this Environmental Review have led to further environmental research and investigation in order to quantify the environmental assets of the site. The risks posed to these assets by the development of the Wellard Urban Precinct East have been identified and defined, and are discussed in detail. Management responses to these risks have been defined as part of an overall environmental management framework for the development.

The key environmental issues requiring a management response during the development of the Wellard Urban Precinct East are identified by the EPA as follows:

- Wetlands: Bollard Bulrush Swamp;
- Fauna: the fauna of Bollard Bulrush Swamp; and
- Water: particularly surface and groundwater quality and quantity.

4.1 WETLAND

Bollard Bulrush Swamp is recognised in the DEC's *Geomorphic Wetlands of the Swan Coastal Plain* dataset (as a mixture of Conservation category, Resource Enhancement and Multiple Use), and as an EPP Lake under the *Environmental Protection (Swan Coastal Plains Lakes) Policy 1992*. These classifications afford varying levels of protection to the wetland. The floristic community of the wetland is "*M. rhaphiophylla – Gahnia trifida* seasonal wetlands".

4.1.1 POTENTIAL SOURCES OF IMPACT

Residential development in proximity to the Swamp may result in both positive and negative modifications. On the positive side, there is likely to be more passive surveillance of the site, which should lead to less uncontrolled access by mountain bike riders and walkers, which is noted as a highly destructive practise. However, residents living nearby may seek to gain access themselves to the naturalistic environment preserved in the wetland, leading to potential negative impacts on vegetation, fauna and fauna habitat, and the physical structure of the shore and swamp through increased pedestrian traffic (in the case of uncontrolled access).

Potential threats to wetlands in association with the change in land use to Urban/Residential are identified as follows:

- alteration to the water regime;
- habitat modification;
- inappropriate recreational usage;
- weed invasion; and
- diminished water quality.

4.1.2 MANAGEMENT OBJECTIVES

The management objectives recognised by the State Government for Multiple Use wetlands are to allow for "*Use, development and management…in the context of ecologically sustainable development and best management practice catchment planning through landcare*" (EPA 2008a).

The management objectives for Resource Enhancement wetlands "*to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category status. This can be achieved by restoring their wetland function, structure and biodiversity."* (EPA 2008a).

The management objectives for Conservation category wetlands is the "*preservation of wetland attributes and functions through various mechanisms including:*

- reservation in national parks, crown reserves and State owned land,
- protection under Environmental Protection Policies, and
- wetland covenanting by landowners.

These are the most valuable wetlands and the Commission will oppose any activity that may lead to further loss or degradation. No development." (EPA 2008a).

4.1.3 PROPOSED MITIGATION AND MANAGEMENT ACTIONS

The effective mitigation and management actions for Bollard Bulrush Swamp rely on an approach which will provide a consolidated wetland area for conservation into the future.

In 2012, staff from Strategen attended the site and took a series of photographs from points surrounding the wetland (these are provided in Appendix G). This process was used by Strategen to re-define the functional boundary of the wetland (Figure 16 - Strategen). Figure 16 has been developed in consultation with the EPA based on the extent and condition of existing vegetation as determined by aerial photographs and site assessment.

Determination of Wetland Buffer

It is relevant to note that there is an area surrounding the Conservation category and Resource Enhancement Wetland areas that is categorised as Multiple-Use. The Multiple-Use portion of the wetland is degraded and severely infested with weeds and therefore ENV considers that a portion of it should be used as a separation area to protect the attributes of the other portion.

This buffer will protect the vegetation and fauna values of the wetland, and provide areas for roosting, nesting, feeding and refuge. This separation from the urban land use will reduce the impact of human activities on both the vegetation and fauna of the wetland area. This will occur through limiting exposure to the following:

- Passive and active recreation by nearby residents which have the potential to disturb waterbirds and vegetation of the wetland;
- Domestic animals;
- Construction effects such as noise and vibration; and
- Effects of housing such as noise, movement and light.

The WAPC draft *Guideline for the Determination of Wetland Buffer Requirements* (2005) recommends a 50 m buffer, but this may vary depending on the threatening processes. A buffer distance of 50m is considered as appropriate to adequately protect the wetland function area and wetland habitat from further weed infestation and from inappropriate recreational uses (see Figure 16 for the outline of the wetland function area and buffer as defined by Strategen).

This will result in a manageable, cohesive wetland area, which encompasses the important features of the wetland and can be rehabilitated to provide net benefit in terms of the enhancement of native vegetation, fauna habitat, and aesthetics.

Subdivision Design

The subdivision design has been carefully considered in order to provide appropriate planning and environmental outcomes (Figure 17 – Greg Rowe and Associates).

Appropriate development setbacks will be incorporated into subdivision design and the Wetland Management Plan. Details of landscaping and design interface solutions, such as protective fencing and creation of a hard edge to the agreed wetland area, will also be included in a Wetland Management Plan.

Management Control

The effectiveness of management of the wetland area will be greatly enhanced through its transfer from fragmented, private ownership, to a cohesive unit under public ownership. The consolidation and rehabilitation of a central conservation area which

encapsulates the wetland function area will provide a more cohesive vegetated area and habitat.

Urbanisation of the adjacent area will provide the opportunity to exclude grazing and uncontrolled access to the swamp. This will in turn allow the rehabilitation and recovery of the wetland core vegetation (where the key environmental values are located), and reduce the threats posed by increased nutrient loading. Provision of formal, controlled public access to the swamp will increase the amenity and recreation values available to the surrounding community.

A Construction Environmental Management Plan will be implemented during development, and this will include management strategies to reduce the likelihood of the Priority 1 weeds on the site spreading further within the site, or to other sites.

A Wetland Management Plan will be developed to manage the impacts of the proposed development on the wetland, and its flora and fauna values. The implementation of the Wetland Management Plan will allow progress towards the enhancement of the wetland core habitat, vegetation and function, including the reduction of weed dominance. This will lead to a greatly improved environmental outcome which is otherwise unlikely to be achieved under current conditions, in the absence of any formal management.

4.2 FAUNA

The fauna survey of the subject site found fauna typical of a highly disturbed wetland environment on the Swan Coastal Plain. Two migratory bird species listed under the EPBC Act were considered to be likely to occur in the wetland portion of the site (the Cattle Egret and Eastern Great Egret), and evidence of the presence of one conservation significant Priority Four species (the Southern Brown Bandicoot).

4.2.1 POTENTIAL SOURCES OF IMPACT

The primary sources of impact on migratory birds utilising the wetland environment as a result of the project would most likely stem from altered hydrological regimes impacting on the wetland, the continued degradation of the wetland vegetation as a result of uncontrolled access and further weed dominance, and the possibility of predation by feral animals such as the black rat, the domestic cat, and the domestic dog.

4.2.2 MANAGEMENT OBJECTIVES

Management of the wetland should aim to protect the fauna present, particularly migratory birds, and the Southern Brown Bandicoot. This is most likely to be achieved through the rehabilitation of the potential fauna habitat represented by the site.

4.2.3 PROPOSED MITIGATION AND MANAGEMENT ACTIONS

Design

The design of the wetland interface will allow a greater level of control of access by feral animals and control for weed infestation. In combination with revegetation and weed control actions, this will encourage the recovery of fauna habitat in the agreed wetland area.

Management Control

Revegetation of the wetland area can focus on the creation of appropriate habitat for the Southern Brown Bandicoot, the Cattle Egret, and the Eastern Great Egret. Improvement of the quality of the habitat will serve to encourage use by all native fauna, including conservation significant fauna.

4.3 SURFACE WATER

4.3.1 POTENTIAL SOURCES OF IMPACT

Change of land use from rural to urban can result in an increase in the surface run-off from the development area due to an increase in non-permeable surfaces. Urban development may also increase the volume of pollutants, both chemical and physical, which are transported by that run-off.

4.3.2 MANAGEMENT OBJECTIVES

Surface water management is not only about restricting the increase in runoff due to development but must also manage and restore desirable environmental flows where potential impacts on significant ecosystems are identified; in this case Bollard Bulrush Swamp. The potential movement of pollutants from the site in stormwater also needs to be addressed. Appropriate management intervention can facilitate improvements in surface water quality post-development.

4.3.3 PROPOSED MITIGATION AND MANAGEMENT ACTIONS

Surface Water - Design and Management Control

Surface water management in the subject site will:

- Ensure that adequate protection is provided to buildings and infrastructure against flooding;
- Ensure downstream flood risks are mitigated;

- Maintain catchment runoff within the development are to pre-development peak flow velocities;
- Maintain sub-catchment discharge point flow velocities to pre-development peak flow velocities;
- Promote on-site retention of events up to the one–year–one–hour average recurrence interval; and
- Minimise the release of anthropogenic pollutants from the subject site.

Flooding - Design and Management Control

GHD was commissioned in 2010 to undertake flood modelling for the Bollard Bulrush Swamp. The full report undertaken by GHD is provided in Appendix H. The model was based on the model conducted for the Jandakot Drainage and Water Management Plan (DoW 2009). The Bollard Bulrush model reflected the proposed development of the area, hence used increased percentage of impermeable area. This will give a worst case scenario of the likely impact because urban sensitive design was not factored into the model.

The results indicate that the maximum water level within the Bollard Bulrush Swamp changes by less than 100 mm for the 100 year ARI event and that levels both upstream and downstream of the Peel Main Drain remain relatively unchanged during such a storm. Results are presented in Table 18.

Table 18: Modelling of Full Extent of Proposed Development (GHD 2010)*

LOCATION	TOP WATER LEVEL (m AHD)		PEAK FLOW (m^3/S)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Bollard Bulrush Swamp	4.85 *(+ 30 mm)*	5.65 *(+ 4 0mm)*	3.38 *(no change)*	4.00 *(no change)*
Peel Main Drain and Bertram Rd	7.90 *(no change)*	8.20 *(no change)*	3.25 *(no change)*	3.82 *(no change)*
Peel Main Drain at Millar Rd	4.72 *(+ 20 mm)*	5.62 *(+ 30 mm)*	4.73 *(+ 350 L/s)*	5.77 *(+ 710 L/s)*

** brackets indicate change from Jandakot DWMP modelling results*

To protect against flooding, the site will be filled to achieve finished floor levels at least 0.5 m above the 100 year peak water level. Preliminary estimates indicate up to 1.5 m of fill is required for house pads in the area adjacent to the wetland (below the 5.6 m AHD contour) to meet requirements for flooding. The fill requirements for flooding are greater than the requirements for groundwater separation, as discussed previously.

A water balance model was prepared to compare flows discharged from the site pre-development and post-development. Model inputs and assumptions were obtained from the MRS Amendment report and GHD Flood Modelling study.

An increase in recharge volume of approximately 250% is estimated post-development as shown in Appendix H. The pre-development recharge is estimated at 93 ML/year. Water balance calculations indicate that approximately 233 ML/yr additional recharge will occur on site once developed. This expected increase in recharge is a direct result of the increase in impervious area associated with development of residential and school areas.

Conceptual Stormwater Management System

The environmental flow objectives of the *Water Quality Improvement Plain (WQIP) for the Rivers and Estuary of the Peel-Harvey System* (EPA 2008b) are to maintain natural flow variability, protect wetlands and floodplains (mimic natural inundation and drying patterns) and minimise the effect of dams on water quality (mimic natural frequency, duration and seasonal flow).

Stormwater design will aim to achieve these objectives via the following:

- Retention of the 1 in 1 year ARI storm on site;
- Detention of flow to pre-development discharge for events up to the 1-year-1-hour average recurrence interval; and
- Maintenance of the hydrological regime of the wetlands.

Details to achieve this will be provided in a Local Water Management Plan (LWMS).

Surface Water Quality Best Management Practices

Surface water quality management within the site will aim to achieve phosphorus reductions and meet water quality targets specified in EPA (2008b) WQIP including a mean phosphorus concentrations of 0.1 mg/L in streams in winter. Both structural and non-structural Best Management Practices (BMP's) will be implemented to improve the quality of drainage from the development. The selection of BMPs will be guided by the Department of Water's *Stormwater Management Manual* (2004-2007) and the recommendations within the *Jandakot Water Resource Management Strategy* (DoW 2004).

Structural BMP's to be implemented will include:

- Water sensitive urban design to promote infiltration and treat stormwater before its discharge into waterways;
- Stormwater basins and swales to minimise sediment and pollutant movement;
- Subsoil drainage outlet points will run into a swale or bioretention area;
- Separation of stormwater from clean sources (such as roofs) from 'dirty' sources such as roads and industrial areas into separate basins; and
- Revegetation of cleared areas following construction, except where there will be buildings, paving or detention basins, where possible.

Non-structural BMP's will include:

- Various Environmental Management Plans will be prepared and implemented that present details of stormwater management during both the construction and operational stages;
- Inclusion of stormwater and spill management and environmental awareness training for construction staff; and
- Community education.

Stormwater management system design and proposed BMPs will be detailed in the LWMS and Urban Water Management Plans (UWMP's).

Post-development Surface Water Monitoring

Post development monitoring should be for 3 years from 80% completion of the development include sampling of surface water for pH, electrical conductivity, nutrients and metals.

The post-development monitoring program will follow the program summarised in Table 19.

Table 19: Post-Development Surface Water Monitoring Program

Frequency	Parameters to be Monitored
Site Specific	Water Levels
Quarterly	*In Situ*: pH, EC, Temperature TSS, Total N, Total P, NH_3, NO_3, NO_2, TKN, SRP/FRP

A site specific contingency action plan with associated trigger values based on the predevelopment monitoring results must be developed and presented in the Local Water Management Strategy. When trigger values are breached, communication must occur with the department of water and the Town of Kwinana as per the Jandakot DWMP (DoW 2009).

4.4 GROUNDWATER

4.4.1 POTENTIAL SOURCES OF IMPACT

Changes to the water that result from development may include alterations to the groundwater level or quality. Reduction of groundwater levels as a result of development have the potential to negatively impact on groundwater dependent ecosystems. Conversely, increases in groundwater level have the potential to increase the risk to infrastructure and assets from flooding, as well as promote transportation of nutrients and other pollutants held in the soil.

Changes in land use may also bring about changes to the groundwater quality of an area – often the quality of the groundwater may improve. The subject site also occurs within an area of high risk for Acid Sulfate Soils (ASS). Dewatering, soil disturbance, compaction or lateral displacement in areas of ASS during residential development can result in the contamination of soil and groundwater.

4.4.2 MANAGEMENT OBJECTIVES

The key objectives for groundwater management outlined in the Jandakot DWMP are:

- Protection of infrastructure and assets from flooding and inundation by high seasonal groundwater levels, perching and/or soil moisture;
- Protection of groundwater- dependent ecosystems from the impacts of urban runoff or water table decline; and
- Managing and minimising changes in groundwater levels and groundwater quality following development/redevelopment (DoW 2009).

4.4.3 PROPOSED MITIGATION AND MANAGEMENT ACTIONS

Groundwater Level Management

Groundwater levels will be maintained post-development through the use of imported fill and subsoil drainage where required. Filling to protect against flooding should also provide sufficient clearance to maximum groundwater, making any dewatering at the site highly unlikely to be necessary.

Groundwater Quality Management

Groundwater quality will be maintained to pre-development levels (median winter concentrations) and if possible improve the quality leaving the development area, which will be facilitated through the urban development of the site. The following best management measures will be implemented to manage groundwater quality as per the EPA (2008b) WQIP, the *Jandakot Structure Plan* (WAPC 2007) and the DoW's *Jandakot Water Resource Management Strategy* (DoW 2004):

- Urban fertiliser management, including limiting the use of fertilisers in Public Open Space (POS), promotion of fertiliser wise gardens and public education;
- Incorporation of soil amendments, swales and infiltration basins and irrigated POS, where required.
- Encouragement of soil amendments in residential lawns and gardens via Waterwise landscaping packages.
- Where groundwater is extracted for irrigation, extract that portion of the shallow groundwater that is enriched with nutrients.
- Connection of the development to reticulated sewage as detailed in Section 5.5.3.

Groundwater management system design will be detailed in the LWMS and UWMPs.

Post-development Groundwater Monitoring

Post development monitoring should be for 3 years from 80% completion of the development include sampling of groundwater for pH, electrical conductivity, nutrients and metals.

Groundwater bores will be sampled across the site in the post-development monitoring program ensuring in bores located at the upstream side of the development and bores at the downstream side of the development.

The post-development monitoring program will follow the program summarised in Table 20.

Table 20: Post-Development Groundwater Monitoring Program

Frequency	Parameters to be Monitored
Quarterly	Water Levels
	In Situ: pH, EC, Temperature TSS, Total N, Total P, NH_3, NO_3, NO_2, TKN, SRP/FRP
Annually	Heavy Metals

A site specific contingency action plan with associated trigger values based on the predevelopment monitoring results must be developed and presented in the Local Water Management Strategy. When trigger values are breached, communication must occur with the department of water and the Town of Kwinana as per the Jandakot Drainage and Water Management Plan (DoW 2009).

Acid Sulphate Soils Management

Dewatering, soil disturbance, compaction or lateral displacement in areas of ASS during residential development of the site will be avoided where possible. The design of the development is highly likely to involve the importation of fill during development to achieve the required separation from groundwater levels, and to reduce flooding risk. This will reduce the likelihood of disturbing ASS through reducing the need for dewatering and large-scale excavations.

Should design development later in the planning process involve the disturbance or dewatering of any areas of potential ASS, a compliant investigation will be undertaken and an Acid Sulfate Soils and Dewatering Management Plan will be implemented for the site as a condition of subdivision.

Management of Effluent Disposal

Because of the high groundwater levels on the site and the size of residential lots, the use of on-site wastewater systems is not considered appropriate. The EPA (2008) WQIP states that all new developments in the Peel-Harvey Catchment are to be connected to reticulated sewage or Alternative Treatment Units (ATU's). The development will therefore be connected to the urban sewerage system.

5 ENVIRONMENTAL MANAGEMENT FRAMEWORK

5.1 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

The Construction Environmental Management Plan will provide a series of guidelines which will address the following issues during the construction phase of the future development of the site:

- Clearing protocols;
- Protection of wetland values;
- Protection of any native fauna present on the site;
- Reduction of noise pollution caused increased large vehicle traffic in the area, as well as construction noise and vibration;
- Spill mitigation and management in terms of chemicals and fuels either kept onsite or used onsite;
- Dust management during site clearing activities;
- Dieback management;
- Provision of a hygiene station to wash vehicles down prior to leaving the site to reduce the likelihood of spread of declared weed plants;
- Minimisation of disturbance of any Acid Sulphate Soils that occur on the site; and
- Revegetation and rehabilitation of preserved areas of native vegetation, and restriction of public access to rehabilitation and vegetated areas to reduce further degradation.

5.2 WETLAND MANAGEMENT PLAN

A Wetland Management Plan will be prepared at the subdivision stage of the development, outlining specific strategies for the preservation of the agreed area of Bollard Bulrush Swamp. This plan will detail the following:

- How preservation of the hydrological regime will be achieved; and
- How the vegetation and ecological values of the agreed portion of the wetland will be maintained and enhanced, including interface management.

The wetland management plan will include:

- A specific vision to ensure the wetland's values and attributes are conserved and enhanced;
- Outline of the existing environment;
- Identification of potential threats and sources of impacts;
- Outline current management issues;
- Specify management undertaken to date;
- Identify new management strategies, including;
    - Detail of the interface between the development and the wetland, and how this will assist in the control of weed infestation;
    - Rehabilitation works to be undertaken in the agreed wetland area and buffer (see Figure 16), including planting of appropriate native plant species and wetland-sensitive weed treatments;
    - Location and details of any infrastructure proposed to protect wetland values, such as fencing, paths, boardwalks and signposting;
    - Control of direct public access to the wetland, possibly through the installation of pathways or boardwalks to allow passive recreation;
    - Location and detail of interpretive signage;
    - Description of community education program, which may include provision of educational materials to residents; and
    - Any fauna relocation (if necessary);
- An implementation plan, including definition of responsible parties; and
- Guidelines for future monitoring programs, including methodology, performance criteria, and contingency measures.

5.3 WATER MANAGEMENT PLANS

A series of reports focussing on total water cycle management for the site will be produced in concert with further development planning of the site. These will provide an increasing level of detail in support of each stage of the planning process, as required by *Better Urban Water Management* (WAPC 2008).

5.3.1 DISTRICT WATER MANAGEMENT STRATEGY

A District Water Management Strategy (DWMS) will be prepared to accompany any future application for lifting of Urban deferment for the site. This will be based upon the guidelines presented in *Better Urban Water Management* (WAPC 2008) and will include the following:

- Design and management objectives;
- A summary of the pre-development environment including a summary of any previous studies; in particular the modelling work completed for this Environmental Review, and the analysis and management options contained within it;
- An analysis of potential development impacts and options for enhancing water conservation in future development at the site;
- A presentation of the site water balance and a discussion on fit-for-purpose water source planning, including allocation of water for different uses and any existing and required infrastructure;
- A water management strategy; including a presentation of the stormwater model and a discussion on the appropriate management of surface water, groundwater, wastewater and drinking water management and how to enhance water efficiency at the site; and
- An Implementation framework.

5.3.2 LOCAL WATER MANAGEMENT STRATEGY

A Local Water Management Strategy consistent with the requirements of *Better Urban Water Management* (WAPC 2008) will be prepared alongside the Local Structure Plan for the development. This Strategy will include the following sections:

- Principles and objectives of total water cycle management;
- Details of the proposed development;
- Design criteria;
- A description of the pre-development environment;
- Average Annual Maximum Groundwater Levels based on groundwater monitoring;
- Minimum floor levels to provide protection from the groundwater table and local flood levels;
- Description of the conceptual stormwater water modelling;
- Detail structural and non-structural controls for stormwater quality to be used in the development;
- An assessment of potential potable water conservation measures for the site; and
- Guidance on future management of the site including requirements for monitoring, roles, responsibilities and construction.

5.3.3 URBAN WATER MANAGEMENT PLAN

In line with *Better Urban Water Management* (WAPC 2008) and the *Urban Water Management Plan Guidelines* developed by DoW (2008), an Urban Water Management Plan will be produced alongside the subdivision application for the development, and will include:

- A summary of the pre-development environment including a summary of previous studies;
- Design objectives for water management;
- Pre and post-development water balances and a discussion of how the potable water management strategies will be met;
- Summary of the stormwater design undertaken by project engineers to demonstrate that the design complies with Department of Water and Town of Kwinana requirements and accompanying engineer's drawings;
- A groundwater management plan to demonstrate protection of groundwater resources;
- Specific design information regarding engineering design and landscape architecture in the UWMP;
- Proposed nutrient management approaches, including both structural and non-structural controls;
- A plan for management of subdivision works;
- Design of a post-development monitoring programme; and
- An implementation plan.

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FIGURES

CLIENT: Wellard Landowner's Group
JOB NO.: 10.127
AUTHOR: K. Thomson
DRAWN: T. Ellis
DATE: 9-03-2011
SCALE: 1:8,000 @ A4
PROJECTION: GDA94 MGA50

Location Map

Wellard Urban Precinct East
Environmental Review

FIGURE 1

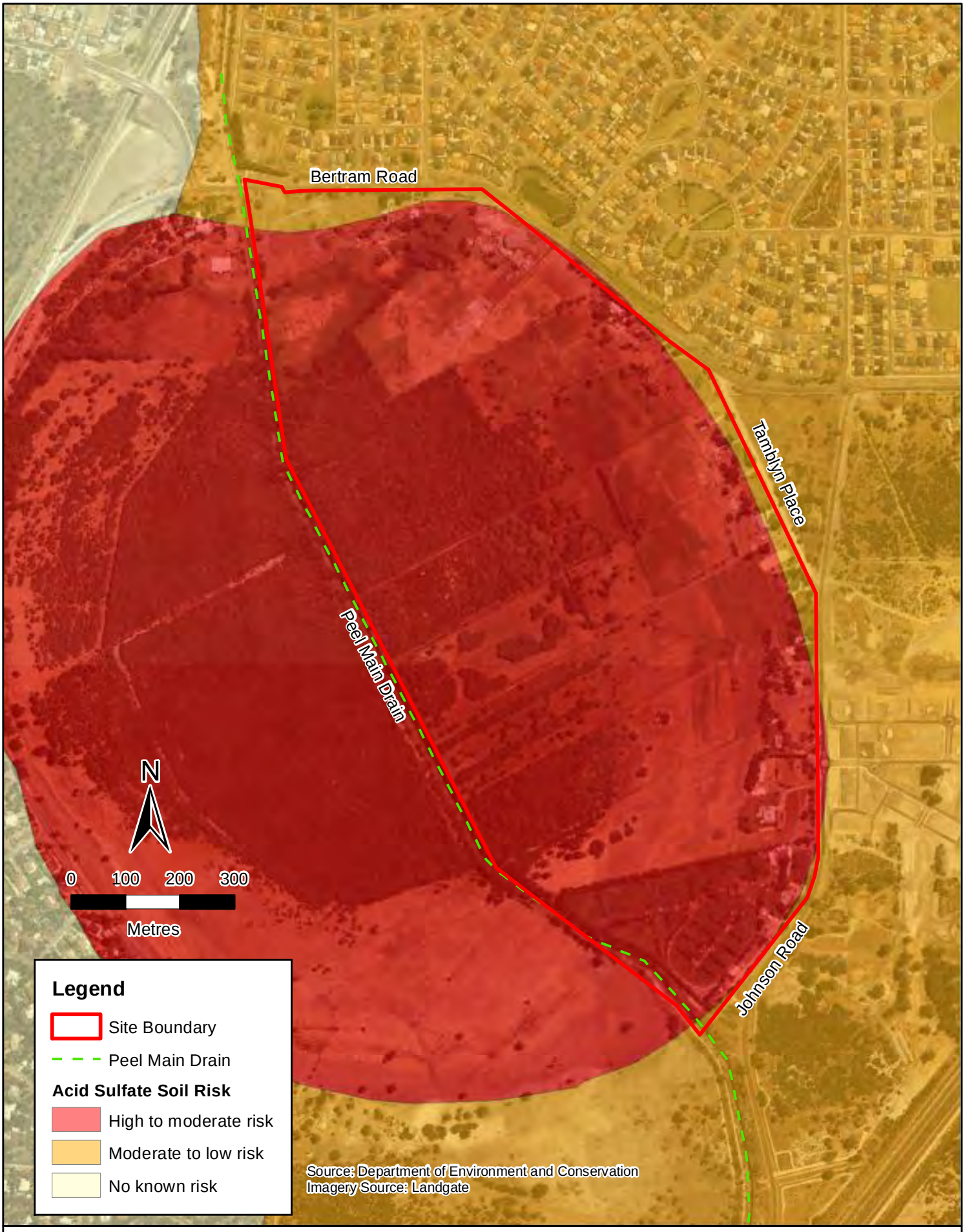
Source: Greg Rowe & Associates

CLIENT		**JOB NO.**	
Wellard Landowner's Group		10.127	
AUTHOR	**DRAWN**	**DATE**	
K. Thomson	M. Mikkonen	12-09-2012	
SCALE	**PROJECTION**		
NTS @ A4	GDA94 MGA50		

Existing Zoning Plan

Wellard Urban Precinct East
Environmental Review

FIGURE 2



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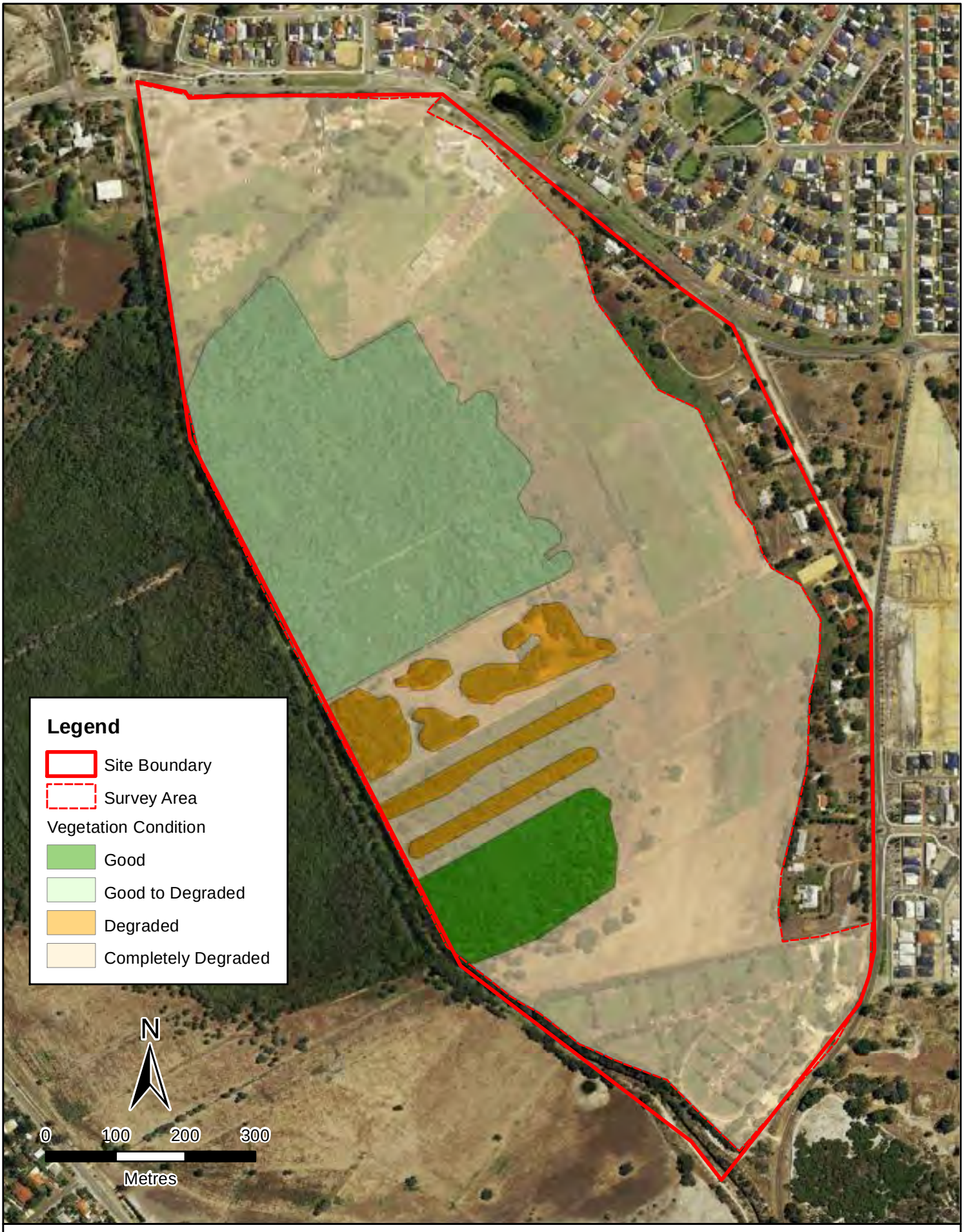
CLIENT		**JOB NO.**
Wellard Landowner's Group		10.127
AUTHOR	**DRAWN**	**DATE**
K. Thomson	T. Ellis	12-09-2012
SCALE	**PROJECTION**	
1:9,000 @ A4	GDA94 MGA50	

Acid Sulfate Soil Risk Mapping

Wellard Urban Precinct East
Environmental Review

FIGURE 4

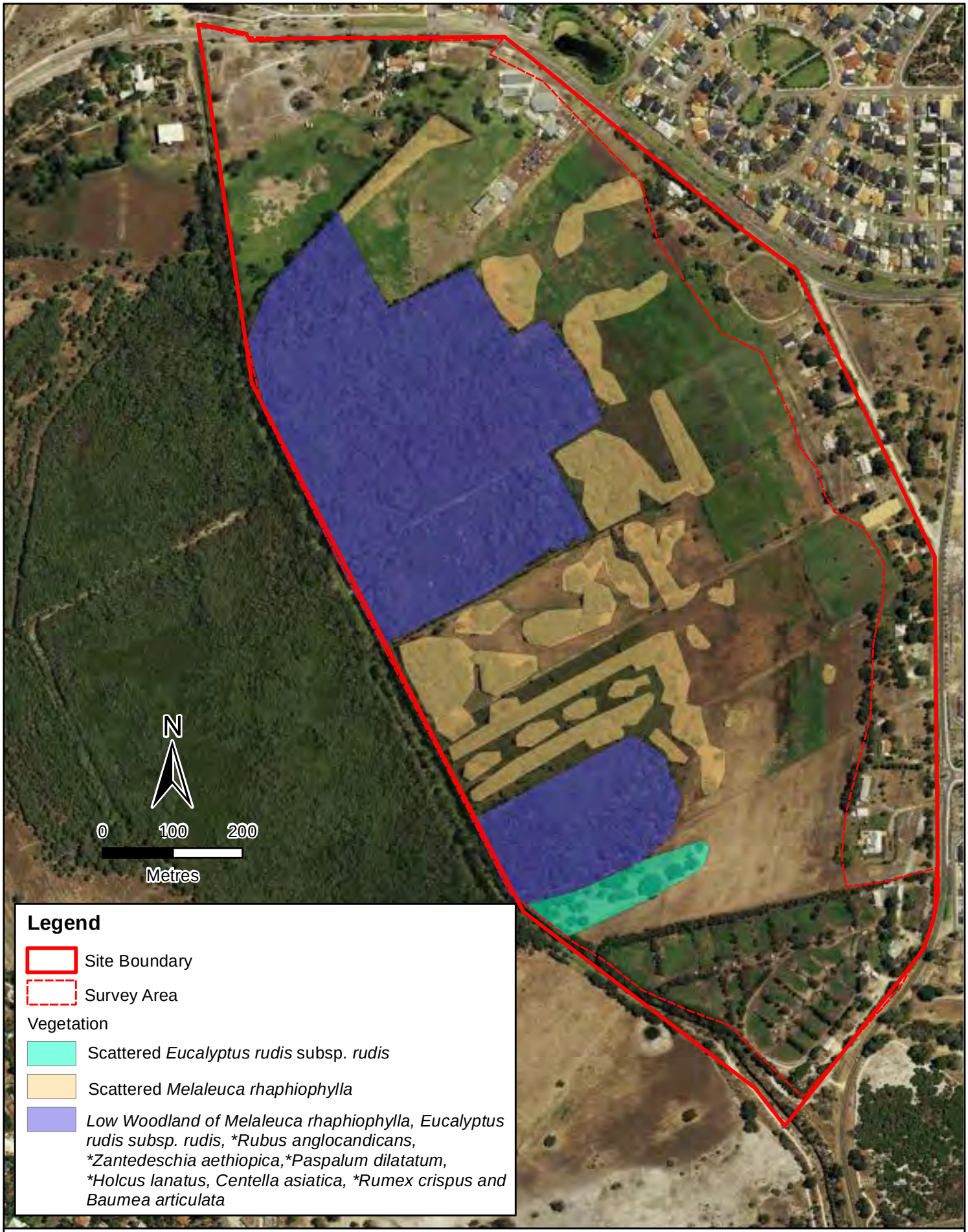


CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: C. Sgherza
DRAWN: T. Ellis
DATE: 12-09-2012
SCALE: 1:7,000 @ A4
PROJECTION: GDA 94 MGA 50

Vegetation Condition

Wellard Urban Precinct East
Environmental Review

FIGURE 5



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CLIENT
Wellard Landowner's Group

JOB NO.
10.127

AUTHOR
C. Sgherza

DRAWN
T. Ellis

DATE
12-09-2012

SCALE
1:7,000 @ A4

PROJECTION
GDA94 MGA50

Vegetation Complex

Wellard Urban Precinct East
Environmental Review

FIGURE 6

env Australia

CLIENT	JOB NO.
Wellard Landowner's Group	10.127

AUTHOR	DRAWN	DATE
C. Sgherza	T. Ellis	12-09-2012

SCALE	PROJECTION
1:7,000 @ A4	GDA94 MGA50

Location of Declared Plants

Wellard Urban Precinct East
Environmental Review

FIGURE 7

CLIENT
Wellard Landowner's Group

JOB NO.
10.127

AUTHOR
K. Thomson

DRAWN
T. Ellis

DATE
12-09-2012

SCALE
1:7,000 @ A4

PROJECTION
GDA94 MGA50

Fauna Habitat

Wellard Urban Precinct East
Environmental Review

FIGURE 8

env Australia

CLIENT		JOB NO.	
Wellard Landowner's Group		10.127	
AUTHOR	DRAWN	DATE	
K. Thomson	T. Ellis	12-09-2012	
SCALE	PROJECTION		
1:10,000 @ A4	GDA94 MGA50		

Hydric Soils Distribution

Wellard Urban Precinct East
Environmental Review

FIGURE 9

env Australia

CLIENT	JOB NO.
Wellard Landowner's Group	10.127

AUTHOR	DRAWN	DATE
K. Thomson	M. Mikkonen	11-09-2012

SCALE	PROJECTION
1:8,000 @ A4	GDA94 MGA50

Geomorphic Wetlands

Wellard Urban Precinct East
Environmental Review

FIGURE **10**

CLIENT
Wellard Landowner's Group

JOB NO.
10.127

AUTHOR
K. Thomson

DRAWN
T. Ellis

DATE
12-09-2012

SCALE
1:8,000 @ A4

PROJECTION
GDA94 MGA50

EPP Lakes

Wellard Urban Precinct East
Environmental Review

FIGURE 11

env Australia

CLIENT		JOB NO.	
Wellard Landowner's Group		10-127	
AUTHOR	DRAWN	DATE	
K. Thomson	T. Ellis	12-09-2012	
SCALE	PROJECTION		
1:8,000 @ A4	GDA94 MGA50		

Aerial Photograph 22-11-1991

Wellard Urban Precinct East
Environmental Review

FIGURE 12

env Australia

CLIENT		JOB NO.	
Wellard Landowner's Group		10-127	
AUTHOR	DRAWN	DATE	
K. Thomson	T. Ellis	12-09-2012	
SCALE	PROJECTION		
1:8,000 @ A4	GDA94 MGA50		

EPP Mapping 22-11-1991

Wellard Urban Precinct East
Environmental Review

FIGURE 13

env Australia

CLIENT	JOB NO.
Wellard Landowner's Group	10.127
AUTHOR / DRAWN	DATE
B. Woodward / S. Rho	12-09-2012
SCALE	PROJECTION
1:10,000@ A4	GDA 94 MGA 50

Groundwater Plan

Wellard Urban Precinct East
Environmental Review

FIGURE 14

CLIENT	JOB NO.
Wellard Landowner's Group	10.127
AUTHOR	**DRAWN**	**DATE**
B. Woodward	S. Rho	12-09-2012
SCALE	**PROJECTION**
1:10,000 @ A4	GDA 94 MGA 50

Surface Water Plan

Wellard Urban Precinct East
Environmental Review

FIGURE **15**

CLIENT		JOB NO.	
Wellard Landowner's Group		10.127	
AUTHOR	DRAWN	DATE	
B. Woodward	S. Rho	12-09-2012	
SCALE	PROJECTION		
1:10,000 @ A4	GDA 94 MGA 50		

Wetland Boundary and 50m Buffer (Strategen)

Wellard Urban Precinct East Environmental Review

FIGURE 16

CLIENT		**JOB NO.**	
Wellard Landowner's Group		10.127	
AUTHOR	**DRAWN**	**DATE**	
B. Woodward	S. Rho	12-09-2012	
SCALE	**PROJECTION**		
1:10,000 @ A4	GDA 94 MGA 50		

Concept Structure Plan (Greg Rowe)

Wellard Urban Precinct East
Environmental Review

FIGURE 17

APPENDIX A

BOLLARD BULRUSH EAST FLORA AND VEGETATION ASSESSMENT

BOLLARD BULRUSH EAST

FLORA AND VEGETATION ASSESSMENT

BOLLARD BULRUSH EAST
FLORA AND VEGETATION ASSESSMENT

Prepared for

WELLARD LANDOWNERS GROUP

Prepared by

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Content Review:	*Teresa Gepp*
Date:	*29 July 2011*

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment 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 ENV.Australia Pty Ltd (ENV) ('scope of services'). In some circumstances the scope of services may have been limited by factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV has relied on 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, ENV 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 in part on the data, those conclusions are contingent upon the accuracy and completeness of the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, unavailable, misrepresented or otherwise not fully disclosed to ENV.

Environmental Conclusions

In accordance with the scope of services, ENV has relied on 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.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling 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, express or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and for no other party. ENV 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 ENV or for any loss or damage suffered by any other party relying on 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

ENV will not be liable to update or revise the report to take into account any events or circumstances occurring or facts 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.

EXECUTIVE SUMMARY

ENV.Australia Pty Ltd was commissioned in June by Greg Rowe and Associates, on behalf of the Wellard Landowners Group, in 2010 to undertake a flora and vegetation assessment for the Bollard Bulrush East site within the Town of Kwinana. The survey area is approximately 73 hectares in size and consists of cleared agriculture land and remnant vegetation.

The purpose of this assessment is to provide information on the significance of the flora and vegetation present within the survey area.

The field survey was conducted on the 29th September and recorded 23 taxa from 16 families and 22 genera.

No plant species listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999*, as Declared Rare pursuant to the *Wildlife Conservation Act 1950* or as Priority species listed by the Department of Environment and Conservation were located during the survey. The survey area is highly disturbed and ENV considers that it is unlikely that the Bollard Bulrush East survey area supports species of conservation significance.

Sixteen introduced species were identified during the survey. The majority of the introduced species present are typical bushland weeds. Two Declared Plants were recorded within the survey area, Arum Lily (**Zantedeschia aethiopica*) and Blackberry (**Rubus anglocandicans*). Both of these species require management in accordance with the *Agriculture and Related Resources Protection Act 1976.*

The Bollard Bulrush East survey area is mapped as the Herdsman Complex: Vegetation consists of sedgelands and fringing woodland of *Eucalyptus rudis* - *Melaleuca* species. This complex exceeds the 10% recommended retention status for the Bush Forever study area.

One vegetation unit was identified within the survey area, Low Woodland of *Melaleuca rhaphiophylla* and *Eucalyptus rudis* subsp. *rudis*. This unit was described as being in Good to Degraded and therefore it could not be confidently inferred to a Floristic Community Type. However, the vegetation was considered to be similar to the Floristic Community Type: SCP17 '*M. rhaphiophylla – Gahnia trifida* seasonal wetlands'. This Floristic Community Type is not listed as a Threatened Ecological Community under Federal or State legislation or a Priority Ecological Community by the Western Australian Department of Environment and Conservation.

The remnant vegetation within the survey area is described as being in Good to Completely Degraded condition. Disturbances to the vegetation include clearing, invasion by introduced species as well as grazing and trampling by domestic livestock (cattle).

The Department of Environment and Conservation's Geomorphic Wetlands Dataset identifies two wetlands within the survey area; one Resource Enhancement and Multiple Use wetland. In addition the Bollard Bulrush Swamp is listed as a wetland of high ecological value under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

1 INTRODUCTION

ENV.Australia Pty Ltd ('ENV') was commissioned in June by Greg Rowe and Associates, on behalf of the Wellard Landowners Group, in 2010 to undertake a flora and vegetation assessment for the Bollard Bulrush East site ('the survey area').The site consists of Lots 1, 4, 5, 6 and 86 Johnson Road and Lots 67, 68, 72 and 74 Bertram Road. The survey area is approximately 73 hectares (ha) in size and consists of remnant vegetation within cleared paddocks.

The purpose of this assessment is to provide information on the significance of the flora and vegetation present within the survey area.

1.1 LOCATION

The survey area is located approximately 35 kilometres (km) south of Perth CBD, in the suburb of Wellard, in the Town of Kwinana. The survey area is bound by private property on its northern, eastern and southern sides. The Peel Harvey Main Drain is located on the western boundary of the survey area (Figure 1).

1.2 CLIMATE

The climate of this region is warm Mediterranean, with an average maximum summer temperature of 28.3°C and an average minimum winter temperature of 10.9°C (Bureau of Meteorology (BoM) 2010). The region receives an average annual rainfall of 765.3 mm, with the majority of precipitation occurring in winter (BOM 2010) (Figure 2).

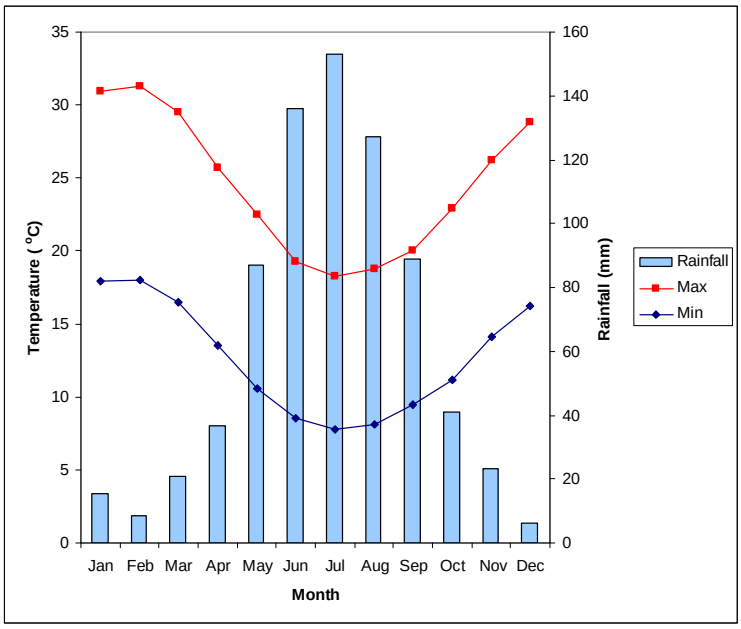

Figure 2: Average Monthly Rainfall and Maximum and Minimum Temperatures at Medina Research Station (1983-2010) (BoM 2010)

1.3 REGIONAL SOILS, LANDFORMS AND VEGETATION

For a development proposal to be assessed in terms of the flora and vegetation values that may be impacted upon, an understanding of the vegetation communities at the site in question is required. In Western Australia, there are various reports that detail a region's botanical values.

A widely-used vegetation classification system that maps and describes vegetation communities in south-west Western Australia is *Vegetation of the Darling System* in the *Atlas of Natural Resources, Darling System, Western Australia* (Department of Conservation and Environment 1980). This document describes vegetation communities as vegetation complexes, and maps the distribution of each complex.

Vegetation complexes are defined as a combination of distinct site vegetation types, usually associated with a particular geomorphic, climatic, floristic and vegetation structural association. Vegetation complexes are based on the pattern of vegetation at a regional scale, as it reflects the underlying key determining factors of landforms, climate and soils.

The soils and landform unit, as well as the vegetation complex supported by the survey area, are described below:

1.3.1 Soils and Landforms

The survey area occurs on the Swan Coastal Plain portion of the Darling System (Churchward & McArthur 1978). The Swan Coastal plain consists of aeolian and fluviatile deposits, specifically the site is on:

- Herdsman unit: Peaty swamps associated with Bassendean and Karrakatta units.

1.3.2 Beard Vegetation Mapping

The survey area is in the South West Botanical Province and the Darling Botanical District (Beard 1990). This region typically consists of forest country with related woodlands and is divided into four subregions or botanic subdistricts.

The survey area is within the Swan Coastal Plain Subregion of the Drummond Botanical Subdistrict (Beard 1990). The Drummond Botanical Subdistrict consists mainly of the following vegetation communities:

- *Banksia* Low Woodland on leached sands and *Melaleuca* Swamps in poorly drained areas;
- Woodland of Tuart (*Eucalyptus gomphocephala*); and
- Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands on the less leached soils (Beard 1990).

1.3.3 Vegetation Complex Mapping

Heddle *et al*., (1978) mapped the area as containing one Swan Coastal Plain vegetation complex which is related to the underlying soil profile:

- Herdsman Complex: Vegetation consists of sedgelands and fringing woodland of *Eucalyptus rudis* - *Melaleuca* spp.

The Environmental Protection Authority's (EPA) document *Levels of Assessment for Proposals Affecting Natural Areas Within System 6 Region and Swan Coastal Plain Portion of the System 1 Region* (EPA 2006) gives an estimate of the percentage of each complex that remains compared to its pre-European settlement extent, so an estimate of the scarcity of each complex can be determined.

Across its extent 34.6% of the Herdsman Complex is estimated to remain (EPA 2006). Within the Bush Forever project area, which covers the Swan Coastal Plain portion of the Perth Metropolitan Area (PMA), 31% of the Herdsman Complex is estimated to remain (Government of Western Australia 2000).

The EPA recognises vegetation complexes that are not well represented in reserves as being significant. Vegetation complexes which have 10%-30% remaining may be considered regionally significant. Proposals that would impact on a vegetation complex with 10% or less remaining may be formally assessed by the EPA (EPA 2006).

1.4 PROTECTION OF FLORA AND VEGETATION

Flora species are protected formally and informally by various legislative and non-legislative measures, which are as follows:-

Legislative Protection

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth): a Federal Act;
- *Wildlife Conservation Act 1950* (WA): a State Act; and
- *Environmental Protection Act 1986* (WA): a State Act.

Non-Legislative Protection

- Western Australian Department of Environment and Conservation (DEC) Priority lists for flora and vegetation; and
- informal recognition of locally significant populations

A short description of these measures is given below, and definitions of the species conservation codes and ecological community categories they use, and those used by the DEC, are provided in Appendix A.

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) ('the EPBC Act') aims to protect matters of national environmental significance, which are detailed in Appendix A.

Under the EPBC Act, the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities ('SEWPAC') lists threatened species and Threatened Ecological Communities (TECs) in certain categories determined by criteria set out in the Act (*www.environment.gov.au/epbc/index.html*).

The Act provides for substantial penalties for any unauthorised actions likely to adversely affect matters of national environmental significance. It also provides for a national environmental assessment and approvals process for proposed actions likely to affect the prescribed matters of national environmental significance. If a proposed action is approved subject to certain conditions, the proponent does not contravene the Act if the action is carried out in accordance with the conditions imposed.

Projects likely to cause impacts on matters of national environmental significance (as defined in the EPBC Act – see Appendix A) should be referred to SEWPAC for assessment under the EPBC Act.

Wildlife Conservation Act 1950 (WA*)*

The Western Australian DEC recommends flora taxa for listing under the provisions of the *Wildlife Conservation Act 1950* (WA*)* ('WC Act') as protected according to its need for protection (see Appendix A).

Flora species are given Declared Rare status when their populations are geographically restricted or are threatened by local processes. In addition, under the WC Act, by Notice in the Western Australian Government Gazette of 9 October 1987, all native flora (spermatophytes, pteridophytes, bryophytes and thallophytes) is protected throughout the State.

The Act makes it an offence to 'take' threatened species without an appropriate licence. There are financial penalties for contravening the Act.

Environmental Protection Act 1986 (WA)

Declared Rare Flora (DRF) and TECs are given special consideration in environmental impact assessment, and are Environmentally Sensitive Areas (ESAs) under the *Environmental Protection Act 1986* ('EP Act') and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The protection of DRF and TECs is a 'clearing principle' for assessing applications for permits to clear native vegetation, where exemptions for a clearing permit under the

Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply. There are substantial penalties (financial and/or imprisonment) for unlawfully damaging ESAs.

DEC Priority Lists

The DEC lists 'Priority' flora species that have not been assigned statutory protection under the WC Act, but which are under consideration for declaration as 'Rare Flora' under the Act. Species assessed as Priorities 1-3 (see Appendix A) are in urgent need of further survey, whilst Priority 4 species require monitoring every 5-10 years (see Appendix A for definitions).

In addition, the DEC maintains a list of Priority Ecological Communities (PECs) which identifies those communities that need further investigation before possible nomination for TEC status.

Although DEC Priority species and communities have no formal protection, they are under consideration for legislative protection. Sensitivities to harm can therefore be expected to be heightened.

Informal Recognition of Flora and Vegetation

Certain populations or communities may be of local significance or interest because of their patterns of distribution and abundance. For example, flora may be locally significant because they are range extensions to the previously-known distribution or are newly-discovered taxa (and therefore have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (primarily land clearing), and relict populations of such species assume local importance.

Despite the lack of any formal protection for species in this category, project proponents are strongly advised to be aware of and be sensitive to community concerns as to locally significant species or communities.

1.5 INTRODUCED SPECIES

The Environmental Weed Strategy for Western Australia (Department of Conservation and Land Management 1999) contains criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity (Appendix B). The Strategy defines environmental weeds as 'plants that establish themselves in natural ecosystems and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade.'

Plants may also be 'Declared' by the Agriculture Protection Board under the *Agriculture and Related Resources Protection Act 1976* (WA) ('ARRP Act'). Declared Plants are gazetted under five categories (P1-P5), which define the action required. Details of the

definitions of these categories are provided in Appendix B. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is Declared, landholders are obliged to control that plant on their properties (Department of Agriculture and Food 2010).

1.6 WETLAND CLASSIFICATIONS

1.6.1 Geomorphic Wetlands

In an effort to protect wetlands on the Swan Coastal Plain, the DEC developed a dataset, mapping the location, type and management category of wetlands on the Swan Coastal Plain (DEC 2010a). A management category is assigned to each wetland which provides guidance on the nature of the management and protection the wetland should be afforded.

Table 1: Wetland Management Categories

Management Category	General Description	Management Objectives
Conservation	Wetlands which support a high level of ecological attributes and functions.	Highest priority wetlands. Objective is to preserve and enhance the conservation values of the wetlands, through various mechanisms, including reservation in national parks, Crown reserves and State-owned land, protection under Environmental Protection Policies, and wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands, and any activity that may lead to further loss or degradation is inappropriate. The EPA urges that all CCWs and their buffers be fully protected. A minimum buffer of 50 m from the edge of wetland-dependent vegetation is typically allocated to CCWs. However, the policy is that the buffer be determined on a case-by-case basis.

Management Category	General Description	Management Objectives
Resource Enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions.	Priority wetlands. The ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity. Protection is recommended through a number of mechanisms. The EPA urges that all reasonable measures be taken to minimise the potential impacts on REWs and their buffers. A minimum buffer of 50 m from the edge of wetland-dependent vegetation is typically allocated to REWs.
Multiple Use	Wetlands with few remaining important attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare. The EPA urges that all reasonable measures be taken to retain the wetland's hydrological functions (including onsite water infiltration and flood detention) and, where possible, other wetland functions. There is usually no minimum buffer requirement allocated to Multiple Use Wetlands.

(After: EPA 2008)

The DEC position on buffers is that they should be maintained in their current state and/or rehabilitated to native vegetation, and that no development (e.g. drainage basins, lawn area, active recreation space) should occur within the buffer zone.

The DEC Geomorphic Wetlands Dataset identifies two wetlands as occurring within the survey area. One of these wetlands (UFI 6730) has a Resource Enhancement management category and the other (UFI 13327) has a Multiple Use management category (Figure 3).

1.6.2 Environmental Protection Policy Wetlands

To protect and conserve the remaining wetlands on the Swan Coastal Plain, the EPA developed the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP) under section 26 of the EP Act. EPP Lakes are managed by the EPA and amendments require approval under the EP Act. The Bollard Bulrush Swamp is listed under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (Figure 3).

1.7 BUSH FOREVER

Bush Forever is a State Government Policy and program which identifies 51,200 ha of regionally significant bushland for protection, covering 26 vegetation complexes. This amounts to about 18% of the original vegetation on the Swan Coastal Plain portion of the PMA, and excludes local conservation reserves.

Regionally significant bushland has been identified on the basis of criteria relating to its conservation value. Important among these criteria is the achievement, where possible, of a comprehensive representation of all the ecological communities originally occurring in the region, principally through protecting a target of at least 10 per cent of each vegetation complex (Government of Western Australia 2000).

The Government of Western Australia has endorsed Bush Forever as the means of seeking the appropriate protection and management of areas of regionally significant bushland on the Swan Coastal Plain Portion of the PMA and a balance between environmental, social and economic objectives. As an endorsed government policy it is used as a basis for decision-making and an agreed framework for the protection and management of Bush Forever Sites through the implementation mechanisms identified in the plan (Government of Western Australia 2000).

The survey area has not been identified as being required to meet the Bush Forever biodiversity retention targets within Western Australia.

2 SCOPE OF WORK

The flora and vegetation assessment undertaken within the survey area specifically included:

- a desktop assessment of relevant literature and databases to determine Threatened Flora and Ecological Communities that may occur in the area;
- a flora and vegetation field survey, incorporating a search for conservation significant flora and the establishment of two permanent quadrats;
- a review of data collected against criteria established in Federal and State processes for species conservation;
- the production of vegetation mapping and vegetation condition mapping;
- interim identification and mapping of any TECs, PECs and any other areas of ecological importance (e.g. Wetlands, ESAs); and
- the production of a technically sound report presenting the results of the survey and recommendations.

3 METHODS

All flora surveys undertaken by ENV are designed to be consistent with the EPA requirements for the environmental surveying and reporting of flora surveys in Western Australia, as set out in the following documents:

- *Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation with Particular Reference to Agricultural Areas, Position Statement No. 2* (EPA 2000); and
- *Guidance for the Assessment of Environmental Factors – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004).

ENV then assesses and reports the results of its surveys with particular regard to the provisions of the EPBC Act, WC Act and EP Act.

The methodology for the work involved the following key steps:

3.1 DESKTOP SURVEY

A request for a database search was submitted to the DEC to obtain a list of Declared Rare and Priority Flora species, TECs and PECs in the area of Wellard. The search area included a 5 km radius around the following coordinates; 32° 15' 32" S - 115° 50' 31" E (GDA94) (DEC 2010b).

A desktop review was undertaken of the following databases and documents:

- DEC combined biological database NatureMap (DEC 2010c);
- SEWPAC Protected Matters Search Tool (SEWPAC 2010), also known as an EPBC search; and
- previous flora surveys (e.g. previous consultants reports, DEC reports).

3.2 FIELD SURVEY

On the 29th September 2010 an ENV botanist visited the site and conducted a vegetation survey by traversing the property on foot. Data was collected from quadrats in the survey area, and geographic coordinates noted for changes in vegetation units[1]. Three 10 m x 10 m quadrats and one relevé were assessed in the vegetation unit. At each site a photograph was taken, the vegetation unit was described and a condition statement

[1] For the purposes of this flora and vegetation assessment, a vegetation unit is described on a fine scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

made. The sampling intensity was selected in consideration of the landforms, habitat, vegetation structure, diversity and seasonality. Refer to Appendix C for the Flora Field Data Sheets and Site Photographs and Appendix D for the Vegetation Condition Scale.

During the field survey, plants that were suspected as being significant were described and their geographic coordinates noted.

3.2.1 Taxonomy

Where field identification of plant taxa was not possible, specimens were collected systematically for later identification at the Western Australian Herbarium (WAH) by use of identification keys and by comparison with the reference collection.

3.2.2 Vegetation Mapping

Vegetation unit descriptions were tabulated, and their boundaries were mapped. The vegetation descriptions for the units across the survey area were referenced against Gibson *et al.,* (1994) to determine the Floristic Community Types ('FCTs') present and the consequent potential for the survey area to support TECs or PECs. FCTs were defined according to Gibson *et al.,* (1994) on the basis of Multivariate Analysis of quadrat data, species composition, soils and topography.

The Multivariate Analysis of the quadrat data involved transformation (presence-absence) and computation of a similarity matrix based on Bray-Curtis similarity. The matrix allows for comparison of the vegetation within the study area with Gibson *et al.,* (1994) FCT data. This allows determination of the similarity between the vegetation communities mapped and TECs or PECs.

3.3 FLORA SURVEY LIMITATIONS AND CONSTRAINTS

It is important to note the specific constraints imposed on individual surveys. Constraints are often difficult to predict, as is the extent to which they influence survey effort. Survey variables concerning the flora and vegetation survey are detailed in Table 2.

Table 2: Limitations and Constraints Associated with the Flora and Vegetation Survey

Variable	Impact on Survey Outcomes
Access Problems	No access problems were encountered.
Experience levels	The botanists who executed the work were practitioners suitably qualified in their respective fields. • Coordinating Botanist: Ciaran Sgherza (Environmental Scientist/ Botanist); • Field Staff: Ciaran Sgherza; • Taxonomy: Peter Jobson (Senior Botanist / Taxonomist); and • Data Interpretation: Ciaran Sgherza.
Timing [2], weather, season in relation to Flora	The survey was undertaken in spring on the 29th September 2010. The area had received 455.4 millimetres (mm) of rain in the year to date (January to September) which is significantly below the long term average of 604.7 mm for the same period (1983 – 2007) (BOM 2010). Flora composition changes over time, with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). Therefore the results of future botanical surveys in this location may differ from the results of this survey.
Completeness	Species that were insufficiently mature or dead were identified in the field to genus or family level only (where possible). A comprehensive species list has not been prepared for areas that do not constitute a natural vegetation area, such as gardens or areas that have been totally cleared.

[2] EPA Guidance Statement 51 (2004) stipulates that flora and vegetation surveys should be undertaken following the season that contributes the greatest rainfall in the region. In the South-west Province the main rain is in winter, requiring surveys to be undertaken in spring. Short-term variations in normal weather patterns (e.g. drought) may necessitate supplementary survey work at other times of year or in later years to take into account temporal changes in diversity.

Variable	Impact on Survey Outcomes
Determination	This survey makes inferences about vegetation types that have the potential to be TECs. However, a decision as to the presence or absence of TECs at the site remains the responsibility of the DEC's Species & Communities Branch. The taxonomy and conservation status of the Western Australian flora are dynamic. This report was prepared in reliance on taxonomy and conservation current at the time issuing, but it should be noted this may change.

3.4 PERMITS

Specimens collected during the survey were taken by permit of and subject to the conditions of the following licences issued under sections 23C and 23F of the WC Act:

- SL008481 (General Scientific Licence) and 73-0910 (DRF Licence) issued to Ciaran Sgherza.

4 RESULTS

4.1 DESKTOP SURVEY

The desktop database search of the Wellard area resulted in ten Declared Rare and eight Priority Flora species being identified as potentially occurring in the area. For a list of species found during the desktop survey search, please refer to Appendix E.

The Desktop survey determined that five TECs and three PECs are known to occur within a 5 km radius of the survey area. Refer to Appendix E for the full list.

4.2 FIELD SURVEY - FLORA

4.2.1 Flora

Sixteen families, 22 genera and 23 taxa were recorded in the survey area (seven native flora taxa and 16 introduced), refer to Appendix F for the flora species list.

The plant families most frequently recorded from the survey were as follows;

- Poaceae five species:
- Myrtaceae three species; and
- Asteraceae two species.

An average of 13 species was recorded in each of the three quadrats conducted within the survey area; refer to Appendix G for the Matrix of Taxa by Site.

4.2.2 Protected Flora

No Threatened species pursuant to the EPBC Act were located during the survey.

No plant taxa gazetted as Declared Rare pursuant to the WC Act were located in the survey area.

No Priority Flora species listed by the DEC were located in the survey area.

4.2.3 Introduced Flora

The table below contains the dominant weed species identified during the field survey, with their ratings and criteria according to the Environmental Weed Strategy for Western Australia (refer to Appendix B for the criteria used for ranking).

Table 3: Weed Species Identified

Taxon	Common Name	Criteria			
		Rating	Invasiveness	Distribution	Impacts
**Cortaderia selloana*	Pampas Grass	High	Yes	Yes	Yes
**Typha orientalis*	Bulrush	High	Yes	Yes	Yes
**Zantedeschia aethiopica*	Arum Lily	High	Yes	Yes	Yes
**Briza maxima*	Blow fly grass	Moderate	Yes	Yes	-
**Cirsium vulgare*	Slender Thistle	Moderate	Yes	Yes	-
**Ficus carica*	Fig	Moderate	Yes	-	Yes
**Gomphocarpus fruticosus*	Cotton Bush	Moderate	Yes	Yes	-
**Holcus lanatus*	Yorkshire Fog	Moderate	Yes	Yes	-
**Paspalum dilatatum*	Paspalum	Moderate	Yes	Yes	-
**Sonchus oleraceus*	Common Sowthistle	Moderate	Yes	Yes	-
**Rumex crispus*	Curled Dock	Mild	-	Yes	-
**Prunella vulgaris*	Self Heal	Low	-	-	-
**Lolium perenne* x *rigidum*	-	TBA	-	-	-
**Schinus terebinthifolius*	-	TBA	-	-	-
**Livistona australis*	-	Not Listed	-	-	-
**Rubus anglocandicans*	Blackberry	Not Listed	-	-	-

Two species listed as Declared Plants on the Swan Coastal Plain were located during the survey (DAFWA 2010) (Figure 4). These are:

- Arum Lily (**Zantedeschia aethiopica*) (Plate 1) listed as P1 for the whole State; and
- Blackberry (**Rubus anglocandicans*) (Plate 2) listed as P1 for the whole State.

Plate 1: Arum Lily (**Zantedeschia aethiopica*)

Plate 2: Blackberry (**Rubus anglocandicans*)

4.3 FIELD SURVEY - VEGETATION

4.3.1 Vegetation

One vegetation unit was identified within the survey area (Figure 5):

MpEr Low Woodland of *Melaleuca rhaphiophylla, Eucalyptus rudis* subsp*. rudis*, **Rubus anglocandicans, *Zantedeschia aethiopica,*Paspalum dilatatum, *Holcus lanatus, Centella asiatica, *Rumex crispus* and *Baumea articulata.*

In addition stands of native trees including *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* have been indentified in Figure 5. No native understorey species were recorded under these trees and thus, they have not been discussed as vegetation units.

Refer to Appendix C for site photographs. For further discussion and interpretation of the site floristics, refer to Section 5.

4.3.2 Floristic Community Types

The FCT represented by the vegetation unit within the survey area was inferred by statistical analysis, along with dominant species presence and distribution, as set out in Table 5 below.

Table 5: Floristic Community Type Analysis

Vegetation Type	Floristic Community Type	Percentage Similarity (%)	Comments	Inferred Floristic Community Type
Low Woodland of *Melaleuca rhaphiophylla* and *Eucalyptus rudis* subsp. *rudis*	SCP 17 – '*M. rhaphiophylla* – *Gahnia trifida* seasonal wetlands'	21	ENV considers that the vegetation unit is most similar to FCT SCP17 based on species present and location in the landscape. However, due to the low native species diversity and the condition of the vegetation the FCT is not able to be confidently inferred.	SCP 17 – '*M. rhaphiophylla* – *Gahnia trifida* seasonal wetlands'
	SCP 13 – 'Deeper wetlands on heavy soils'	14		
	SCP 14 'Deeper wetlands on sandy soils'	13		

4.3.3 Priority and Threatened Ecological Communities

FCT SCP 17 '*M. rhaphiophylla* – *Gahnia trifida* seasonal wetlands' is well reserved and considered to be at Low risk (Gibson *et al.,* 1994). Therefore, no Threatened or Priority Ecological communities are present within the Bollard Bulrush East survey area.

4.3.4 Vegetation Condition

The vegetation condition within the site varied from Good to Completely Degraded (Figure 6). All vegetation within the survey area had been disturbed. Disturbances included invasion by introduced species, grazing and trampling by domestic livestock (cattle) and historical clearing. Many of the lots within the survey area are still utilised for cattle grazing.

4.3.5 Wetlands

The Resource Enhancement wetland (UFI 6730) identified by the DEC Geomorphic Wetlands Dataset is described as being in Good to Degraded condition. The Multiple Use wetland (UFI 13327), identified by the DEC Geomorphic Wetlands, is described as being in Completely Degraded condition as it has been historically cleared and used for agricultural purposes. Both of the wetlands identified by the DEC supported vegetation that is representative of a wetland.

5 DISCUSSION

Flora

The average flora species richness per quadrat recorded during this survey, 13 species per quadrat, is similar to the species richness of wetland communities recorded by Gibson *et al.,* (1994). For example, Gibson *et al.,* (1994) recorded mean species richness of 13.6 species within SCP17 and a mean species richness of 17.4 within SCP13. However, the flora species richness recorded within the Bollard Bulrush East survey area has been influenced by the high diversity of introduced species recorded, 69% of the total taxa. Therefore, it is not an accurate representation of the native flora diversity within the survey area. Currently, the vegetation does not support a native middle or understorey. Both of these layers within the vegetation are dominated by introduced species and thus the diversity of native species has been reduced.

Threatened, Declared Rare and Priority Flora

No Threatened species pursuant to the EPBC Act, no plant taxa gazetted as Declared Rare pursuant to the WC Act and no Priority Flora listed by the DEC were recorded in the survey area.

ENV considers it to be very unlikely that the survey area supports flora of conservation significance. The survey was undertaken at the appropriate time of year (spring) and the entire survey area was adequately searched for species of conservation significance. The low rainfall experienced during the winter of 2010 may have affected the emergence of some species of conservation significance, in particular orchid species (*Drakaea elastica* and *Drakaea micrantha*). Thus, these species may not have been present or identifiable at the time of the survey. Despite this, the survey area is not considered to support appropriate habitat for flora of conservation significance, as a result of the reduced condition of the vegetation as well as trampling and grazing by cattle. ENV considers that the potential for the survey area to contain Threatened, Declared Rare or Priority Flora is low.

Weeds

Sixteen introduced species were recorded within the survey area. The majority of these are considered to be common agricultural (**Lolium perenne x rigidum*) and bushland weeds (**Briza maxima* and **Sonchus oleraceus*) in the region (Hussey *et al.,* 2007). Two species, **Cortaderia selloana* and **Typha orientalis*, are common wetland weeds and are rated as High by the Environmental Weed Strategy for Western Australia (Department of Conservation and Land Management 1999).

Two Declared Plants were recorded within the survey area: Arum Lily (**Zantedeschia aethiopica*); and Blackberry (**Rubus anglocandicans*). The level of infestation of these species within the survey area was considered to be high, as a result of the wide

distribution and high number of individuals within the survey area. Arum Lily and Blackberry are both listed as P1 for the whole State and require management strategies to reduce their distribution. A management plan including a hygiene station to wash vehicles down prior to leaving the site during development would address this requirement.

Vegetation Condition

The condition of the vegetation with the survey area has been reduced by agricultural land uses. The clearing of land and the presence of cattle has facilitated the invasion of introduced species within the site. The high diversity (approximately 69% of the species recorded) and cover of introduced species indicates that native species have been displaced. The presence of cattle within the survey area has also reduced the condition of the vegetation by grazing and trampling of the soil.

Floristic Community Types

The vegetation within the survey area is considered to be most similar to FCT SCP 17 '*M. rhaphiophylla – Gahnia trifida* seasonal wetlands'. However, as a result of the low native species diversity and the reduced condition of the vegetation it is difficult to confidently infer it to any FCT. The vegetation within the survey area has been assessed as representing a highly disturbed example of SCP 17. Several of the common and typical species of this FCT, as defined by Gibson *et al.,* (1994) are absent from the vegetation, such as *Gahnia trifida, Lobelia alata* and *Lepidosperma longitudinale*. However, the presence of the overstorey species, *Melaleuca rhaphiophylla* and *Eucalyptus rudis* subsp. *rudis*, and the percentage similarity (21%) result in the allocation of the of the vegetation unit to FCT SCP 17.

The vegetation community recorded within the survey area is not listed as a TEC by Federal or State legislation or on the DECs PEC database. Thus, it is not representative of a TEC or PEC.

Vegetation Complexes

The survey area is mapped as the Herdsman Complex: Vegetation consists of sedgelands and fringing woodland of *Eucalyptus rudis - Melaleuca* species, which has an estimated 31% remaining in the Bush Forever project area (Government of Western Australia 2000).

This complex exceeds the 10% recommended retention status for Western Australia by the *EPA's Position Statement No. 2* and targets set under Bush Forever. Therefore it is considered to be adequately represented within the Bush Forever study area.

Wetlands

The two wetlands identified by the DEC as occurring within the survey supported vegetation that is representative of wetland communities, however, the condition of this vegetation varied. The Resource Enhancement wetland (UFI 6730) within the survey area represents the core of the wetland vegetation within the survey area. The high level of disturbance to this vegetation, however, has reduced the ecological value of the vegetation. The area identified as a Multiple Use wetland (UFI 13327) is Completely Degraded, as this area has been cleared and utilised for agricultural purposes. However, the Bollard Bulrush East survey area is listed as a wetland of high ecological value and protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.*

6 SUMMARY AND CONCLUSION

The flora and vegetation survey undertaken by ENV.Australia determined that:

- Twenty-three taxa, including seven native flora taxa and 16 introduced taxa, were recorded within the Bollard Bulrush East survey area;
- No plant species listed as Threatened pursuant to the EPBC Act, as Declared Rare pursuant to the WC Act or as Priority by the DEC were located during the survey and it is considered unlikely that the survey area supports species of conservation significance;
- One vegetation community representative of wetland vegetation, Low Woodland of *Melaleuca rhaphiophylla* and *Eucalyptus rudis* subsp. *rudis*, was recorded within the survey area;
- The vegetation within the survey area is described as being in Good to Completely Degraded condition;
- The vegetation within the survey area is considered to be similar to the FCT SCP 17 '*M. rhaphiophylla – Gahnia trifida* seasonal wetlands'. However, it should be noted that an FCT can not be confidently inferred to the vegetation as a result of the low native species diversity and the reduced condition of the vegetation; and
- The vegetation community recorded during the survey is not listed as a TEC or PEC by the SEWPAC or by the DEC.

No species or vegetation of conservation significance were identified within the survey area. The survey was undertaken at an appropriate time and methods allow for the conclusion that no species or vegetation of conservation significance potentially occurs within the Bollard Bulrush East survey area. Therefore, no flora or vegetation values that require protection were identified during the survey.

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FIGURES

CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: C. Sgherza
DRAWN: S. Rho
DATE: 25-10-2010
SCALE: 1:25,000 @ A4
PROJECTION: GDA 94 MGA 50

Location Map

Bollard Bulrush East Flora and Vegetation Assessment

FIGURE 1

CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: C. Sgherza
DRAWN: T. Ellis
DATE: 25-10-2010
SCALE: 1:15,000@ A4
PROJECTION: GDA 94 MGA 50

Wetlands

Bollard Bulrush East Flora and Vegetation Assessment

FIGURE 3

CLIENT: Wellard Landowners Group

JOB NO.: 10.127

AUTHOR: C. Sgherza

DRAWN: T. Ellis

DATE: 25-10-2010

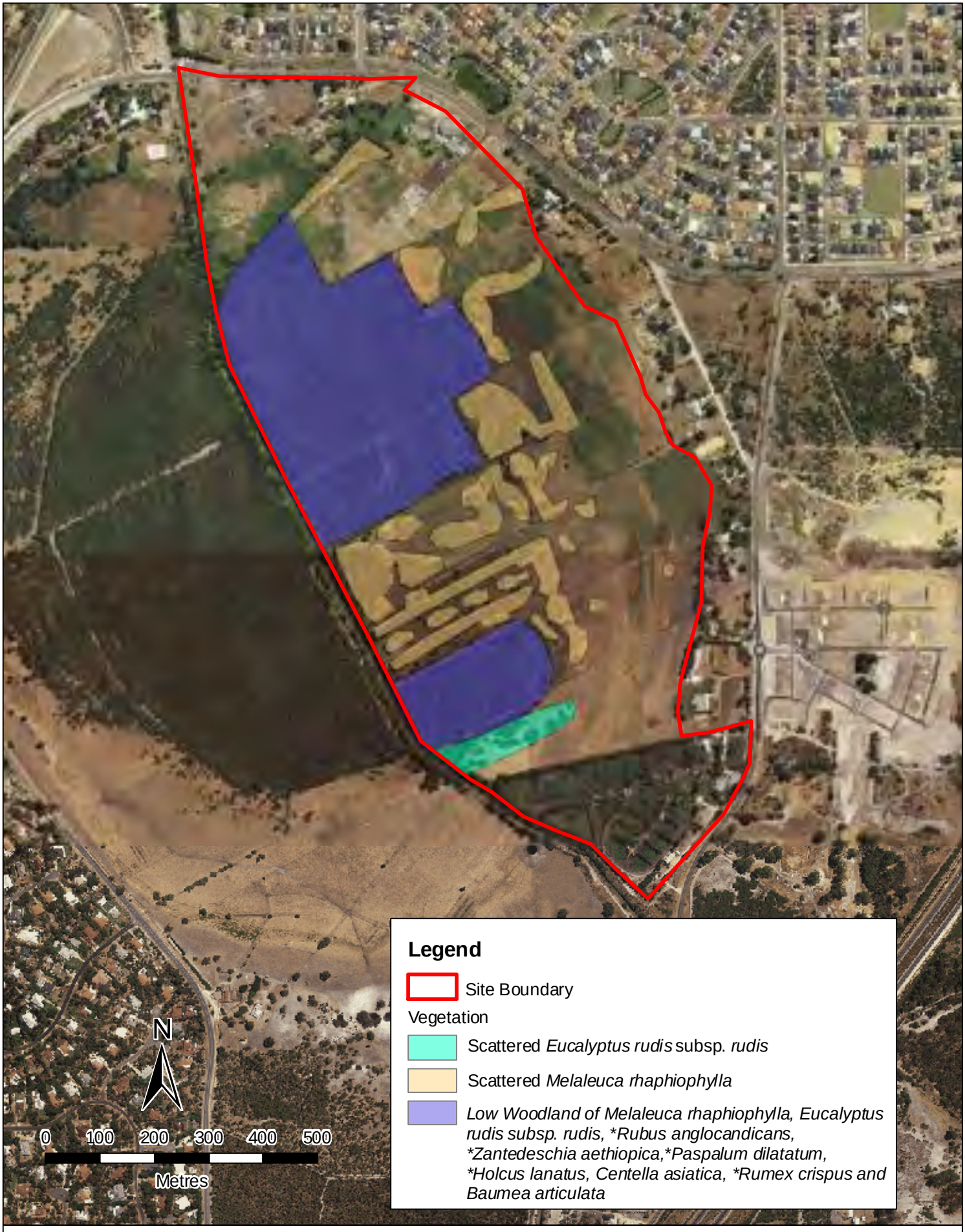
SCALE: 1:9,000 @ A4

PROJECTION: GDA 94 MGA 50

Location of Declared Plants

Bollard Bulrush East Flora and Vegetation Assessment

FIGURE 4

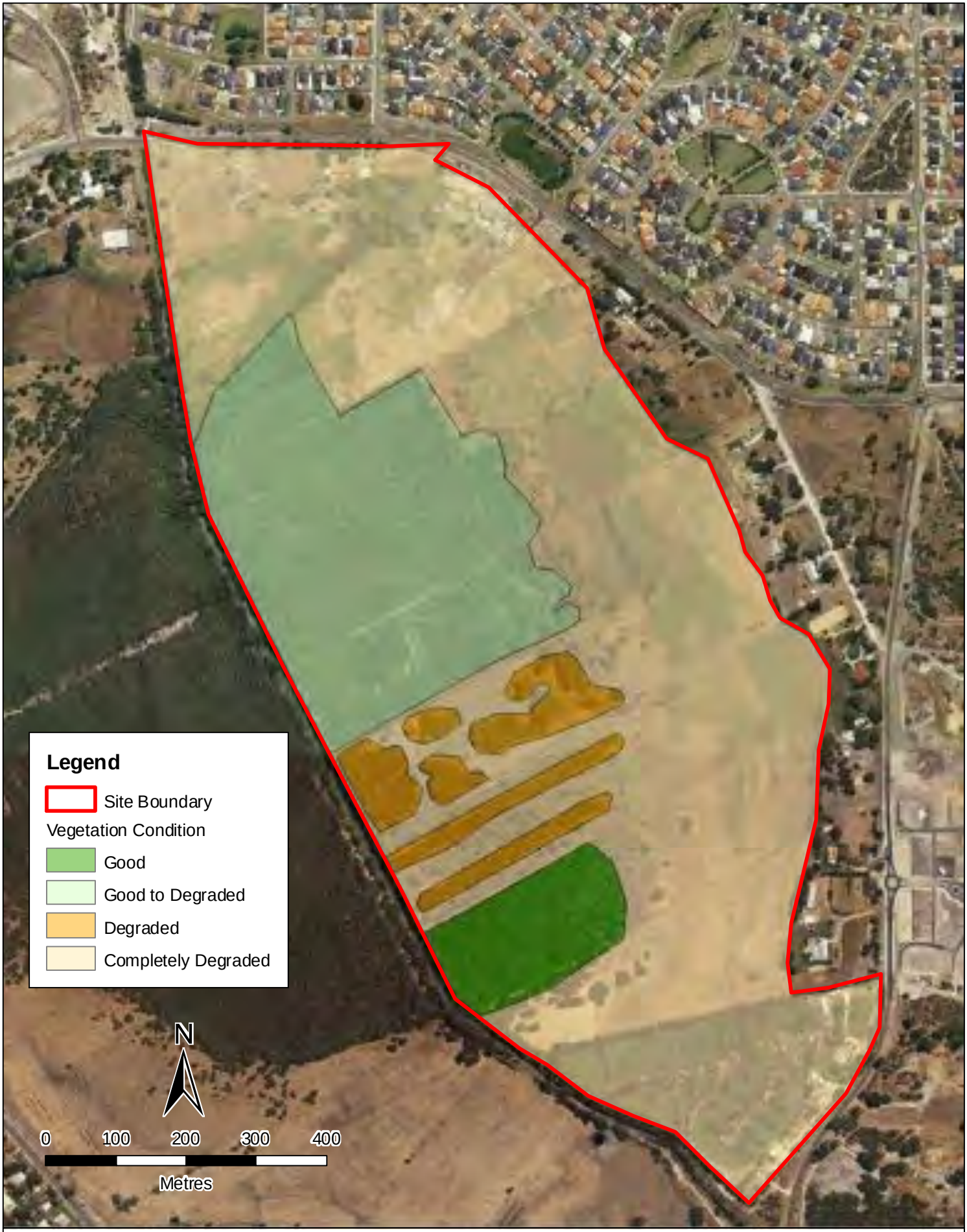


CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: C. Sgherza
DRAWN: T. Ellis
DATE: 25-10-2010
SCALE: 1:9,000 @ A4
PROJECTION: GDA 94 MGA 50

Vegetation

Bollard Bulrush East Flora and Vegetation Assessment

FIGURE 5



CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: C. Sgherza
DRAWN: T. Ellis
DATE: 27-10-2010
SCALE: 1:7,000 @ A4
PROJECTION: GDA 94 MGA 50

Vegetation Condition

Bollard Bulrush East Flora and Vegetation Assessment

FIGURE 6

APPENDIX A

DEFINITIONS OF DECLARED RARE / PRIORITY / THREATENED FLORA AND THREATENED / PRIORITY ECOLOGICAL COMMUNITIES

APPENDIX A

DEFINITIONS OF DECLARED RARE / PRIORITY / THREATENED FLORA AND THREATENED / PRIORITY ECOLOGICAL COMMUNITIES

A1: Categories of Declared Rare and Priority Flora

Conservation Code	Category
X	**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, and have been gazetted as such.
R	**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 and have been gazetted as such.
P1	**Priority One - Poorly Known Taxa** Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey.
P2	**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 (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey.
P3	**Priority Three - Poorly Known Taxa** Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but need further survey.
P4	**Priority Four - Rare Taxa** Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Source: Department of Environment and Conservation (2010). *Western Australian Flora Conservation Codes*. Department of Environment and Conservation, Perth, Western Australia. Online: http://florabase.calm.wa.gov.au.

A2: Categories of Threatened Flora Species

Category Code	Category
Ex	**Extinct** Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the 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 a particular 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.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term 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.

Source: *Environment Protection and Biodiversity Conservation Act 1999*

A3: Definitions of Threatened Ecological Communities

Presumed Totally Destroyed (PD)

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B);

A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats **or**

B) All occurrences recorded within the last 50 years have since been destroyed.

Critically Endangered (CR)

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and **either or both** of the following apply (i or ii)

   i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years)

   ii) modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and **one or more** of the following apply (i, ii or iii):

   i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years)

   ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes

   iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes

C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years)

Endangered (EN)

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and **either or both** of the following apply (i or ii)

   i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years)
   ii) modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and **one or more** of the following apply (i, ii or iii):

   i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years)
   ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes
   iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes

C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).

Vulnerable (VU)

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated.
B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.
C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Source: Department of Environment and Conservation (2010). *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*. Department of Environment and Conservation, Perth, Western Australia. Online: www.naturebase.net/

A4: Definitions of Priority Ecological Communities

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly known ecological communities Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly known ecological communities. Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.

Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;

(iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(a) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands.

(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(c) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Source: Department of Environment and Conservation (2010). *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities*. Department of Environment and Conservation, Perth, Western Australia. Online: www.naturebase.net/

APPENDIX B
ENVIRONMENTAL WEEDS AND DECLARED PLANT CATEGORIES

APPENDIX B

ENVIRONMENTAL WEEDS AND DECLARED PLANT CATEGORIES

B1: Criteria used for Ranking Environmental Weeds

The Environmental Weed Strategy for Western Australia (CALM 1999) contains criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity. These criteria are as follows:

- **Invasiveness –** ability to invade bushland in good to excellent condition or ability to invade waterways. (Score as yes or no).
- **Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world. (Score as yes or no).
- **Environmental Impacts** – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community. (Score as yes or no).

The rating of each weed is determined by the following scoring system:

- **High** - a weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research i.e. prioritising funding to it.
- **Moderate** -a weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that 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** – a weed species scoring one of the criteria. A mild rating would indicate monitoring of the week and control where appropriate.
- **Low** – a weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring.

Source: Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia*. Department of Conservation and Land Management, Perth, Western Australia.

B2: Standard Meanings of Declared Plant Categories

P1

Prohibits movement.

The movement of plants or their seeds is prohibited within the State.

This prohibits the movement of contaminated machinery and produce including livestock and fodder.

P2

Aim is to eradicate infestation.

Treat all plants to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.

P3

Aims to control infestation by reducing area and/or density of infestation.

The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.

Treat to destroy and prevent seed set all plants:

* Within 50m inside of the boundaries of the infestation;

* within 50m of roads and high water mark on waterways;

* within 50m of sheds, stock yards and houses.

Treatment must be done prior to seed set each year.

Properties with less than 20ha of infestation must treat the entire infestation.

Additional areas may be ordered to be treated.

P4

Aims to prevent infestation spreading beyond existing boundaries of infestation

The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery.

Treat to destroy and prevent seed set all plants:

* within 50m inside of the boundaries of the infested property for one-leaf and 20m for two-leaf;

* within 50m of roads and high water mark on waterways;

* within 50m of sheds, stock yards and houses.

Treatment must be done prior to seed set each year. Properties with less than 20ha of infestation must treat the entire infestation.

Additional areas may be ordered to be treated.

Special considerations.

In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas.

P5

Aims to control infestations on public lands.

Source: Department of Agriculture and Food (2010). *List of Declared Plants*. Department of Agriculture and Food, Western Australia. Online: http://www.agric.wa.gov.au/.

APPENDIX C
FLORA SURVEY FIELD DATA SHEETS AND SITE PHOTOGRAPHS

APPENDIX C

FLORA SURVEY FIELD DATA SHEETS AND SITE PHOTOGRAPHS

Site Q01

Described by NW

Location Wellard

MGA Zone50 390520mE 6430676mN

Habitat Dampland

Soil Wet brown loam

Rock Type

Vegetation Low Open Forest of *Melaleuca rhaphiophylla, Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum, *Holcus lanatus, Centella asiatica, *Rumex crispus, Baumea articulata, Typha* sp. and **Cortaderia selloana*.

Veg Condition Good

Fire Age Young

Notes Aspect: N/A.
Bare ground: 1%.
Litter cover: 1% Logs; 1% Twigs; 15% Lvs.
Disturbance type: Weeds.

SPECIES LIST:

Name	Cover	Height	Specimen	Notes
Baumea articulata	5%	0.9m	01.03	
Cassytha racemosa	+	CR	01.04	
Centella asiatica	30%	0.2m	01.05	
**Cirsium vulgare*	+	0.4m	NC	
**Cortaderia selloana*	1%	4m	NC	
Eucalyptus rudis subsp. *rudis*	+	9m	01.12	
**Ficus carica*	+	0.4m	01.01	
**Holcus lanatus*	10%	0.3m	01.06	
**Livistona australis*	+	0.1m	NC	
Melaleuca rhaphiophylla	40%	7m	NC	
**Paspalum dilatatum*	40%	0.3m	01.09	
**Rubus anglocandicans*			NC	Associated Species
**Rumex crispus*	1%	0.3m	01.07	
**Schinus terebinthifolius*	+	3m	01.02	
**Typha orientalis*	3%	1m	NC	
**Zantedeschia aethiopica*	+	0.4m	NC	

Site Q02

Described by NW

Location Welland

MGA Zone50 390881 mE 6430533mN

Habitat Dampland

Soil Wet brown loam

Rock Type

Vegetation Low Open Woodland of *Melaleuca rhaphiophylla, Eucalyptus rudis* subsp. *rudis,* Paspalum dilatatum, *Holcus lanatus, Centella asiatica,* Zantedeschia aethiopica, *Rumex crispus* and *Baumea articulata.*

Veg Condition Good to Degraded

Fire Age Old

Notes Aspect: N/A.
Bare ground: 5%.
Litter cover: 1% Logs; 13% Twigs; 20% Lvs.
Disturbance type: Weeds and clearing.

SPECIES LIST:

Name	Cover	Height	Specimen	Notes
Baumea articulata	1%	0.6m	01.03	
Cassytha racemosa	+	CR	01.04	
Centella asiatica	60%	0.25m	01.05	
**Cirsium vulgare*	+	0.3m	NC	
Eucalyptus rudis subsp. *rudis*	2%	6m	NC	
**Gomphocarpus fruticosus*	+	0.1m	NC	
**Holcus lanatus*	1%	0.5m	01.06	
Melaleuca lateritia	+	1m	02.06	
Melaleuca rhaphiophylla	6%	5m	NC	
**Paspalum dilatatum*	2%	0.4m	02.04	
**Prunella vulgaris*	+	0.3m	02.02	
**Rumex crispus*	1%	0.4m	02.03	
**Zantedeschia aethiopica*	2%	0.5m	NC	

Site Q03

Described by NW

Location Wellard

MGA Zone 50 390936mE 6429912mN

Habitat Dampland

Soil Wet brown loam

Rock Type

Vegetation Low Woodland of *Eucalyptus rudis subsp. rudis, Melaleuca rhaphiophylla, Centella asiatica* and *Baumea articulata.*

Veg Condition Good to Degraded

Fire Age Old

Notes Aspect: N/A.
Bare ground: 2%.
Litter cover: 2% Logs; 15% Twigs; 30% Lvs.
Disturbance type: Weeds and clearing.

SPECIES LIST:

Name	Cover	Height	Specimen	Notes
Baumea articulata	30%	1m	01.03	
**Briza maxima*	+	0.4m	NC	
Cassytha racemosa	+	CR	01.04	
Centella asiatica	20%	0.2m	01.05	
Eucalyptus rudis subsp. *rudis*	20%	10m	NC	
**Holcus lanatus*	+	0.2m	01.06	
**Lolium perenne* x *rigidum*	+	0.4m	03.01	
Melaleuca rhaphiophylla	5%	6m	NC	
**Sonchus oleraceus*	+	0.1m	03.02	
**Zantedeschia aethiopica*	+	0.5m	NC	

Site R01

Described by NW

Location Wellard

MGA Zone50 390725mE 6430290mN

Habitat Dampland

Soil Wet brown loam

Rock Type

Vegetation Low Open Forest of *Melaleuca rhaphiophylla* and *Baumea articulata.*

Veg Condition Good

Fire Age Moderate

Notes Aspect: N/A.
Bare ground: 60%.
Litter cover: 1% Logs; 2% Twigs; 5% Lvs.
Disturbance type: Cattle and weeds.

SPECIES LIST:

Name	Cover	Height	Specimen	Notes
Baumea articulata	20%	0.6m	R01.02	
Caesia micrantha	+	0.3m	R01.01	
Centella asiatica	+	0.2m	01.05	
Melaleuca rhaphiophylla	60%	4m	NC	

APPENDIX D
BUSH FOREVER CONDITION SCALE

APPENDIX D

BUSH FOREVER CONDITION SCALE

Condition Scale Code	Condition Scale
P	**Pristine (1)** Pristine or nearly so, no obvious signs of disturbance
E	**Excellent (2)** Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
VG	**Very Good (3)** Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
G	**Good (4)** Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
D	**Degraded (5)** Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
CD	**Completely Degraded (6)** The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Source: Government of Western Australia (2000). *Bush Forever Volume 2: Directory of Bush Forever Sites*. Department of Environmental Protection, Perth, Western Australia.

APPENDIX E
DATABASE SEARCH RESULTS

APPENDIX E

DATABASE SEARCH RESULTS

E1: Declared Rare and Priority Flora

FAMILY	TAXA	Conservation Status Code		Source	Life Cycle[1]	Flowering Time[1]	Habitat[1]
		STATE	FEDERAL				
Aponogetonaceae	*Aponogeton hexatepalus*	P4	-	DEC	Perennial	Jul-Oct	Pools (Aquatic)
Centrolepidaceae	*Centrolepis caespitosa*	P4	Endangered	EPBC Search	Perennial	Oct - Dec	Salt flats
Cyperaceae	*Cyathochaeta teretifolia*	P3	-	DEC	Perennial	Not Available	Swamps and creek edges
Cyperaceae	*Lepidosperma rostratum*	DRF	Endangered	EPBC Search	Perennial	Not Available	Peaty sand and clay
Ericaceae	*Andersonia gracilis*	DRF	Endangered	EPBC Search	Perennial	Sept - Nov	Winter-wet areas
Fabaceae	*Aotus cordifolia*	P3	-	DEC	Perennial	Aug-Jan	Swamps
Malvaceae	*Lasiopetalum pterocarpum*	DRF	Endangered	EPBC Search	Perennial	Sep- Dec	Sand over Limestone
Myrtaceae	*Darwinia foetida*	DRF	Crit End	EPBC Search	Perennial	Not known	Not known
Orchidaceae	*Caladenia huegelii*	DRF	Endangered	DEC / EPBC Search	Perennial	Sept-Oct	Sandy soils
Orchidaceae	*Diuris micrantha*	DRF	Vulnerable	DEC / EPBC Search	Perennial	Sept-Oct	Seasonally wet flats
Orchidaceae	*Drakaea elastica*	DRF	Endangered	EPBC Search	Perennial	Oct-Nov	Near seasonally wet flats
Proteaceae	*Grevillea curviloba* subsp. *incurva*	DRF	Endangered	EPBC Search	Perennial	Aug - Sept	Winter-wet health
Proteaceae	*Synaphea stenoloba*	DRF	Endangered	EPBC Search	Perennial	Aug - Oct	Winter-wet flats
Proteaceae	*Synaphea* sp. Fairbridge Farm (D.Papenfus 696)	DRF	Endangered	EPBC Search	Perennial	Oct	Near seasonally wet flats
Proteaceae	*Synaphea* sp. Serpentine (G.R. Brand 103)	P3	-	DEC	Perennial	Oct	Slumpland
Sapindaceae	*Dodonaea hackettiana*	P4	-	DEC	Perennial	Jul-Oct	Outcropping Limestone
Rutaceae	*Boronia juncea* subsp. *juncea*	P1	-	DEC	Perennial	Apr	Sand
Stylidiaceae	*Stylidium ireneae*	P4	-	DEC	Perennial	Sept-Oct	Saline clay flats
Stylidiaceae	*Stylidium longitubum*	P3	-	DEC	Annual	Oct-Dec	Seasonally wet flats

[1] Source: Western Australian Herbarium [WAH] (2010) *FloraBase - Information on the Western Australian Flora.* Department of Environment and Conservation, Perth. Online: http://florabase.calm.wa.gov.au [October 2010].

E2: Threatened and Priority Ecological Communities

Ecological Community	Description	Conservation Status		Source
		State	Federal	
SCP3a	*Corymbia calophylla - Kingia australis* woodlands on heavy soils of the Swan Coastal Plain	Endangered	Endangered	EBPC Search
SCP3c	*Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain	Critically Endangered	Endangered	EBPC Search
SCP19b	Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Critically Endangered	Endangered	DEC / EBPC Search
SCP26a	*Melaleuca huegelii - Melaleuca acerosa* (currently *M. systena*) shrublands on limestone ridges	Endangered	-	DEC
SCP09	Dense shrublands on clay flats	Vulnerable	-	DEC
SCP22	*Banksia ilicifolia* woodlands	Priority 2	-	DEC
SCP24	Northern Spearwood shrublands and woodlands	Priority 3	-	DEC
SCP21c	Low lying *Banksia attenuata* woodlands or shrublands	Priority 3	-	DEC

APPENDIX F
FLORA SPECIES LIST

APPENDIX F

FLORA SPECIES LIST

* denotes foreign introduced species

Abbreviations:

sp.: species (singular)
spp.: species (plural)
subsp.: subspecies
var.: variety
ms: manuscript name (unpublished)

FAMILY	TAXA
Anacardiaceae	**Schinus terebinthifolius*
Anthericaceae	*Caesia micrantha*
Apiaceae	*Centella asiatica*
Araceae	**Zantedeschia aethiopica*
Arecaceae	**Livistona australis*
Asclepiadaceae	**Gomphocarpus fruticosus*
Asteraceae	**Cirsium vulgare*
Asteraceae	**Sonchus oleraceus*
Cyperaceae	*Baumea articulata*
Lamiaceae	**Prunella vulgaris*
Lauraceae	*Cassytha racemosa*
Moraceae	**Ficus carica*
Myrtaceae	*Eucalyptus rudis* subsp. *rudis*
Myrtaceae	*Melaleuca lateritia*
Myrtaceae	*Melaleuca rhaphiophylla*
Poaceae	**Briza maxima*
Poaceae	**Cortaderia selloana*
Poaceae	**Holcus lanatus*
Poaceae	**Lolium perenne* x *rigidum*
Poaceae	**Paspalum dilatatum*
Polygonaceae	**Rumex crispus*
Rosaceae	**Rubus anglocandicans*
Typhaceae	**Typha orientalis*

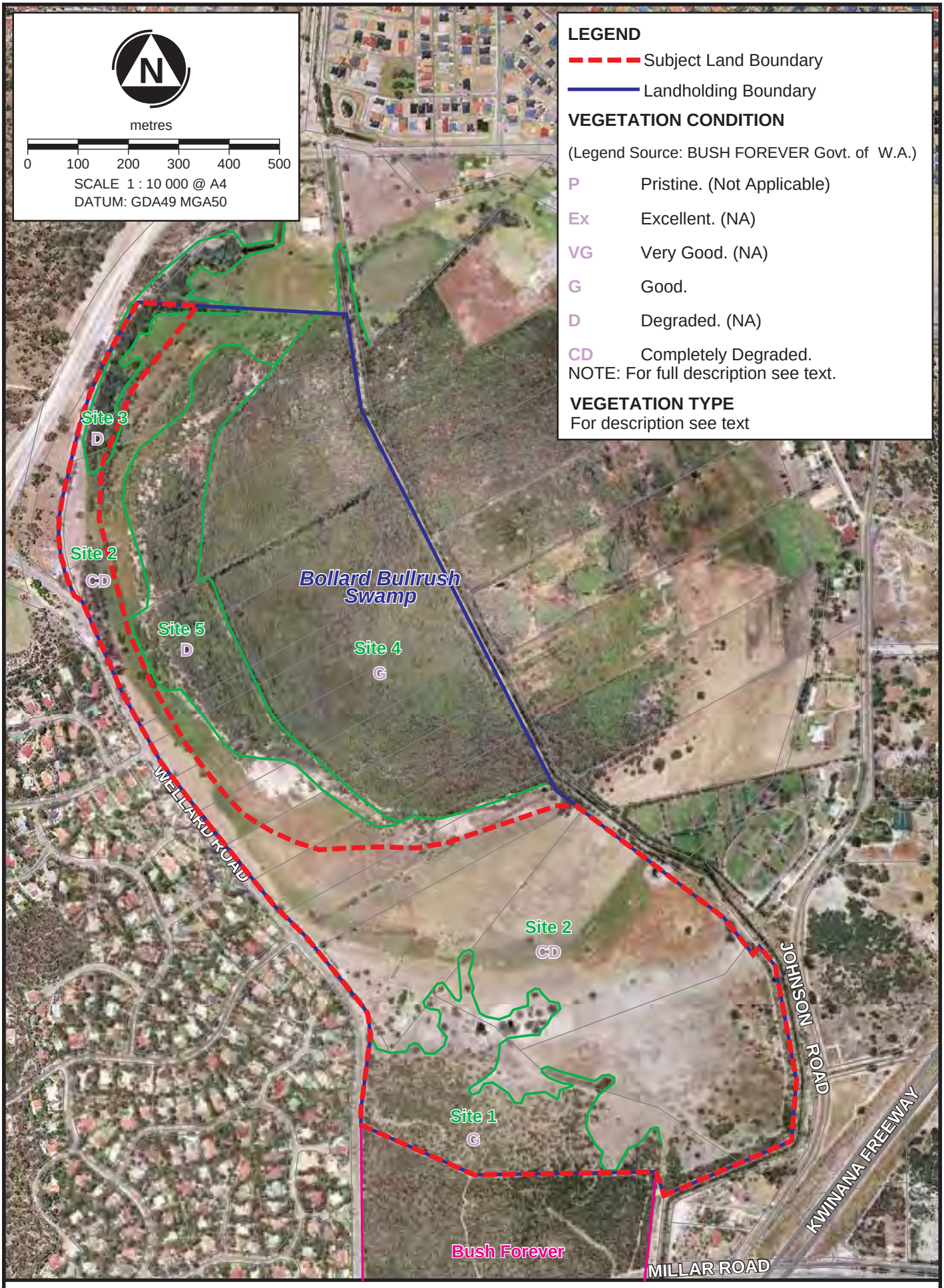
APPENDIX G
MATRIX OF TAXA BY SITE

APPENDIX G

MATRIX OF TAXA BY SITE

Species Name	Q01	Q02	Q03	R01
Baumea articulata	5%	1%	30%	20%
**Briza maxima*			+	
Caesia micrantha				+
Cassytha racemosa	+	+	+	
Centella asiatica	30%	60%	20%	+
**Cirsium vulgare*	+	+		
**Cortaderia selloana*	1%			
Eucalyptus rudis subsp. *rudis*	+	2%	20%	
**Ficus carica*	+			
**Gomphocarpus fruticosus*		+		
**Holcus lanatus*	10%	1%	+	
Livistona australis	+			
**Lolium perenne* x *rigidum*			+	
Melaleuca lateritia		+		
Melaleuca rhaphiophylla	40%	6%	5%	60%
**Paspalum dilatatum*	40%	2%		
**Prunella vulgaris*		+		
**Rubus anglocandicans*	nc			
**Rumex crispus*	1%	1%		
**Schinus terebinthifolius*	+			
**Sonchus oleraceus*			+	
**Typha orientalis*	3%			
**Zantedeschia aethiopica*	+	2%	+	

APPENDIX B
BOLLARD BULRUSH SWAMP WEST VEGETATION CONDITION MAPPING (ENV 2009)



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08-382-1F5.dgn

DevX - BOLLARD BULLRUSH SWAMP WEST
ENVIRONMENTAL ASSESSMENT TO SUPPORT
SPECIAL RESIDENTIAL & RESIDENTIAL SUBDIVISION

VEGETATION TYPE AND CONDITION

Environmental Geology: Geological Survey of Western Australia, 1:50 000 Environmental Series

FIGURE 5

env Australia

APPENDIX C
BOLLARD BULRUSH EAST FAUNA ASSESSMENT

BOLLARD BULRUSH EAST

FAUNA ASSESSMENT

BOLLARD BULRUSH EAST

FAUNA ASSESSMENT

Prepared for:

WELLARD LANDOWNERS GROUP

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Report Number: *10/209*

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Status: *Final*

QA Review: *Ciaran Sgherza*

Technical Review: *Dr Ron Firth*

Content Review: *Teresa Gepp*

Date: *29 July 2011*

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment 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 ENV.Australia Pty Ltd (ENV) ("scope of services"). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV 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, ENV 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. ENV 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 ENV.

Environmental Conclusions

In accordance with the scope of services, ENV 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.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Also it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling 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. ENV 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 ENV 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

ENV 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.

EXECUTIVE SUMMARY

ENV.Australia Pty Ltd was commissioned by Greg Rowe and Associates, on behalf of the Wellard Landowners Group, in June 2010 to undertake a fauna and fauna habitat assessment for the Bollard Bulrush East survey area. The survey area is approximately 73 hectares in size.

The purpose of this assessment is to provide supporting documentation for proposed future residential development of the survey area. The objectives of the fauna assessment are to:

- Document the general fauna habitat types in the survey area as they relate to faunal assemblages.
- Compile a list of terrestrial vertebrate fauna previously recorded in the region, based on database searches.
- Identify terrestrial vertebrate fauna of conservation significance that potentially occur within the survey area, based on databases and past work in the surrounding area.
- Develop a map illustrating the fauna habitat types present.
- Provide technical advice on fauna issues likely to constrain the proposed development.

A Level One assessment was undertaken in the survey area, in consideration of the Environmental Protection Authority *Guidance Statement No. 56.*

One fauna habitat type was identified in the survey area; a *Melaleuca* Dampland. This fauna habitat type represents 32% of the survey area; the remaining 68% is largely made up of degraded land previously used for agriculture. Based on a site assessment and survey, the fauna habitat type is considered to be of low value and is unlikely to support a wide suite of fauna species and/or species of conservation significance. There is a lack of microhabitat diversity due to the presence of weed species which dominate the understorey and midstorey layers of the fauna habitat. There is also a lack of important habitat structures such as large trees with hollows, loose bark and fallen hollow logs (used by many fauna species as den and nest sites).

Two-hundred and eleven species of fauna have been previously recorded within the vicinity of the survey area, including six amphibians, 33 reptiles, 150 birds and 22 mammals. During the fauna survey twenty-nine terrestrial vertebrate fauna were recorded, comprising of one amphibian species, one reptile species, 18 bird species and two mammal species. Of these only the Southern Brown Bandicoot (*Isoodon obesulus* subsp. *fusciventer*) is a species of conservation significance and is listed on the Department of Environment and Conservation Priority list. Secondary evidence in the

form of species specific conical diggings was recorded in moderate density across the survey area.

Twenty-eight species of conservation significance have been previously recorded within the vicinity of the survey area. This includes three reptile species, 18 bird species and seven mammal species. Of these one was 'Recorded', two species were considered as 'Likely', three species 'Possible', 18 as 'Unlikely' to occur. Four were considered as 'Highly Unlikely' to occur within the survey area. This is based on the ecological requirements and known distribution of the species and the type and quality of fauna habitats within the survey area. Species considered as 'Likely' to occur are bird species namely the Cattle Egret and Eastern Great Egret.

Generally the site was degraded and cleared and did not provide much value to a wide suite of fauna species. Approximately 32% of the survey area contained fauna habitat and the remaining was in degraded condition and depauperate of faunal assemblages. In addition the survey area has been subject to past and present agriculture activities and this has largely reduced the sites value for fauna particularly species with conservation significance.

1 INTRODUCTION

ENV.Australia Pty Ltd ('ENV') was commissioned by Greg Rowe and Associates, on behalf of the Wellard Landowners Group in June 2010 to undertake a fauna and fauna habitat assessment for the Bollard Bulrush East site ('the survey area'). The survey area is approximately 73 hectares (ha) in size.

The purpose of this assessment is to provide supporting documentation for proposed future residential development of the survey area.

1.1 OBJECTIVES

The objectives of the fauna assessment are to:

- Document the general fauna habitat types in the survey area as they relate to faunal assemblages.
- Compile a list of terrestrial vertebrate fauna previously recorded in the region, based on database searches.
- Identify terrestrial vertebrate fauna of conservation significance that potentially occur within the survey area, based on databases and past work in the surrounding area.
- Develop a map illustrating the fauna habitat types present.
- Provide technical advice on fauna issues likely to constrain the proposed development.

1.2 LOCATION

The Bollard Bulrush East survey area is located approximately 35 kilometres (km) south of the Perth Central Business District, in the suburb of Wellard, in the Town of Kwinana. The survey area is bounded by housing and a school on its northern, eastern and southern sides and remnant vegetation on its western side (Figure 1).

1.3 CLIMATE

The climate of this region is warm Mediterranean, with an average maximum summer temperature of 28.3°C and an average minimum winter temperature of 10.9°C (Bureau of Meteorology (BoM) 2010). The region receives an average annual rainfall of 765.3 mm, with the majority of precipitation occurring in winter (BOM 2010) (Figure 2).

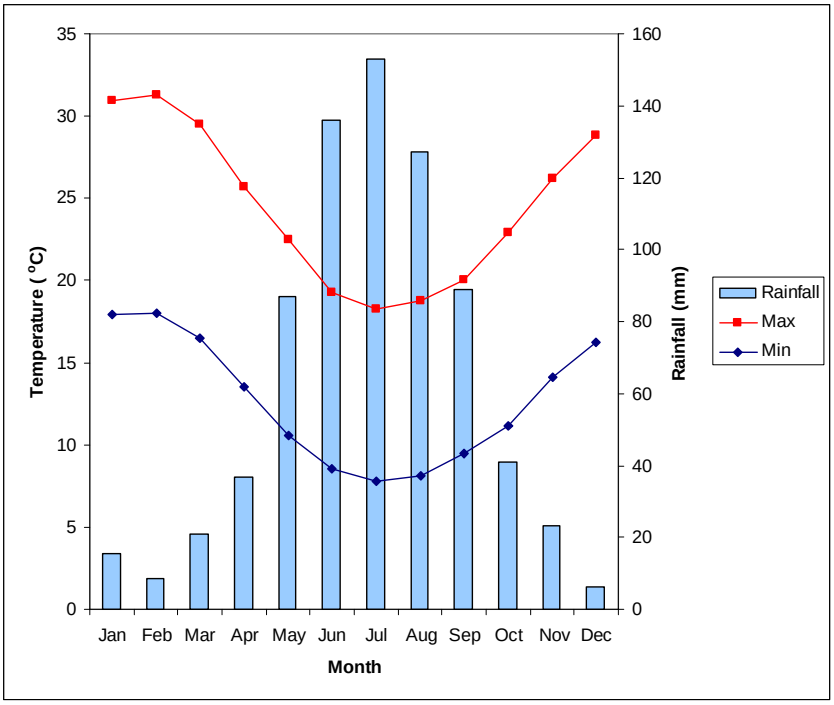

Figure 2: Average monthly rainfall and maximum and minimum temperatures at Medina Research Station (1983-2010) (BoM 2010)

1.4 REGIONAL SOILS, LANDFORMS AND VEGETATION

For a development proposal to be assessed in terms of the fauna and habitat values that may be impacted upon, an understanding of the vegetation communities at the survey area in question is required. In Western Australia, there are various reports that detail a region's botanical values.

A widely-used vegetation classification system that maps and describes vegetation communities in southwest Western Australia is *Vegetation of the Darling System* in the *Atlas of Natural Resources, Darling System, Western Australia* (Department of Conservation and Environment 1980). This document describes vegetation communities as vegetation complexes, and maps the distribution of each complex.

Vegetation complexes are defined as a combination of distinct site vegetation types usually associated with a particular geomorphic, climatic, and floristic and vegetation structural association. Vegetation complexes are based on the pattern of vegetation at a regional scale, as it reflects the underlying key determining factors of landforms, climate and soils.

The soils and landform unit, as well as the vegetation complex the survey area supports, are described below.

1.4.1 Soils and Landforms

The survey area occurs on the Swan Coastal Plain portion of the Darling System (Churchward and McArthur 1978). The Swan Coastal plain consists of aeolian and fluviatile deposits, specifically the survey area is on:

- Herdsman unit: Peaty swamps associated with Bassendean and Karrakatta units.

1.4.2 Beard Vegetation Mapping

The survey area is in the South West Botanical Province and the Darling Botanical District (Beard 1990). The vegetation of this region typically consists of forest with related woodlands and is divided into four subregions or botanic subdistricts.

The survey area is within the Swan Coastal Plain Subregion in the Drummond Botanical Subdistrict (Beard 1990). The Drummond Botanical Subdistrict consists mainly of the following vegetation communities:

- *Banksia* Low Woodland on leached sands and *Melaleuca* Swamps in poorly drained areas.
- Woodland of Tuart (*Eucalyptus gomphocephala*).
- Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) woodlands on the less leached soils (Beard 1990).

1.4.3 Vegetation Complex Mapping

Heddle *et al*., (1978) mapped the area as containing one Swan Coastal Plain vegetation complex which is related to the underlying soil profile:

- Herdsman Complex: Vegetation consists of sedgeland and fringing woodland of *Eucalyptus rudis* - *Melaleuca* species.

The Environmental Protection Authority's (EPA) document *Levels of Assessment for Proposals Affecting Natural Areas Within System 6 Region and Swan Coastal Plain Portion of the System 1 Region* (EPA 2006) gives an estimate of the percentage of each complex that remains compared to its pre-European settlement extent, so an estimate of the scarcity of each complex can be determined.

In Western Australia 34.6% of the Herdsman Complex is estimated to remain (EPA 2006). While within the Perth Metropolitan Area (PMA), 31% of the Herdsman Complex is estimated to remain (Government of Western Australia 2000).

The EPA recognises certain vegetation complexes that are not well represented in reserves as being significant. Vegetation complexes which have 10%-30% remaining may be considered regionally significant. Proposals that would impact on a vegetation

complex with 10% or less remaining are likely to be formally assessed by the EPA (EPA 2006).

1.5 PREVIOUS FAUNA STUDIES

There is only a limited amount of published or publicly available biological survey work undertaken within the vicinity of Wellard. The most recent of these are within 15 km of the survey area and include:

- Fauna Survey (Level 2) East Rockingham WWTP Site (Harewood 2009).
- Fauna Survey (Level 1) East Rockingham WWTP Site (Harewood 2008).
- Fauna Assessment of Bush Forever Site 355 (Bamford 2005).
- Fauna Assessment of a Portion of the Sepia Depression Ocean Outlet Landline, Lake Richmond (ENV 2005).

2 METHODOLOGY

2.1 BACKGROUND TO SURVEY METHODOLOGY

2.1.1 Protection of Fauna and Fauna Habitat

Fauna, habitat, and fauna ecological communities are protected formally and informally by various legislative and non-legislative measures, which are outlined below. Species listed under these Acts and non-legislative measures are considered 'conservation significant' in this assessment.

Legislative Protection

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Western Australian *Wildlife Conservation Act 1950* (WC Act).
- Western Australian *Environmental Protection Act 1986* (EP Act).

Non-Legislative Protection

- Department of Environment and Conservation (DEC) Priority lists.
- Informal recognition of fauna of interest.

A short description of these legislative and non-legislative measures is given below, and definitions of the species conservation codes and ecological community categories they use, are provided in Appendix A.

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act aims to protect matters of national environmental significance, which are detailed in Appendix A. Under the EPBC Act, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) lists protected species and Threatened Ecological Communities (TECs) by criteria set out in the act (Commonwealth of Australia 2007). Species are considered to be conservation significant if they are listed as Threatened (i.e. Vulnerable, Endangered etc.), or Migratory.

Migratory bird species listed under the EPBC Act are also listed under international migratory bird agreements relating to the protection of birds which migrate between Australia and other countries. These includes the: Japan-Australia Migratory Bird Agreement (JAMBA); China-Australia Migratory Bird Agreement (CAMBA); Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA); and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Some marine fauna or terrestrial fauna that use marine habitats are listed as Marine under the EPBC Act. These species are only considered conservation significant when a proposed development occurs in a Commonwealth marine area (i.e. any Commonwealth Waters or Commonwealth Marine Protected Area). Outside of such areas the EPBC Act does not consider these species to be matters of national environmental significance, so they are not protected under the Act. As such species only listed as Marine under the EPBC Act are not considered in this assessment.

Wildlife Conservation Act 1950

The DEC, lists taxa under the provisions of the WC Act as protected and are classified as Schedule 1 to Schedule 4 according to their need for protection (see Appendix A). The Act makes it an offence to 'take' threatened species without an appropriate licence. There are financial penalties for contravening the WC Act.

Environmental Protection Act 1986

Significant habitat necessary for the maintenance of indigenous fauna to Western Australia as well as TECs is given special consideration in environmental impact assessment, and areas with TECs present have special status as Environmentally Sensitive Areas (ESAs) under the EP Act, and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The protection of 'significant habitats' for fauna indigenous to Western Australia and TECs is a 'clearing principle' for assessing applications for permits to clear native vegetation. Where exemptions for a clearing permit under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply. There are substantial penalties for unlawfully damaging ESAs.

DEC Priority Lists

The DEC produces a list of Priority species that have not been assigned statutory protection under the WC Act. Priority Fauna are under consideration as 'Scheduled' fauna, but are in urgent need of further survey or require regular monitoring, and although not currently threatened may become so in the future. Appendix A provides definitions of Priority codes.

In addition, the DEC maintains a list of Priority Ecological Communities which identifies those communities that need further investigation before being nomination as a TEC.

Although DEC Priority species and communities have no formal legal protection, they are under consideration as 'Scheduled' taxa under the WC Act or as ESAs under the EP Act. Sensitivities to harm Priority species or communities can therefore be expected to be heightened.

Informal Recognition of Threatened Fauna

Certain populations or communities may be of local significance or interest because of their distribution and or abundance. For example, fauna may be locally significant because they represent a range extension (i.e. outside of known distribution) or are newly discovered taxa and therefore have the potential to be listed as Threatened in the future. In addition, many species are in decline as a result of threatening processes, and relict populations of such species maybe locally important.

2.1.2 EPA Requirements for Fauna Surveys

The survey was carried out in a manner consistent with the EPA requirements for environmental surveying and reporting of fauna surveys in Western Australia:

- *Terrestrial Biological Surveys as an Element of Biodiversity Protection. Position Statement No. 3* (EPA 2002).

- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 56* (EPA 2004).

According to the EPA *Guidance Statement No. 56* (EPA 2004), a baseline field fauna survey for environmental impact assessment should at the very least provide a comprehensive list of species within a given area. There are two levels of fauna survey as outlined by the EPA:

- ***Level One:*** desktop study to collate historical knowledge, in conjunction with a reconnaissance survey (site inspection).

- ***Level Two:*** trapping and opportunistic field survey to characterise the fauna present, combined with a Level One survey. Where the scale and nature of the proposed impact is moderate to high, a Level Two survey will be required in most areas of the state, and is typically required for resource development projects.

The methodology of the current survey, a Level One survey, has been developed in consideration of the EPA *Guidance Statement No. 56.* The relatively small size of the survey area and extensive level of faunal assemblage knowledge on the Swan Coastal Plain, a Level One survey is appropriate for the proposed development.

2.2 DESKTOP REVIEW

The purpose of the desktop review was to gather background information on the survey area and the fauna that it may support. This involved a search of the following sources:

- Western Australian Museum (WAM) and DEC combined biological database *NatureMap* (DEC 2010a) (an approximate 10 km buffer surrounding the survey area was searched).

- DEC Threatened and Priority Fauna Database (DEC 2010b) (area search was as above).
- SEWPAC *Protected Matters Search Tool* (SEWPAC 2010), also known as an EPBC search (an approximate 10 km buffer surrounding the survey area was searched).
- Birds Australia's Birdata (Birdata 2010) (area search was based on a one degree square which encompassed the survey area).
- Previous fauna surveys (e.g. previous ENV reports, other consultant's reports, DEC reports).

Collectively, these sources were used to compile a list of species that have been previously recorded in the vicinity of the survey area (Appendix B). This list will invariably include some species that do not occur in the survey area, because some fauna have a limited or patchy distribution, high level of habitat specificity, are locally extinct or were erroneously identified in previous surveys. Some records were excluded from this list, such as extinct species and clearly erroneous records.

2.3 FIELD SURVEY

The purpose of the field survey was to verify the accuracy of the desktop survey and to further delineate and characterise the fauna and faunal assemblages in the study area. The fauna field survey consisted of a fauna habitat assessment and opportunistic observations.

2.3.1 Fauna Habitat Assessment

During the field survey, broad fauna habitats were identified based on vegetation structure and landforms. These fauna habitats were then assessed for their potential to support species of conservation significance and the quality of habitat they provide to a wider suite of fauna. Habitats were rated as high, moderate or low on the basis of the complexity of microhabitats, including significant trees with hollows, loose bark, fallen hollow logs and leaf litter, and their representation in the region and survey area.

The locations of the fauna habitat assessment sites are included in Figure 3 and the information recorded presented in Appendix C.

2.3.2 Opportunistic Observations

Fauna was opportunistically observed and recorded during the field component of the field assessment. Field staff searched for and investigated scats, tracks, burrows and other traces of animals throughout the entire survey area. Where conservation significant species were located, the coordinates were recorded with a GPS.

2.4 TAXONOMY

If there were any taxonomic nomenclature issues for species identified in the desktop assessment (through subsequent name changes or taxonomic reviews) an effort was made to determine the currently accepted scientific name for each taxon. In cases where correct taxonomy of an old record cannot be determined, previous scientific names may be presented. Some taxa names may be followed by 'sp.', indicating that the species name was not provided in the data source or the taxonomy is in doubt. Where there are previously recorded taxa such as this that have the potential to be a conservation significant species, they will be discussed specifically in the results section.

Species were identified in the field using relevant field guides. Tyler *et al*. (2000) and Cogger (2000) were used to identify frogs. Wilson and Swan (2008), Storr *et al*. (1999, 2002) and Cogger (2000) were used to identify reptiles. Pizzey and Knight (2007), Simpson and Day (2004) and Geering *et al*. (2007) were used to identify birds. Menkhorst and Knight (2004), van Dyck and Strahan (2008) and Churchill (2008) were used to identify mammals, while Triggs (1996) was used to identify mammal scats, tracks and traces.

3 RESULTS

3.1 VARIABLES INFLUENCING THE FAUNA SURVEY

As per EPA *Guidance Statement No. 56* (EPA 2004), variables which may influence a survey need to be documented. These variables are detailed in Table 1.

Table 1: Variables Associated with the Fauna Assessment

Variable	Impact on Survey Outcomes
Experience levels/ Resources	The biologists that executed these surveys included practitioners that are regarded as suitably qualified in their respective fields. Field Reconnaissance: • Mr John Trainer – Zoologist. Data Interpretation / Report Writing: • Mr Matthew Love – Senior Zoologist. • Mr John Trainer – Zoologist.
Scope: sampling methods/ Intensity	A Level One survey was carried out, which included a desktop review and site reconnaissance. A site reconnaissance involved performing fauna habitat assessments and opportunistic recordings, therefore many species that occur in the survey area would not have been observed, particularly small ground-dwelling fauna that are typically captured by trapping techniques employed in a Level Two survey.
Sources of Information	At the bioregion level, the south west of Western Australia has been the subject of many targeted biological surveys, primarily for the resource and residential development sector. Site-specific data is limited, but this is not considered a limiting factor for this survey. Previous fauna surveys in the general vicinity are highlighted in Section 1.5.
Timing, weather, season.	The survey was undertaken in spring on the 29 September 2010. The area had received 455.4 millimetres (mm) of rain in the year to date (January to September) which is significantly below the long term average of 604.7 mm for the same period (1983 – 2007) (BOM 2010). This below average rainfall may reduce the number of flora species in the area and the number which can be identified (reduced fruit, seed and flowering) particularly for groundcover species e.g. grasses and herbs. This in turn reduces foraging and sheltering sites for ground dwelling fauna e.g. small mammals and reptiles.

Variable	Impact on Survey Outcomes
Disturbances	No disturbances affected the outcomes of the fauna survey.
Access problems	No access problems affected the outcome of the fauna survey.

3.2 HABITAT ASSESSMENT

3.2.1 Habitat Types

There was one fauna habitat type identified in the survey area - *Melaleuca* Dampland. This fauna habitat type is mapped in Figure 4, and with detailed results presented in Appendix C.

The survey area also contains areas that have been cleared (and so are degraded). These areas provide little to no value as habitat and are principally cleared areas as a consequence of historical agriculture activity.

Table 2: Major habitat types of the survey area

Habitat Type	Habitat Value	Approximate Area of Habitat Type (ha)
Melaleuca Dampland	Low	22.7 ha
Degraded	n/a	50.2 ha
Total		72.9 ha

***Melaleuca* Dampland**

The *Melaleuca* Dampland low woodland habitat forms a small portion of the survey area (32%) and is the only fauna habitat type present. The dominant vegetation in this fauna habitat type consists of Swamp Paperbark (*Melaleuca rhaphiophylla*), Flooded Gum (*Eucalyptus rudis* subsp. *Rudis*), **Paspalum dilatatum*, Yorkshire Fog (**Holcus lanatus*), *Centella asiatica*, Curled Dock (**Rumex crispus*) and Jointed Rush (*Baumea articulata*). The midstorey and understorey are heavily disturbed and dominated by weed species such as the Blackberry (**Rubus anglocandicans*) and Arum Lily (**Zantedeschia aethiopica*). The soils were generally low-lying, black sand and will often inundate during or after rain events. Frog species may become prevalent during these times when surface water is present. Fauna typically associated with this habitat include the Marbled Gecko (*Christinus marmoratus*), Western Swamp Skink (*Egernia luctuosa*), and Tiger Snake (*Notechis scutatus*). The *Melaleuca* Dampland was in Good - Degraded condition as per the Keighery condition scale which is used in Bush Forever assessment

(Government Western Australia 2000). The Wetland habitat type is considered to be of low value to fauna within the survey area.

3.3 FAUNA ASSEMBLAGE

Twenty-nine terrestrial vertebrate fauna were recorded during the survey, comprising one amphibian species, one reptile species, 25 bird species, and two mammal species (Appendix B). Two-hundred and eleven species of fauna have been previously recorded within the vicinity of the survey area, including six amphibians, 33 reptiles, 150 birds and 22 mammals. All fauna previously recorded in the vicinity of the survey area also listed in Appendix B.

3.3.1 Amphibians

One amphibian species recorded during the fauna assessment was Glauert's Froglet (*Crinia glauerti*) (Appendix B1).

Six species of amphibians have been previously recorded in the vicinity of the survey area (Appendix B1). Species likely to occur in the survey area include the common Motorbike Frog (*Litoria moorei*) and Moaning Frog (*Heleioporus eyrei*).

3.3.2 Reptiles

One species of reptile was recorded during the fauna assessment, Buchanan's Snake-eyed Skink (*Cryptoblepharus buchananii*) (Appendix B2).

Thirty-three species of reptiles have been previously recorded in the vicinity of the survey area (Appendix B2). Reptiles likely to occur in the survey area include the Southwestern Cool Skink (*Acritoscincus trilineatum*), the Two-toed Earless Skink (*Hemiergis quadrilineata*) and the Bobtail (*Tiliqua rugosa*).

3.3.3 Birds

Twenty-five species of bird were recorded in the survey area, including species like the Pacific Black Duck (*Anas superciliosa*), Whistling Kite (*Haliastur sphenurus*), Splendid Fairy-wren (*Malurus splendens*), Grey Fantail (*Rhipidura fuliginosa*), Black-faced Cuckoo-shrike (*Coracina novaehollandiae*) and Australian Magpie (*Cracticus tibicen*) (Appendix B3).

One species of introduced bird was recorded during the fauna assessment, the Rainbow Lorikeet (**Trichoglossus haematodus moluccanus*).

One hundred and fifty species of birds have been previously recorded in the vicinity of the survey area (Appendix B3). Many of these species are unlikely to occur in the survey area, since these records are from a larger area encompassing a wide range of habitats and include migratory birds that only occur on a transitory basis. In addition many of

these birds are also associated with fresh water and marine systems and are included due to the close proximity of the survey area to the ocean.

3.3.4 Mammals

During the fauna assessment one mammal species of conservation significance, the Southern Brown Bandicoot (*Isoodon obesulus* subsp. *fusciventer*) was recorded in the survey area (Appendix B4).

The only introduced mammal recorded during the fauna assessment was the European Rabbit (**Oryctolagus cuniculus*).

Twenty-two species of mammal have previously been recorded in the vicinity of the survey area (Appendix B4). Many of these species are unlikely to occur in the survey area, since these records are from a large area encompassing a wide range of habitats that don't occur in the survey area.

3.4 CONSERVATION SIGNIFICANT FAUNA

A database search of the Bollard area resulted in 28 conservation significant fauna species being identified as potentially occurring in the area (Appendix D). This is comprised of three reptile species, 18 bird species and seven mammal species. Some of the conservation significant fauna previously recorded in the region will not occur in the survey area as they have a limited or patchy distribution, high level of habitat specificity, are locally extinct or were erroneously recorded in previous surveys.

One species, the Southern Brown Bandicoot was recorded in the survey area. This species is listed as Priority 5 on the DEC Priority Fauna List. Secondary evidence in the form of species specific conical diggings was recorded in moderate density across the survey area.

Two species were considered as 'Likely', three species as 'Possible', 18 as 'Unlikely' and four as 'Highly Unlikely' to occur within habitats of the survey area. This is based on the ecological requirements and known distribution of the species and the type and quality of fauna habitats within the survey area. The species considered as 'Likely' to occur are bird species namely the Cattle Egret and Eastern Great Egret.

4 DISCUSSION

4.1 FAUNAL ASSEMBLAGE

Twenty-nine terrestrial vertebrate fauna were recorded during the survey, comprising one amphibian species, one reptile species, 25 bird species, and two mammal species. As this was a Level One survey that included a reconnaissance survey to assess fauna habitat types, many of the potentially occurring species were not recorded. For example, many ground dwelling reptiles and mammals are mainly recorded or captured when trapping techniques are employed during a Level Two survey. This level of fauna species is expected given the poor condition of the survey area. In addition a clear lack of vegetation in the midstorey and understorey of the survey area restricts the number of micro-niches available, which further results in less diversity, particularly of ground-dwelling species.

The Swamp Paperbark and Flooded Gum could provide shelter and foraging opportunities for a number of different species including arboreal reptiles and mammals and a number of bird species. These species however would be commonly recorded urban species and none would have any conservation significance.

The conservation significant Southern Brown Bandicoot was recorded during the survey. The survey area would not support a large population of this species given the clear lack of native understorey species (which it requires) and the low-lying areas that would become inundated during rain events (van Dyck and Strahan 2008). The Southern Brown Bandicoot has been recorded in the vicinity of the survey area and has a long historical presence on the Swan Coastal Plain.

Historically twenty-eight fauna species of conservation significance have been recorded within the vicinity of the survey area. Three species were considered as 'Likely'; seven species were 'Possible'; 31 were considered as 'Unlikely'; and two were considered as 'Highly Unlikely' to occur within habitat of the survey area. This was based on the ecological requirements and known distribution of the species and the type and quality of fauna habitats present.

The species considered as 'Likely' to occur are bird species namely the Cattle Egret and Eastern Great Egret. These species and the Southern Brown Bandicoot that was recorded in the survey area will be discussed in more depth regarding any potential impacts.

4.2 SIGNIFICANCE OF FAUNA HABITAT

The *Melaleuca* Dampland within the survey area is degraded as a result of the lack of midstorey and understorey species and the presence of weeds; consequently it is of little value to conservation significant species (unlikely to support any additional species of conservation significance) or to common species. The understorey contains a large

array of weed species such as Blackberry and Arum Lilies which restricts the micro-niche diversity of the fauna habitat type.

The survey area is approximately 73 ha in size and is located between residential housing to the west and pastoral land to the east. The survey area is isolated from other similar habitats in the local vicinity. The fauna habitat in the survey area is highly fragmented with little habitat connectivity with surrounding area. This greatly reduces the value and functionality of the survey area to fauna, particularly those that require larger areas or home ranges. Ecological connectivity facilitates many life-history functions of fauna, particularly fauna of the area. The ability to utilise connected habitats is integral to the life histories of a broad spectrum of species, with connectivity between habitats being crucial to important functions such as breeding.

4.3 SIGNIFICANCE OF FAUNA SPECIES

The species recorded in the fauna assessment were common species often recorded in the general area, and have many historic records for the Swan Coastal Plain.

The species recorded in the survey area and the Egrets that were considered as 'Likely' to occur may not be impact by any potential development within the survey area. The Cattle Egret and Easter Great Egret are highly mobile and can easily move to other areas with similar habitat. The Southern Brown Bandicoot is ground-dwelling so their capacity to translocate to other areas outside of the survey area is not as easy as for more mobile species. However the habitat within the survey area is largely degraded as is not expected to support a significant population.

5 CONCLUSION

The fauna assessment undertaken by ENV determined that:

- One fauna habitat type was identified in the survey area; a *Melaleuca* Dampland. This fauna habitat type was considered to have low habitat value.
- Two-hundred and eleven species of fauna have been previously recorded within the vicinity of the survey area, including six amphibians, 33 reptiles, 150 birds and 22 mammals.
- During the fauna survey twenty-nine terrestrial vertebrate fauna were recorded, comprising of one amphibian species, one reptile species, 18 bird species, and two mammal species.
- One species is of conservation significance, the Southern Brown Bandicoot (Priority 5).
- Twenty-eight species of conservation significance have been previously recorded within the vicinity of the survey area. This was comprised of three reptile species, 18 bird species and seven mammal species.
- Three species were considered as 'Likely'; seven species were 'Possible'; 31 were considered as 'Unlikely'; and two were considered as 'Highly Unlikely' to occur within habitat of the survey area.

Generally the site was degraded and cleared and did not provide much value to a wide suite of fauna species. Approximately 32% of the survey area contained fauna habitat and the remaining was in degraded condition and depauperate of faunal assemblages. In addition the survey area has been subject to past and present agriculture activities and this has largely reduced the sites value for fauna particularly species with conservation significance.

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FIGURES

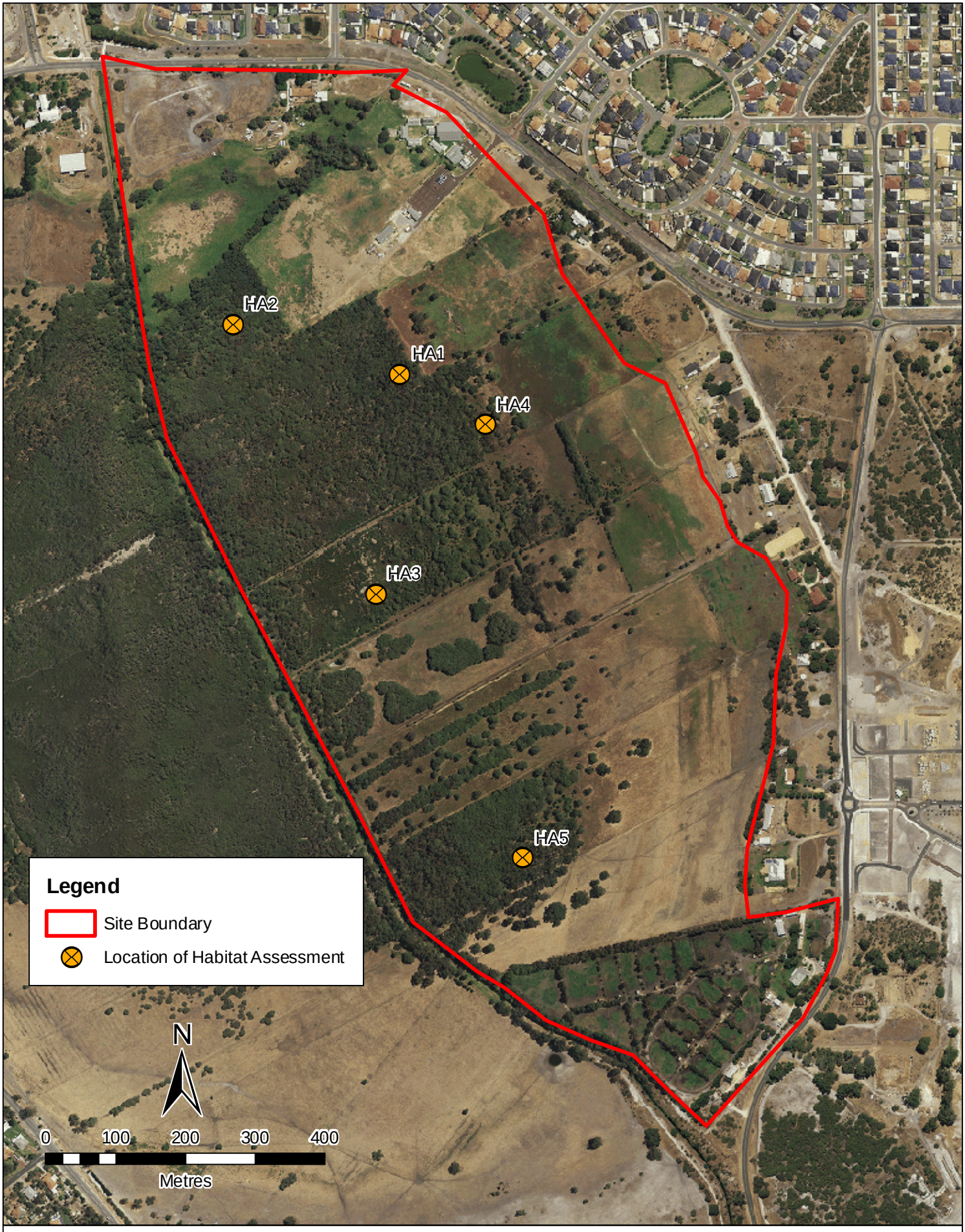
CLIENT: Wellard Landowners Group
JOB NO.: 10.127

Location Map

Bollard Bulrush East Fauna Assessment

AUTHOR: M. Love
DRAWN: T. Ellis
DATE: 16-11-2010
SCALE: 1:25,000 @ A4
PROJECTION: GDA 94 MGA 50

FIGURE 1



CLIENT
Wellard Landowners Group

JOB NO.
10.127

AUTHOR:
M. Love

DRAWN
T. Ellis

DATE
16-11-2010

SCALE
1:7,000 @ A4

PROJECTION
GDA 94 MGA 50

Location of Fauna Habitat Assessments

Bollard Bulrush East
Fauna Assessment

FIGURE 3

CLIENT: Wellard Landowners Group
JOB NO.: 10.127
AUTHOR: M. Love
DRAWN: T. Ellis
DATE: 16-11-2010
SCALE: 1:7,000 @ A4
PROJECTION: GDA 94 MGA 50

Fauna Habitat Map

Bollard Bulrush East
Fauna Assessment

FIGURE 4

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

BOLLARD BULRUSH EAST FAUNA ASSESSMENT

APPENDIX A

DEFINITIONS OF CONSERVATION CODES FOR FAUNA OF CONSERVATION SIGNIFICANCE

A1: *Environment Protection and Biodiversity Conservation Act 1999* (*Cth*): Threatened Species and Threatened Ecological Communities Codes

The *EPBC Act* prescribes seven matters of national environmental significance:-

- World Heritage properties;
- National Heritage places;
- Wetlands of international importance;
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

Species in the categories ExW, CE, E, V and M (see below), and Threatened Ecological Communities in the CE and E categories are protected as matters of national environmental significance under the *EPBC Act*.

Category	Code	Category
Extinct	**Ex**	Taxa for which there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	**ExW**	Taxa known to survive only in cultivation, in captivity or as a naturalised population well outside its past range; or not recorded in its known and/or expected habitat at appropriate seasons anywhere in its past range despite exhaustive surveys over a timeframe appropriate to its life cycle and form.
Critically Endangered	**CE**	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	**E**	Taxa not critically endangered and facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Vulnerable	**V**	Taxa not critically endangered or endangered and facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria**.**
Conservation Dependent	**CD**	Taxa which are the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within five years.

Category	Code	Category
Migratory	**Mi**	Taxa that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations, that are included in an international agreement approved by the Minister for the Environment, Heritage and the Arts and that have been placed on the national List of Migratory Species under the provisions of the EPBC Act. At present there are four such agreements: • the Bonn Convention • the China-Australia Migratory Bird Agreement (CAMBA) • the Japan-Australia Migratory Bird Agreement (JAMBA) • the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
Marine	**Ma**	Taxa protected in a Commonwealth Marine Protected Area by virtue of section 248 of the *EPBC Act*. These taxa include certain seals, crocodiles, turtles and birds, as well as various marine fish. Commonwealth marine areas are matters of national environmental significance under the *EPBC Act*. An action will require approval if the: • action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment, or • action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant impact on the environment in a Commonwealth marine area[1] The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters. The Commonwealth marine area stretches from 3 to 200 nautical miles (approximately 5-370 km) from the coast. Marine protected areas are marine areas which are recognised to have high conservation value.

A2: Western Australian Threatened Fauna Categories

Wildlife Conservation Act 1950 (WA)

Category	Code	Description
Schedule 1	S1	Rare or likely to become extinct.
Schedule 2	S2	Presumed extinct.
Schedule 3	S3	Birds subject to an agreement between the governments of Australia and Japan, the People's Republic of China & the Republic of Korea relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Other specially protected fauna.

A3: Department of Environment and Conservation Fauna Priority Codes

Category	Code	Description
Priority 1	P1	Taxa with few, poorly known populations on threatened lands.
Priority 2	P2	Taxa with few, poorly known populations on conservation lands.
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands.
Priority 4	P4	Taxa in need of monitoring: not currently threatened or in need of special protection, but could become so. Usually represented on conservation lands.
Priority 5	P5	Taxa in need of monitoring: not considered threatened, but the subject of a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

APPENDIX B

PREVIOUSLY RECORDED FAUNA IN THE REGION

APPENDIX B

B1: AMPHIBIAN SPECIES PREVIOUSLY RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, A = Listed in Naturemap, B = Listed by Birds Australia, C = Previous fauna surveys records (<15km), D = Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

AMPHIBIANS		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Family HYLIDAE								
Litoria adelaidensis	Slender Tree Frog				x			
Litoria moorei	Motorbike Frog, Bell Frog				x			
Family MYOBATRACHIDAE								
Crinia glauerti	Glauert's Froglet				x			x
Crinia insignifera	Squelching Froglet				x			
Heleioporus eyrei	Moaning Frog				x			
Limnodynastes dorsalis	Bullfrog or Banjo Frog				x			

[X] fauna species recorded from the survey area.

APPENDIX B

B2: REPTILE SPECIES PREVIOUSLY RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, A = Listed in Naturemap, B = Listed by Birds Australia, C = Previous fauna surveys records (<15km), D = Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

REPTILES		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Family CHELUIDAE								
Chelodina oblonga	Oblong Turtle						x	
Family AGAMIDAE								
Ctenophorus adelaidensis	Western Heath Dragon				x		x	
Pogona minor	Bearded Dragon				x		x	
Family GEKKONIDAE								
Christinus marmoratus	Marbled Gecko				x		x	
Strophurus spinigerus spinigerus	Southwestern Spiny-tailed Gecko				x		x	
Family PYGOPODIDAE								
Aprasia repens	Sand-plain Worm-lizard						x	
Delma fraseri	Fraser's Delma				x		x	
Delma grayii	Side-barred Delma						x	
Lialis burtonis	Burrton's Legless Lizard				x		x	
Pletholax gracilis	Keeled Legless Lizard				x			
Pygopus lepidopodus	Common Scaly-foot				x			
Family SCINCIDAE								
Acritoscincus trilineatum	Southwestern Cool Skink				x		x	
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink						x	x
Ctenotus australis					x		x	
Ctenotus fallens					x		x	
Ctenotus gemmula	Jewelled Ctentous			P3	x			
Hemiergis quadrilineata	Two-toed Earless Skink				x		x	
Lerista elegans					x		x	
Lerista lineata	Lined Skink			P3	x		x	
Menetia greyii	Common Dwarf Skink				x		x	
Morethia lineoocellata					x		x	
Morethia obscura	Woodland Flecked Skink				x		x	
Tiliqua occipitalis	Western Blue-tongue				x		x	
Tiliqua rugosa	Southwestern Bobtail				x		x	
Family VARANIDAE								
Varanus tristis	Black-headed Monitor				x		x	
Family TYPHLOPIDAE								
Ramphotyphlops australis	Southern Blind Snake				x		x	
Family ELAPIDAE								
Brachyurophis semifasciata	Southern Shovel-nosed Snake				x			
Neelaps bimaculatus	Black-naped Snake				x			
Neelaps calonotos	Black-striped Snake			P3	x			
Notechis scutatus	Tiger Snake				x			
Pseudonaja affinis	Dugite				x		x	
Pseudonaja nuchalis	Gwardar				x			
Simoselaps bertholdi	Jan's Banded Snake				x			

[X] fauna species recorded from the survey area.
[*] denotes introduced species.

APPENDIX B

B3: BIRD SPECIES PREVIOUSLY RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, A = Listed in Naturemap, B = Listed by Birds Australia, C = Previous fauna surveys records (<15km), D = Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

BIRDS		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Family PHASIANIDAE								
Coturnix pectoralis	Stubble Quail	Ma			x			
Family ANATIDAE								
Anas gracilis	Grey Teal				x	x		
Anas rhynchotis	Australasian Shoveler				x	x		
Anas superciliosa	Pacific Black Duck				x	x		x
Aythya australis	Hardhead				x	x		
Biziura lobata	Musk Duck	Ma			x	x		
Chenonetta jubata	Australian Wood Duck				x	x		x
Cygnus atratus	Black Swan				x	x		
Malacorhynchus membranaceus	Pink-eared Duck				x	x		
Oxyura australis	Blue-billed Duck				x	x		
Tadorna tadornoides	Australian Shelduck				x	x		
Family PODICIPEDIDAE								
Poliocephalus poliocephalus	Hoary-headed Grebe				x	x		
Podiceps cristatus	Great Crested Grebe				x	x		
Tachybaptus novaehollandiae	Australasian Grebe				x	x		
Family ANHINGIDAE								
Anhinga melanogaster	Darter				x	x		
Family PHALACROCORACIDAE								
Phalacrocorax carbo	Great Cormorant				x	x		
Phalacrocorax melanoleucos	Little Pied Cormorant				x	x		
Phalacrocorax sulcirostris	Little Black Cormorant				x	x		x
Phalacrocorax varius	Pied Cormorant				x	x		
Family PELECANIDAE								
Pelecanus conspicillatus	Australian Pelican	Ma			x	x		
Family ARDEIDAE								
Ardea garzetta	Little Egret	Ma			x	x		
Ardea ibis	Cattle Egret	Mi, Ma			x	x		
Ardea modesta	Eastern Great Egret	Mi, Ma			x	x		
Ardea novaehollandiae	White-faced Heron				x	x	x	
Ardea pacifica	White-necked Heron				x	x		
Ixobrychus minutus	Little Bittern			P4	x			
Nycticorax caledonicus	Rufous Night Heron	Ma			x	x		
Family THRESKIORNITHIDAE								
Platalea flavipes	Yellow-billed Spoonbill				x	x		
Platalea regia	Royal Spoonbill				x	x		
Threskiornis molucca	Australian White Ibis	Ma			x	x		x
Threskiornis spinicollis	Straw-necked Ibis	Ma			x	x		x
Family ACCIPITRIDAE								
Accipiter cirrocephalus	Collared Sparrowhawk				x	x	x	
Accipiter fasciatus	Brown Goshawk	Ma			x	x	x	
Aquila audax	Wedge-tailed Eagle				x	x		
Aquila morphnoides	Little Eagle				x	x	x	
Circus approximans	Swamp Harrier	Ma			x	x		
Elanus axillaris	Black-shouldered Kite				x	x	x	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Mi, Ma			x	x		
Haliastur sphenurus	Whistling Kite	Ma			x	x	x	x
Lophoictinia isura	Square-tailed Kite				x			
Family FALCONIDAE								
Falco berigora	Brown Falcon				x	x		
Falco cenchroides	Australian Kestrel	Ma			x	x	x	

BIRDS		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Falco longipennis	Australian Hobby				x	x	x	
Falco peregrinus	Peregrine Falcon		S4		x	x	x	
Family RALLIDAE								
Fulica atra	Eurasian Coot				x	x		
Gallinula tenebrosa	Dusky Moorhen				x	x		
Gallirallus philippensis	Buff-banded Rail	Ma			x			
Porphyrio porphyrio	Purple Swamphen	Ma			x	x		x
Porzana pusilla	Baillon's Crake				x	x		
Porzana tabuensis	Spotless Crake	Ma			x	x		
Tribonyx ventralis	Black-tailed Native-hen				x			
Family TURNICIDAE								
Turnix varia	Painted Button-quail				x	x		
Family SCOLOPACIDAE								
Actitis hypoleucos	Common Sandpiper	Mi, Ma			x	x		
Calidris acuminata	Sharp-tailed Sandpiper	Mi, Ma			x	x		
Calidris ferruginea	Curlew Sandpiper	Mi, Ma			x	x		
Calidris ruficollis	Red-necked Stint	Mi, Ma			x	x		
Numenius madagascariensis	Eastern Curlew	Mi, Ma		P4	x			
Tringa glareola	Wood Sandpiper	Mi, Ma			x	x		
Tringa nebularia	Common Greenshank	Mi, Ma			x	x		
Family BURHINIDAE								
Burhinus grallarius	Bush Stone-curlew			P4	x			
Family RECURVIROSTRIDAE								
Cladorhynchus leucocephalus	Banded Stilt				x	x		
Himantopus himantopus	Black-winged Stilt	Ma			x	x		
Recurvirostra novaehollandiae	Red-necked Avocet	Ma			x	x		
Family CHARADRIIDAE								
Charadrius melanops	Black-fronted Dotterel				x	x		
Charadrius rubricollis	Hooded Plover	Ma		P4	x			
Charadrius ruficapillus	Red-capped Plover	Ma			x	x		
Vanellus tricolor	Banded Lapwing				x			
Family LARIDAE								
Larus novaehollandiae	Silver Gull	Ma			x	x		
Sterna caspia	Caspian Tern	Mi,Ma				x		
Family COLUMBIDAE								
**Columba livia*	Domestic Pigeon				x	x		
Ocyphaps lophotes	Crested Pigeon				x	x		
Phaps chalcoptera	Common Bronzewing				x	x	x	x
**Streptopelia chinensis*	Spotted Turtle Dove				x	x		
**Streptopelia senegalensis*	Laughing Turtle-Dove				x	x	x	
Family PSITTACIDAE								
Cacatua roseicapilla	Galah				x	x	x	x
Cacatua sanguinea	Little Corella				x	x		x
**Cacatua tenuirostris*	Eastern Long-billed Corella				x	x		
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	S1		x	x		
Calyptorhynchus baudinii	Baudin's Cockatoo	VU	S1					
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	S1		x	x	x	
Neophema elegans	Elegant Parrot				x	x		
Polytelis anthopeplus	Regent Parrot				x	x		
Platycercus zonarius	Australian Ringneck				x	x	x	x
Platycercus spurius	Red-capped Parrot				x	x	x	
Platycercus icterotis	Western Rosella				x	x		
**Trichoglossus haematodus*	Rainbow Lorikeet				x	x		x
Family CUCULIDAE								
Cacomantis flabelliformis	Fan-tailed Cuckoo	Ma			x	x		
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	Ma			x	x	x	
Chrysococcyx lucidus	Shining Bronze Cuckoo	Ma			x	x		
Cuculus pallidus	Pallid Cuckoo	Ma			x	x		
Family STRIGIDAE								
Ninox novaeseelandiae	Boobook Owl	Ma			x	x		
Family TYTONIDAE								
Tyto javanica	Eastern Barn Owl				x		x	
Family PODARGIDAE								
Podargus strigoides	Tawny Frogmouth				x	x		

BIRDS		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Family APODIDAE								
Apus pacificus	Fork-tailed Swift	Mi, Ma			x	x		
Family HALCYONIDAE								
**Dacelo novaeguineae*	Laughing Kookaburra				x	x	x	
Todiramphus sanctus	Sacred Kingfisher	Ma			x	x		
Family MEROPIDAE								
Merops ornatus	Rainbow Bee-eater	Mi, Ma			x	x	x	
Family MALURIDAE								
Malurus elegans	Red-winged Fairy-wren				x			
Malurus splendens	Splendid Fairy-wren				x	x	x	x
Family PARDALOTIDAE								
Pardalotus punctatus	Spotted Pardalote				x	x		
Pardalotus striatus	Striated Pardalote				x	x	x	x
Family ACANTHIZIDAE								
Acanthiza apicalis	Broad-tailed Thornbill (Inland Thornbill)				x	x	x	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				x	x		
Acanthiza inornata	Western Thornbill				x	x	x	
Gerygone fusca	Western Gerygone				x	x	x	x
Sericornis frontalis	White-browed Scrubwren				x	x	x	
Smicrornis brevirostris	Weebill				x	x	x	
Family MELIPHAGIDAE								
Anthochaera carunculata	Red Wattlebird				x	x	x	x
Anthochaera lunulata	Western Little Wattlebird				x	x		
Acanthorhynchus superciliosus	Western Spinebill				x	x		
Lichmera indistincta	Brown Honeyeater				x	x	x	x
Lichenostomus ornatus	Yellow-plumed Honeyeater				x			
Lichenostomus virescens	Singing Honeyeater				x	x	x	
Manorina flavigula	Yellow-throated Miner				x			
Melithreptus chloropsis	Western White-naped Honeyeater				x	x		
Phylidonyris melanops	Tawny-crowned Honeyeater				x	x		
Phylidonyris nigra	White-cheeked Honeyeater				x	x		
Phylidonyris novaehollandiae	New Holland Honeyeater				x	x	x	
Family PETROICIDAE								
Eopsaltria georgiana	White-breasted Robin				x			
Melanodryas cucullata	Hooded Robin				x	x		
Petroica goodenovii	Red-capped Robin				x	x		
Petroica multicolor	Scarlet Robin				x	x	x	
Family NEOSITTIDAE								
Daphoenositta chrysoptera	Varied Sittella				x	x	x	
Family PACHYCEPHALIDAE								
Colluricincla harmonica	Grey Shrike-thrush				x	x	x	
Pachycephala pectoralis	Golden Whistler				x	x		
Pachycephala rufiventris	Rufous Whistler				x	x	x	
Family DICRURIDAE								
Grallina cyanoleuca	Magpie-lark	Ma			x	x	x	
Rhipidura fuliginosa	Grey Fantail				x	x	x	x
Rhipidura leucophrys	Willie Wagtail				x	x	x	x
Family CAMPEPHAGIDAE								
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Ma			x	x	x	x
Lalage sueurii	White-winged Triller				x	x		
Family ARTAMIDAE								
Artamus cinereus	Black-faced Woodswallow				x	x		
Artamus cyanopterus	Dusky Woodswallow				x	x		
Family CRACTICIDAE								
Cracticus tibicen	Australian Magpie				x	x	x	x
Cracticus torquatus	Grey Butcherbird				x	x	x	x
Strepera versicolor	Grey Currawong				x	x		
Family CORVIDAE								
Corvus coronoides	Australian Raven				x	x	x	x
**Corvus splendens*	House Crow				x			
Family HIRUNDINIDAE								
Cheramoeca leucosternus	White-backed Swallow				x	x		
Hirundo ariel	Fairy Martin				x			
Hirundo neoxena	Welcome Swallow	Ma			x	x	x	x

BIRDS		Conservation Codes						
Scientific Name	Common Name	EPBC	WC	DEC	A	B	C	D
Hirundo nigricans	Tree Martin	Ma			x	x	x	
Family ZOSTEROPIDAE								
Zosterops lateralis	Silvereye	Ma			x	x	x	x
Family SYLVIIDAE								
Acrocephalus australis	Australian Reed-warbler	Ma			x	x		
Cincloramphus cruralis	Brown Songlark				x	x		
Megalurus gramineus	Little Grassbird				x	x		
Family DICAEIDAE								
Dicaeum hirundinaceum	Mistletoebird				x	x		
Family PASSERIDAE								
**Passer montanus*	Eurasian Tree Sparrow				x			
Family MOTACILLIDAE								
Anthus australis	Australian Pipit; Richard's Pipit				x	x	x	

[X] fauna species recorded from the survey area.
[*] denotes introduced species.

APPENDIX B

B4: MAMMAL SPECIES PREVIOUSLY RECORDED IN THE REGION

Key: EPBC = Environmental Protection and Biodiversity Conservation Act 1999, WC = Wildlife Conservation Act 1950, DEC = Department of Conservation Priority Code, A = Listed in Naturemap, B = Listed by Birds Australia, C = Previous fauna surveys records (<15km), D = Current Survey

Note: For Definitions of Conservation Codes see Appendix A.

MAMMALS		Conservation Codes						
Scientific Name	**Common Name**	**EPBC**	**WC**	**DEC**	**A**	**B**	**C**	**D**
Family DASYURIDAE								
Dasyurus geoffroii	Western Quoll, Chuditch	VU	S1		x			
Phascogale calura	Red-tailed Phascogale	EN	S1					
Phascogale tapoatafa ssp. (WAM M434)	Southern Brush-tailed Phascogale		S1		x			
Family PERAMELIDAE								
Isoodon obesulus fusciventer	Southern Brown Bandicoot, Quenda			P5	x		x	x
Family MACROPODIDAE								
Macropus fuliginosus	Western Grey Kangaroo						x	
Macropus irma	Western Brush Wallaby			P4	x			
Setonix brachyurus	Quokka	VU	S1					
Family PHALANGERIDAE								
Trichosurus vulpecula vulpecula	Common Brushtail Possum				x			
Family TARSIPEDIDAE								
Tarsipes rostratus	Honey Possum, Noolbenger				x			
Family VESPERTILIONIDAE								
Chalinolobus gouldii	Gould's Wattled Bat						x	
Nyctophilus timoriensis timoriensis	Greater Long-eared Bat						x	
Vespadelus regulus	Southern Forest Bat						x	
Family MOLOSSIDAE								
Austrononus australis	White-striped Freetail-bat						x	
Mormopterus planiceps	Southern Freetail-bat						x	
Family MURIDAE								
Hydromys chrysogaster	Water-rat			P4	x			
**Mus musculus*	House Mouse				x		x	
Rattus fuscipes	Western Bush Rat						x	
**Rattus rattus*	Black Rat				x		x	
Family LEPORIDAE								
**Oryctolagus cuniculus*	Rabbit						x	x
Family CANIDAE								
**Vulpes vulpes*	Red Fox						x	
Family FELIDAE								
**Felis catus*	Cat				x		x	
Family SUIDAE								
**Sus scrofa*	Pig				x			

[X] fauna species recorded from the survey area.
[*] denotes introduced species.

APPENDIX C

HABITAT ASSESSMENT DATA SHEETS

BOLLARD BULRUSH EAST FAUNA ASSESSMENT

APPENDIX C

HABITAT ASSESSMENT DATA SHEETS

Habitat Assessment - HA 1

Broad Fauna Habitat: *Melaleuca* Dampland

UTM Co-ordinates: Easting: 390760 Northing: 64340605

Habitat Value: Low

Low Woodland of *Melaleuca rhaphiophylla*, *Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum*, **Holcus lanatus*, *Centella asiatica*, **Rumex crispus* and *Baumea articulata*.

Total Area of Habitat: 22.7 ha
Proportion of Project Area: 32%

Habitat Structure and Microhabitats

Aspect:	n/a	**Exfoliating Slabs:**	None	
Soils:	Brown / Black Sand	**Surface rocks:**	Small: None	Large: None
Boulders:	None	**Tree Hollows:**	Small: None	Large: None
Cracks:	None	**Caves:**	None	Crevices: None
Cliffs :	None	**Suitability for bats:**	Nil	
Litter Cover: 20%	**Woody Debris:** 5%	**Bare Ground:** 25%		

Vegetation

Stratum	Vegetation Species	Cover	Height
Overstory	*Melaleuca rhaphiophylla*	30-70%	6-12 m
Midstory	*Typha* sp., Blackberry (**Rubus anglocandicans*), Common Fig (**Ficus carica*)	30-70%	< 2 m
Understory	**Paspalum dilatatum*, Curled Dock (**Rumex crispus*)	< 2%	< 0.3 m

Condition Rating: Very Good
Disturbance: Weeds, Fencelines
Fire Age Old

Other Relevant Information:

No Black Cockatoo foraging habitat, Numerous Quenda Diggings.

Habitat Assessment - HA 2

Broad Fauna Habitat: *Eucalyptus* Dampland

UTM Co-ordinates: Easting: 390520 Northing: 6430676

Habitat Value: Low

Low Woodland of *Melaleuca rhaphiophylla*, *Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum*, **Holcus lanatus*, *Centella asiatica*, **Rumex crispus* and *Baumea articulata*.

Total Area of Habitat: 22.7 ha
Proportion of Project Area: 32%

Habitat Structure and Microhabitats

Aspect:	n/a	**Exfoliating Slabs:**	None	
Soils:	Brown / Black Sand	**Surface rocks:**	Small: None	Large: None
Boulders:	None	**Tree Hollows:**	Small: None	Large: None
Cracks:	None	**Caves:**	None	Crevices: None
Cliffs :	None	**Suitability for bats:**	Nil	
Litter Cover: < 1%	**Woody Debris:** < 1%	**Bare Ground:** < 1%		

Vegetation

Stratum	Vegetation Species	Cover	Height
Overstory	*Melaleuca rhaphiophylla*	30-70%	6 m
Midstory	Common Fig (**Ficus carica*), Arum Lily (**Zantedeschia aethiopica*)	< 2%	< 1 m
Understory	**Paspalum dilatatum*, Curled Dock (**Rumex crispus*), *Centella asiatica*	70-100%	< 0.3 m

Condition Rating: Excellent
Disturbance: Weeds
Fire Age Old

Other Relevant Information:

No Black Cockatoo foraging habitat; Vegetation 100% very little bare ground and / or woody debris; small amounts of surface water damp low-lying areas; Quenda diggings.

Habitat Assessment - HA 3

Broad Fauna Habitat: *Eucalyptus* Dampland

UTM Co-ordinates : Easting: 390725 Northing: 6430290

Habitat Value: Low

Low Woodland of *Melaleuca rhaphiophylla*, *Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum*, **Holcus lanatus*, *Centella asiatica*, **Rumex crispus* and *Baumea articulata*.

Total Area of Habitat: 22.7 ha
Proportion of Project Area: 32%

Habitat Structure and Microhabitats

Aspect:	n/a	**Exfoliating Slabs:**	None	
Soils:	Brown / Black Sand	**Surface rocks:**	Small: None	Large: None
Boulders:	None	**Tree Hollows:**	Small: None	Large: None
Cracks:	None	**Caves:**	None	Crevices: None
Cliffs :	None	**Suitability for bats:**	Nil	
Litter Cover: 5%	**Woody Debris:** 5%	**Bare Ground:** 50%		

Vegetation

Stratum	Vegetation Species	Cover	Height
Overstory	nil		
Midstory	*Melaleuca rhaphiophylla*, Jointed Rush (*Baumea articulata*)	30-70%	< 2 m
Understory	**Paspalum dilatatum*, Curled Dock (**Rumex crispus*)	< 2%	< 0.3 m
Condition Rating:	Very Good		
Disturbance:	Weeds, cattle damage		
Fire Age	Old		

Other Relevant Information:

No Black Cockatoo foraging habitat; vegetation 40%.

Habitat Assessment - HA 4

Broad Fauna Habitat: *Eucalyptus* Dampland

UTM Co-ordinates: Easting: 390881 Northing: 6430533

Habitat Value: Low

Low Woodland of *Melaleuca rhaphiophylla*, *Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum*, **Holcus lanatus*, *Centella asiatica*, **Rumex crispus* and *Baumea articulata*.

Total Area of Habitat: 22.7 ha
Proportion of Project Area: 32%

Habitat Structure and Microhabitats

Aspect:	n/a	**Exfoliating Slabs:**	None	
Soils:	Brown / Black Sand	**Surface rocks:**	Small: None	Large: None
Boulders:	None	**Tree Hollows:**	Small: None	Large: None
Cracks:	None	**Caves:**	None	Crevices: None
Cliffs :	None	**Suitability for bats:**	Nil	
Litter Cover: < 1%	**Woody Debris:** < 1%	**Bare Ground:** 30%		

Vegetation

Stratum	Vegetation Species	Cover	Height
Overstory	*Melaleuca rhaphiophylla*	30-70%	6 m
Midstory	Jointed Rush (*Baumea articulata*), Arum Lily (**Zantedeschia aethiopica*)	10-30%	< 2 m
Understory	*Centella asiatica*	70-100%	< 0.1 m

Condition Rating: Very Good
Disturbance: Weeds
Fire Age Old

Other Relevant Information:

No Black Cockatoo foraging habitat, significant number of weeds; Quenda diggings, excessive damp areas; vegetation 70%.

Habitat Assessment - HA 5

Broad Fauna Habitat: *Eucalyptus* Dampland

UTM Co-ordinates: Easting: 390936 Northing: 6429912

Habitat Value: Low

Low Woodland of *Melaleuca rhaphiophylla*, *Eucalyptus rudis* subsp. *rudis*, **Paspalum dilatatum*, **Holcus lanatus*, *Centella asiatica*, **Rumex crispus* and *Baumea articulata*.

Total Area of Habitat: 22.7 ha
Proportion of Project Area: 32%

Habitat Structure and Microhabitats

Aspect:	n/a	**Exfoliating Slabs:**	None	
Soils:	Brown / Black Sand	**Surface rocks:**	Small: None	Large: None
Boulders:	None	**Tree Hollows:**	Small: None	Large: None
Cracks:	None	**Caves:**	None	Crevices: None
Cliffs :	None	**Suitability for bats:**	Nil	
Litter Cover: 10%	**Woody Debris:** 5%	**Bare Ground: 5%**		

Vegetation

Stratum	Vegetation Species	Cover	Height
Overstory	*Melaleuca rhaphiophylla*, *Eucalyptus rudis*	30-70%	6-15 m
Midstory	Jointed Rush (*Baumea articulata*)	30-70%	< 1 m
Understory	*Centella asiatica*, **Paspalum dilatatum*, **Holcus lanatus*	30-70%	< 0.1 m

Condition Rating: Excellent
Disturbance: Weeds
Fire Age Old

Other Relevant Information:

No Black Cockatoo foraging habitat

APPENDIX D

CONSERVATION SIGNIFICANT FAUNA RECORDED WITHIN THE VICINITY OF THE SURVEY AREA

BOLLARD BULRUSH EAST FAUNA ASSESSMENT

APPENDIX D

CONSERVATION SIGNIFICANT FAUNA RECORDED WITHIN THE VICINITY OF THE SURVEY AREA

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
REPTILES				
Jewelled *Ctenotus* (*Ctenotus gemmula*)	P3	The Swan Coastal Plain population of the Jewelled *Ctenotus* occurs in coastal heaths and semi-arid woodlands. This species has a patchy distribution along the coastal plains and adjacent interior of the southwest (Wilson and Swan 2008). This species is particularly difficult to locate, and is infrequently collected in biological surveys.	The project area does not contain coastal heaths which is the preferred habitat type for this species. In addition very little is known of its current distribution on the Swan Coastal Plain.	Unlikely
Lined Skink (*Lerista lineata*)	P3	The Lined Skink occurs in sandy coastal heath and shrubland areas in isolated populations in the southwest and midwest coast of Western Australia and in disjunct and isolated populations (Wilson and Swan 2008). This burrowing species is found in loose soil or sand beneath logs and termite mounds, where it feeds on termites and other small insects (Cogger 2000).	The project area lacks coastal heath and shrublands that is the preferred habitat type for this species.	Unlikely
Black-striped Snake (*Neelaps calonotos*)	P3	The Black-striped Snake favours sandy soils of coastal and near coastal dunes and sandplains supporting heath and *Banksia* Eucalypt Woodlands (Nevill 2005, Bush *et al*. 2007). The Black-striped Snake is typically	The project area is not found in coastal to near coastal areas therefore lacks the costal heath vegetation type that is preferred by this species. This species of snake is also very cryptic and is infrequently	Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		found in these sandplain habitats having a very limited distribution exclusive to the Swan Coastal Plain. This taxon is particularly difficult to locate, and is infrequently collected during biological surveys.	collected and or recorded during biological assessments.	
BIRDS				
Cattle Egret (*Ardea ibis*)	Mi	The Cattle Egret occurs in the wetter parts of Western Australia, in particular the Kimberley and the south-west. This species inhabits short grass, in particular damp pastures and wetlands, usually in the company of cattle and occasionally other livestock. In Western Australia it is an irregular visitor, occurring mostly in autumn, and is not thought to breed regularly in Western Australia (Johnstone and Storr 1998).	The project area does contain damp pastures and wetlands which are the preferred habitat for this species. In addition the project area does contain some areas that may be inundated or flooded during peak rain events	Likely
Eastern Great Egret (*Ardea modesta*)	Mi	The Eastern Great Egret occurs in the Kimberley, Pilbara, and on the west coast from the Murchison River south, throughout the south-west, and east to Cape Arid. This species is considered common to very common in the Kimberley, and scarce to moderately common elsewhere (Johnstone and Storr 1998). It inhabits mostly shallow fresh lakes, pools in rivers, lagoons, lignum swamps, clay pans and samphire flats, large dams and sewage ponds. It also inhabits shallow saltwater habitat such as mangrove creeks, tidal pools, samphire swamps and salt work ponds. It breeds colonially at wooded swamps and river pools, nesting in riparian	The project area does contain low-lying areas that may be inundated during peak rain events. The Eastern Great Egret may potentially forage in these areas.	Likely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		trees.		
Little Bittern (*Ixobrychus minutus*)	P4	The Little Bittern occurs north to Moora and south-east to Two Peoples Bay (Johnstone and Storr 1998). It is usually recorded on dense vegetation beds of freshwater pools, swamps and lagoons, well screened with trees. This species often shelters in dense beds of *Typha* sp., *Baumea* sp., and tall rushes in freshwater swamps around lakes and along rivers (Johnstone and Storr 1998).	The Little Bittern prefers well screened wetlands with rush and sedge species, but can also be found roosting in *Melaleuca* which are often found fringing the water bodies. However the quality of the fauna habitat type in the project area is not extensive and a true wetland does not exist for the project area. No roosting or foraging potential exists within habitats of the project area.	Unlikely
White-bellied Sea-Eagle (*Haliaeetus leucogaster*)	Mi	The White-bellied Sea Eagle is distributed along the coast, islands and estuaries of Western Australia but not the lower west and southwest or far east (Johnstone and Storr 1998). They feed on fish, sea snakes and nesting seabirds. Nests are usually placed on high ground such as rock pinnacles, rigid shrubs or in tall trees (Simpson and Day 2004).	This species predominantly inhabits coastal areas or wetlands (Pizzey and Knight 2007) but rarely inland. This species may fly over the project area but no suitable habitat exists in the project area.	Unlikely
Peregrine Falcon (*Falco peregrinus*)	S4	The Peregrine Falcon occurs mainly along coastal cliffs, rivers and ranges as well as wooded watercourses and lakes (Johnstone and Storr 1998). The Peregrine Falcon nests primarily on cliffs, granite outcrops and quarries, and feeds mostly on birds (Johnstone and Storr 1998).	The Peregrine Falcon may forage on an infrequent basis in the project area as part of a larger home range. There are no suitable nesting sites for this species.	Possible

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Common Sandpiper (*Actitis hypoleucos*)	Mi	This Migratory bird breeds from the British isles to Siberia and Japan. It migrates to Australian waters in August to May (Pizzey and Knight 2007). It is moderately common to uncommon around Perth and Mandurah. This species requires marine waters for habitat such as banks, rocks, and sandy beaches (Simpson and Day 2004).	The survey area lacks suitable habitat for this species as they are typically found in more marine environments.	Unlikely
Sharp-tailed Sandpiper (*Calidris acuminata*)	Mi	This Migratory bird breeds in Siberia and migrates to Australian waters in August to April (Pizzey and Knight 2007). It is common around Perth and Mandurah. This species is found widespread in coastal and interior wetlands (Simpson and Day 2004).	The project area does not contain the preferred habitat for this species.	Unlikely
Curlew Sandpiper (*Calidris ferruginea*)	Mi	This migratory bird breeds in Siberia and migrates to Australian waters in August to April (Pizzey and Knight 2007). It is abundant to common around Perth and Mandurah. This species is found in coastal and inland mudflats, sometimes saltworks (Simpson and Day 2004).	The survey area lacks suitable habitat for this species such as coastal inland mudflats and estuarine environments.	Unlikely
Red-necked Stint (*Calidris ruficollis*)	Mi	This migratory bird breeds in Siberia and Alaska and migrates to Australian waters in August to April (Pizzey and Knight 2007). It is abundant to common around Perth and Mandurah during this time. This species requires marine waters for habitat such as coastal and inland shores (Simpson and Day 2004).	This species prefers drying inland freshwater and salt lakes where exposed mud and sand provide foraging and roosting potential. These types of fauna habitats do not exist in the project area.	Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Eastern Curlew (*Numenius madagascariensis*)	Mi, P4	The Eastern Curlew is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. It inhabits a range of coastal habitats, but primarily inter-tidal mudflats, particularly on exposed seagrass beds or mudflats feeding on burrowing crabs or shrimps (Geering *et al*. 2007).	The Survey area does not contain the intertidal mudflats which are the preferred habitat for this species	Unlikely
Wood Sandpiper (*Tringa glareola*)	Mi	The Wood Sandpiper is a summer non-breeding migratory shorebird that occurs along the coast and inland regions of Western Australia. It primarily inhabits freshwater wetlands and rarely inter-tidal mudflats (Geering *et al*. 2007).	No freshwater wetlands such as shallows swamps and drying lakes exist in the project area, suggesting this species is unlikely to occur.	Unlikely
Common Greenshank (*Tringa nebularia*)	Mi	This migratory bird breeds from Scotland to Siberia and migrates to Australian waters in September to April (Pizzey and Knight 2007). It is commonly found around Perth and Mandurah. This species prefers estuaries, inland lakes and open swamps (Simpson and Day 2004).	Shallow fresh waters (claypans, lagoons, open swamps, river pools and dams) do not exist within the survey area making this species unlikely to occur.	Unlikely
Caspian Tern (*Hydroprogne caspia*)	Mi	The Caspian Tern is distributed along the coast of Western Australia. It is scarce or uncommon north of Broome and uncommon to moderately common further south (Johnstone and Storr 1998). This species inhabits coastal areas as well as inland watercourses, saline and brackish lakes (Simpson and Day 2004).	The Caspian Tern is usually found foraging and sheltering in marine habitats such as beaches and estuaries and inlets. This species may fly over the survey area on an infrequent basis but will not use habitats of the survey area for any purpose.	Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii* subsp. *naso*)	VU,S1	The Forest Red-tailed Black Cockatoo is distributed through the humid and sub-humid southwest of Western Australia from Gingin through the Darling Ranges to the southwest from approximately Bunbury to Albany (Johnstone and Storr 1998).	The vegetation of the project area does not contain any potential foraging resources for this species. The Flooded Gums on survey area (*Eucalyptus rudis*) are not a known feeding resource for black cockatoos and or breeding resource on the Swan Coastal Plain. The trees on survey area did not contain any hollows to be considered as potential nesting sites.	Unlikely
Baudin's Cockatoo (*Calyptorhynchus baudinii*)	VU,S1	Baudin's Cockatoo is distributed through the south-western humid and sub-humid zones, from the northern Darling Range and adjacent far east of the Swan Coastal Plain (south of the Swan River), south to Bunbury and across to Albany (Johnstone and Storr 1998). Baudin's Cockatoo rarely occurs near the coast north of Mandurah, and rarely occurs north of the Swan River (Johnstone and Kirkby 2008, Johnstone and Storr 1998).	The vegetation of the project area does not contain any potential foraging resources for this species. The Flooded Gums on survey area (*Eucalyptus rudis*) are not a known feeding resource for black cockatoos and or breeding resource on the Swan Coastal Plain. The trees on survey area did not contain any hollows to be considered as potential nesting sites.	Unlikely
Carnaby's Cockatoo (*Calyptorhynchus latirostris*)	EN,S1	Carnaby's Cockatoo is endemic to southwest Western Australia, and is distributed from the Murchison River to Esperance and inland to Coorow, Kellerberrin and Lake Cronin (Cale 2003). The species was once common, but the population has declined significantly in the last half century (Johnstone and Storr 1998).	The vegetation of the project area does not contain any potential foraging resources for this species. The Flooded Gums on survey area (*Eucalyptus rudis*) are not a known feeding resource for black cockatoos and or breeding resource on the Swan Coastal Plain. The trees on survey area did not contain any hollows to be considered as potential nesting sites.	Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
Fork-tailed Swift (*Apus pacificus*)	Mi	The Fork-tailed Swift is a summer migrant (October-April) to Australia, that has not been recorded breeding in Australia (Barrett *et al*. 2003). The Fork-tailed Swift is an aerial species, which forages high above the tree canopy and rarely lower so is independent of terrestrial habitats in Australia (Johnstone and Storr 1998). It usually occurs in flocks of up to 2000 and is often seen accompanying Tree Martins and Masked Woodswallows (Johnstone and Storr 1998).	As this species forages high in the airspace it is reasonably independent of the ground habitat. This species may fly over the survey area from time to time but only as a temporary migrant.	Possible
Rainbow Bee-eater (*Merops ornatus*)	Mi	The Rainbow Bee-eater is a common breeding migrant that occurs in Western Australia in the Kimberley, and Pilbara through to the southwest (Johnstone and Storr 1998). It generally breeds in summer in the greater southwest and occurs as a passage migrant or visitor in the northern part of its range throughout the rest of the year (Johnstone and Storr 1998, Barrett *et al.* 2003). It occurs in lightly wooded, often sandy country, preferring areas near water. The Rainbow Bee-eater feeds on airborne insects, and nests in burrows excavated in sandy ground or banks, often at the margins of roads and tracks (Johnstone and Storr 1998).	The Rainbow Bee-eater is a commonly recorded migrant that occurs in a variety of habitats. No suitable nesting sites were present in the project area.	Possible
MAMMALS				
Chuditch (*Dasyurus geoffroii*)	VU,S1	The Chuditch (Western Quoll) previously occurred over 70% of Australia, but now only occurs in the southwest of Western Australia.	The lack of suitable habitat suggests this species should not occur within the survey area. The Chuditch needs large logs as den	Highly Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		Being a relatively large predator, it occurs at low densities. Adult females inhabit a core area of 55-200 hectares around their den, while the corresponding figure for males is 400 hectares or more (van Dyck and Strahan 2008). The Chuditch is now only found in sclerophyll forest, woodland and mallee shrubland (van Dyck and Strahan 2008, Menkhorst and Knight 2004). It is highly mobile, and appears able to utilise bush remnants and corridors. Numbers have decreased because of habitat alteration, removal of suitable den logs and dens, and competition for food and predation by foxes and cats (van Dyck and Strahan 2008). The Chuditch has been locally extinct through-out the metropolitan area for some time.	sites which are not found in this area. The Chuditch has a large home range and there is no connectivity with surrounding bush land sufficient enough to support this species. It is highly unlikely to occur in the survey area as it is presumed locally extinct on the Swan Coastal Plain.	
Red-tailed Phascogale (*Phascogale calura*)	EN, S1	The Red-tailed Phascogale is found in isolated reserves from the Wheatbelt to the south coast, and prefers Wandoo and Sheoak woodlands. It has a preference for long unburnt habitat with continuous canopy and tree hollows. Numbers have decreased because of fragmentation and loss of habitat (Menkhorst and Knight 2004).	The project area resides far outside of this species current distribution (van Dyck and Strahan 2008) and no suitable nesting vegetation occurs in the project area for this species to be present.	Highly Unlikely
Southern Brush-tailed Phascogale, Wambenger (*Phascogale tapoatafa* ssp. [WAM M434])		The Wambenger is an undescribed subspecies of the Brush-tailed Phascogale (Phascogale tapoatafa) that occurs in south-west Western Australia (van Dyck and Strahan 2008, Peter Mawson pers. com. [DEC]). The Wambenger's distribution is believed to have been reduced	This species preferred habitat type does not occur within the project area. The Wambenger is typically found in the south-west in dry sclerophyll forests and not on the Swan Coastal Plain.	Highly Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		to approximately 50% of its former range. It is restricted to the extreme south-west, and its characteristic low population densities make it vulnerable to localised extinction (van Dyck and Strahan 2008). This subspecies has been observed in dry sclerophyll forests and open woodlands containing hollow-bearing trees but a sparse ground cover. Habitat destruction, in particular, the loss of hollow-bearing trees and predation by feral animals, are thought to be the major threats to surviving populations.		
Southern Brown Bandicoot, Quenda (*Isoodon obesulus* subsp. *fusciventer*)	P5	The Quenda (Southern Brown Bandicoot) occurs in forest, heath or coastal scrub and occurs along the coast of south-western WA from Moore River mouth to approximately Israelite Bay (Menkhorst and Knight 2004). They typically seek daytime refuge from predators in very thick ground-storey vegetation, often associated with swamps or damplands, and forage by night in more open areas, leaving distinctive conical feeding holes in the ground. The Quenda is threatened by clearing and fragmentation of its preferred habitat (van Dyck and Strahan 2008).	The Southern Brown Bandicoot produces conical diggings that are easily identifiable and are species specific. These diggings were recorded in the project area.	Recorded
Western Brush Wallaby (*Macropus irma*)	P4	The Western Brush Wallaby occurs in open forest or woodland, particularly where there is grassy understory and scrubby thickets present (Menkhorst and Knight 2004). It is found only in south-western Western	This species preferred habitat type does not occur within the project area. In addition, due to the level of development around the project area it is unlikely that the Western Brush Wallaby would occur.	Unlikely

Conservation Significant Species	Conservation Status	Distribution and Ecology	Habitat Relevance	Likelihood
		Australia, where it appears to be in decline, probably as a result of an increase in the numbers of foxes.		
Quokka (*Setonix brachyurusis*)	VU,S1	The Quokka found in the southwest regions of Western Australia, from south of Perth in Jarrah, Marri and Karri Forest to Two People's Bay (Menkhorst and Knight 2004). It mostly occurs in densely vegetated swamps, tea tree thickets on sandy soils along creek lines and dense heath on slopes (van Dyck and Strahan 2008). Quokka numbers have declined because of predation by foxes and the clearing and burning of swamp habitats.	There is a lack of suitable habitat in the project area and the Quokka occurs in only small pockets on the mainland in forested areas of south-west. This species is considered locally extinct on the Swan Coastal Plain.	Highly Unlikely
Water-rat (*Hydromys chrysogaster*)	P4	The Water Rat occupies a wide variety of freshwater habitats, from sub-alpine streams and other inland waterways to lakes, drainage lines, swamps and farm dams (van Dyck and Strahan 2008). It favours areas close to water with thick vegetation cover. The species is widespread in south-western and northern WA, and is also found on various offshore islands.	The project area does not contain the vegetated waterways required for this species to become resident which is the preferred habitat for this species. The Damplands are low-lying inundated areas which are not true wetlands.	Unlikely

KEY:

En	**Listed as Endangered under the EBPC Act 1999.**
Vu	**Listed as Vulnerable under the EBPC Act 1999.**
Mi	**Listed as Migratory under the EBPC Act 1999.**

S	**Scheduled under the WC Act 1950.**
P	**Listed as Priority by the DEC.**
Recorded	**Recorded during the field survey or site reconnaissance.**
Likely	**Suitable habitat is present in the project area and the project area is in the species' known distribution.**
Possible	**Limited or no suitable habitat is present in project area but is nearby, the species has good dispersal abilities and is known from the general area.**
Unlikely	**No suitable habitat is present in project area but is nearby, the species has poor dispersal abilities, but is known from the general area; or suitable habitat is present, however the project area is outside of the species' known distribution.**
Highly Unlikely	**The species has poor dispersal abilities, no suitable habitat is present, and the species is uncommon; or the species is thought to be locally extinct.**

APPENDIX D
BORE SOIL LOGS

Client:
Logged By: D.P & E.S
Drilled By: Strataprobe Pty Ltd
Soil Bore No: MW2

Project:
Job No: 06.127
Date Logged: 20-Jul-06
Installation Method: Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm$_v$ VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
	Indication Level											
			0 - 0.5	CLAYEY/SAND - Dark brown Medium grained Moderately sorted - Dry								
	0.25											
	0.50											
			0.5 - 1.0	SAND - Grey Medium grained Poorly sorted - Dry								
	0.75											
1.0	1.00											
			1.0 - 1.5	SAND - Light brown/almost brown Medium grained Poorly sorted								
	1.25											
	1.50											
			1.5 - 2.0	SAND - Olive brown Medium grained Moderately sorted - Damp								
	1.75											
2.0	2.00											
			2.0 - 3.75	SAND - Olive brown Medium grained Moderately sorted - Wet								
	2.25											
	2.50											
	2.75											
3.0	3.00					GPS 50390461 E 6430946 N Total Depth of Well - 3.75m Depth to Water - 1.5m Screen: 3.75m - 0.75m Blank: 0.75m - 0m Gravel: 3.75m - 0.5m Bent: 0.5m - 0m						
	3.25											
	3.50											
	3.75											
4.0	4.00											
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

Client: **Project:**
Logged By: D.P & E.S **Job No:** 06.127
Drilled By: Strataprobe Pty Ltd **Date Logged:** 20-Jul-06
Soil Bore No: MW2 **Installation Method:** Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm$_v$ VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
			Indication Level									
			0 - 0.5	CLAYEY/SAND - Brown Fine grained Moderately sorted - Dry								
	0.25											
	0.50											
	0.75		0.5 - 1.0	CLAY - Dark brown Fine grained Moderatley sorted - Damp								
1.0	1.00					Colour change to grey at 0.95m						
	1.25		1.0 - 1.5	CLAY - Grey/olive Fine grained Well sorted - Wet								
	1.50											
	1.75		1.5 - 2.0	GRAVELLY/CLAY - Orange/brown Medium grained Moderatley sorted - Wet		Colour change at 1.65m Gravelly rocks present						
2.0	2.00											
	2.25		2.0 - 2.5	CLAYEY/GRAVEL - Grey Fine grained Moderately sorted - Wet		Limestone between 2.0m - 2.5m Gravelly Colour change at 2.2m						
	2.50					Like sludge						
	2.75		2.5 - 3.0	CLAY - Grey Fine grained Moderately sorted - Saturated		2.7m - 3.0m dark green/blue/grey mottled shell fragments becoming more prominent with depth						
3.0	3.00											
	3.25					GPS 50390469 E 6430730 N						
	3.50					Total Depth of Well - 3.1m Depth To Water - 0.56m						
	3.75					Screen: 3.1m - 0.1m Blank: 0.1m - + 0.1m Gravel: 3.1m - 0.2m Bent: 0.2m - 0m						
4.0	4.00											
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

Client: **Project:**
Logged By: D.P & E.S **Job No:** 06.127
Drilled By: Strataprobe Pty Ltd **Date Logged:** 20-Jul-06
Soil Bore No: MW3 **Installation Method:** Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm$_v$ VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
			Indication Level									
			0 - 0.5	SILTY/SAND - Brown Medium grained Moderately sorted - Dry								
	0.25											
						Colour change at 0.5m						
	0.50		0.5 - 1.0	SAND - Light grey Medium grained Well sorted - Damp		Quartz sand						
	0.75											
1.0	1.00		1.0 - 1.5	SAND - Grey Medium grained Well sorted - Damp								
	1.25					Colour change between 0.4m - 0.6m coffee coloured sand						
	1.50		1.5 - 2.0	CLAYEY/SAND - Grey (darker) Medium grained Well sorted - Wet								
	1.75											
2.0	2.00					Colour change from grey to dark brown at approximately 2.0m						
	2.25		2.0 - 2.5	CLAYEY/SAND - Brown Medium grained Well sorted - Wet								
	2.50		2.5 - 3.0	CLAYEY/SAND - Brown/olive Medium grained Well sorted - Wet								
	2.75											
3.0	3.00					GPS 50391262 E 6430374 N						
	3.25											
	3.50					Total Depth of Well - 3.5m Depth to Water - 1.3m						
	3.75											
						Screen: 3.5m - 0.5m Blank: 0.5m - 0m Gravel: 3.5m - 0.5m Bent: 0.5m - 0m						
4.0	4.00											
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

Client: **Project:**
Logged By: D.P & E.S **Job No:** 06.127
Drilled By: Strataprobe Pty Ltd **Date Logged:** 20-Jul-06
Soil Bore No: MW4 **Installation Method:** Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm, VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
				Indication Level								
			0 - 0.5	SANDY/CLAY - Brown black Fine grained Well sorted Damp		Organic matter present						
	0.25											
	0.50											
			0.5 - 1.0	SANDY/CLAY - Brown Fine grained Well sorted Damp								
	0.75											
1.0	1.00		1.0 - 1.5	SANDY/CLAY - Brown/orange Fine grained Well sorted Damp								
	1.25											
	1.50		1.5 - 2.0	CLAYEY/SAND - Grey Medium grained Well sorted - Wet								
	1.75											
2.0	2.00		2.0 - 2.5	SILTY/SAND - Light greeny grey Coarse grained Well sorted Wet								
	2.25											
	2.50		2.5 - 3.0	SILTY/GRAVEL - Grey Coarse grained Poorly sorted Wet								
	2.75											
3.0	3.00		3.0 - 3.1	SILTY/GRAVEL/SAND - Grey Coarse grained Poorly sorted Wet		Hit limestone at 3.0m Coarse fragments of limestone throughout						
	3.25											
	3.50					GPS 5039096 E 6430240 N						
	3.75					Total Depth of Well - 3.1m Depth to Water - 0.5m						
4.0	4.00					Screen: 3.1m - 0.1m Blank: 0.1 - +0.2m Gravel: 3.1m - 0.2m Bent: 0.2m - 0						
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

Client:
Logged By: D.P & E.S
Drilled By: Strataprobe Pty Ltd
Soil Bore No: MW5

Project:
Job No: 06.127
Date Logged: 20-Jul-06
Installation Method: Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm_v VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
	Indication Level											
			0 - 0.5	CLAY - Brown black Fine grained Well sorted Damp								
	0.25											
	0.50		0.5 - 1.0	CLAY - Brown Fine grained Well sorted Damp								
	0.75											
1.0	1.00		1.0 - 1.5	CLAY/LIMESTONE - Dark grey Fine grained Well sorted Damp		Hitting limestone at 1.2m						
	1.25											
	1.50		1.5 - 2.0	CLAY/LIMESTONE - Grey Fine grained Well sorted Wet								
	1.75											
2.0	2.00					Can not core more than 2.0m						
	2.25					GPS 50390681 E 6430064 N						
	2.50					Total Depth of Well - 3.43m Depth to Water - 0.1m						
	2.75					Screen: 3.43m - 0m Blank: 0m - +0.43m Gravel: 3.43m - 0.2m Bent: 0.2m - 0m						
3.0	3.00											
	3.25											
	3.50											
	3.75											
4.0	4.00											
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

Client: **Project:**
Logged By: D.P & E.S **Job No:** 06.127
Drilled By: Strataprobe Pty Ltd **Date Logged:** 20-Jul-06
Soil Bore No: MW6 **Installation Method:** Push Tube

Depth BGL (m)	Sample Taken	Monitor Well Log	Profile	Lithology	Field Rank	Observations (PID in ppm_v VOC)	ASS sample (depth)	pH	pH fox	Change in pH	Rxn	Sample analysed
				Indication Level								
			0 - 0.5	CLAYEY/SAND - Brown Fine grained Well sorted Damp								
	0.25											
	0.50											
			0.5 - 1.0	CLAY - Brown Fine grained Well sorted Damp								
	0.75											
1.0	1.00					Change to sand at approximately 1.0m						
			1.0 - 1.5	CLAYEY/SAND - Brown/olive Medium grained Well sorted Wet								
	1.25											
	1.50											
			1.5 - 2.0	CLAYEY/SAND - Grey Fine grained Well sorted Wet		Colour change to grey at 0.65m						
	1.75											
2.0	2.00											
			2.0 - 2.5	CLAYEY/SAND - Grey Fine grained Well sorted Saturated								
	2.25											
	2.50											
			2.5 - 3.0	SANDY/CLAY - Grey Medium grained Moderately sorted Wet								
	2.75											
3.0	3.00											
						GPS 50391120 E 6429960 N						
	3.25											
	3.50					Total Depth to Well - 3.36m Depth to Water - 1.1m						
	3.75											
						Screen: 3.36m - 0.3m Blank: 0.3m - 0.1m Gravel: 3.36m - 0.5m Bent: 0.5m - 0m						
4.0	4.00											
	4.25											
	4.50											
	4.75											
5.0	5.00											
	5.25											
	5.50											
	5.75											
6.0	6.00											

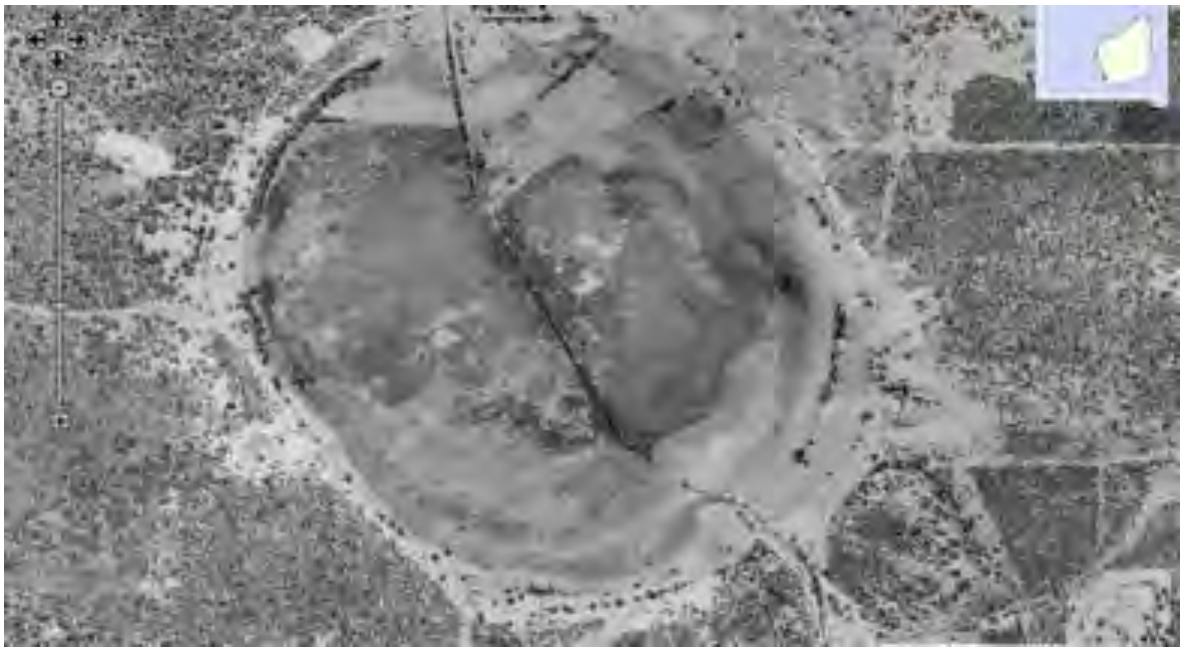
ASS reactions:
x - slight reaction
xx - Medium reaction
xxx - strong reaction
xxxx - Vigorus reaction

ENV. Australia
Level 7
182 St Georges Terrace
Perth, WA, 6000.

APPENDIX E
HISTORICAL AERIAL PHOTOGRAPHS

APPENDIX D
HISTORICAL AERIAL PHOTOGRAPHS

Photograph 27/11/1953



Photograph 11/03/1965

Photograph 06/09/1974

Photograph 07/06/1977

Photograph 30/08/1981

Photograph 19/06/1985

Photograph 06/02/1995

Photograph 24/02/2000

Photograph 26/01/2001

Photograph 26/01/2003

Photograph 12/12/2004

Photograph 16/03/2006

Photograph 06/07/2008

Photograph 02/11/2010

APPENDIX F
INTERIM WATER MONITORING SUMMARY (ENV 2010)

23 December 2010

Our Ref: 10.102-L001-KD

Greg Rowe and Associates
Level 3, 369 Newcastle Street
Northbridge WA 6003

ATTENTION: Darren Evans

Dear Darren

SUBJECT: WATER MONITORING SUMMARY AT BOLLARD BULLRUSH EAST

ENV Australia Pty Ltd (ENV) is pleased to provide Greg Rowe and Associates with the following summary of hydrological monitoring at the Bollard Bullrush East site.

There are seven groundwater monitoring bores located across Bollard Bullrush East site (see Attachment for bore locations). ENV has undertaken six occasions of groundwater level monitoring and two occasions of groundwater quality monitoring between July 2010 and December 2010.

Groundwater Levels

Groundwater on the site generally flows west towards the Peel Main Drain and the centre of Bollard Bullrush Swamp. Groundwater levels were closest to the surface at MW5-E and MW4-E located in the central areas of the swamp with a depth of 0.18 m to 0.3 m below ground level respectively. In August, water levels for all bores on site were closer to ground level, indicating an average groundwater level rise of 0.3 m across the site. In September, groundwater levels dropped their August readings. Groundwater level decline continued into October, with the exception of MW1-E which increased, with depth to groundwater levels varying from surface to 1 metre.

Groundwater levels did not fluctuate greatly over the monitoring period likely due to low rainfall over winter 2010.

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ENV•Australia ABN 72 091 839 520

Table 1: Bore details and groundwater levels (m AHD)

Sample ID	Ground Level (m AHD)	Top of Casing (mAHD)	Depth of Bore (m)	Depth to Water (m AHD)					
				1/07/2010	8/07/2010	5/08/2010	8/09/2010	28/10/2010	11/11/2010
MW1-E	6.87	8.60	4.35	6.29	6.277	6.440	6.418	6.222	6.204
MW2-E	4.41	5.35	5.80	3.55	3.568	4.057	4.199	3.902	3.776
MW3-E	6.38	6.81	3.73	Dry	Dry	Dry	Dry	Dry	Dry
MW4-E	4.08	4.44	3.59	3.78	3.754	3.983	4.135	3.884	3.784
MW5-E	3.87	4.37	3.42	3.69	3.678	3.910	3.958	3.954	3.918
MW6-E old	4.80	5.18	3.68	4.11	4.107	4.462	4.594	4.547	4.836
MW6-E new	4.89	5.49	4.30	4.07	4.037	4.344	4.605	4.223	4.176

Groundwater Quality – Physical Parameters and Nutrients

Water sampling results were compared against ANZECC Lowland River Guidelines (2000) and the Short and Long Term Targets outlined in the Swan Canning Clean-up Program Action Plan (SCCP).

Water sampling analysis indicates that groundwater is relatively neutral, with an average pH of 7.3. pH levels for the site are within the ANZECC Guidelines of 6.5 to 8.

Salinity onsite ranges from 3000 uS/cm (Brackish) to 530 uS/cm (Fresh). The higher salinities onsite are located to the south of the site at MW6-E new and MW6-E old. Progression to the north of the site to MW1-E records a reduction in salinity. Across the sampling period all bores on site recorded a variable reduction in salinity. The October sampling demonstrated that bores to the north (MW1-E and MW2-E) reduced by an average of 240 uS/cm, bores in the central Swamp region (MW4-E and MW5-E) reduced by an average of 835 uS/cm. To the south MW6-E New dropped dramatically by 900 uS/cm while MW6-E Old only dropped by 100 uS/cm. Salinity is consistent with the results shown in the Perth Groundwater Atlas.

Water quality data shows that Total Nitrogen ranges from 3.8 mg/L to 1.1 mg/L; with a site average of 2.0 mg/L. These results are above the ANZECC Guidelines of 1.2 mg/L and the long term SCCP Targets (1 mg/L).

Total Phosphorus ranges from of 1.3 mg/L to 0.07 mg/L; with a site average of 0.48 mg/L. All records are above the ANZECC Guidelines of 0.065 mg/L. All bores across the site recorded an average reduction of 0.38 mg/L between July and October, with the exception of MW1-E to the north which remained the same at a very high 1.3 mg/L.

The water quality results recorded to date show variability, further monitoring on this site will likely clarify the results.

Table 2: Water Quality – Physical Parameters and Nutrients

Date	Bore ID	pH	EC uS/cm	Total P mg/L	PO4 mg/L	Total N mg/L	NO2-N mg/L	NO3-N mg/L	NH3-N mg/L	TKN mg/L
8/07/2010	**MW1E**	7.3	810	1.30	0.250	3.8	0.039	0.720	0.02	3.0
28/10/2010	**MW1E**	7.6	530	1.30	0.300	1.3	0.092		0.02	1.2
8/07/2010	**MW2E**	7.6	1200	0.58	0.005	1.1	0.005	0.007	0.57	1.1
28/10/2010	**MW2E**	7.4	1000	0.12	0.005	1.3	0.008		0.64	1.2
8/07/2010	**MW4E**	7.8	1600	0.46	0.005	1.7	0.023	0.140	0.53	2.1
28/10/2010	**MW4E**	7.6	780	0.15	0.005	1.7	0.033		0.53	1.6
8/07/2010	**MW5E**	7.5	1800	0.38	0.005	1.3	0.036	0.068	0.37	1.6
28/10/2010	**MW5E**	7.1	950	0.12	0.008	1.3	0.031		0.19	1.3
8/07/2010	**MW6 (New)**	7.1	3000	0.88	0.005	2.3	1.500	1.500	1.10	10.0
28/10/2010	**MW6 (New)**	6.9	2100	0.03	0.005	2.7	0.360		0.36	2.4
8/07/2010	**MW6**	7.4	2200	0.38	0.005	2.3	0.220	4.000	0.28	7.8
28/10/2010	**MW6**	6.5	2100	0.07	0.005	3.3	0.180		0.56	3.1
Average		**7.3**	**1506**	**0.48**	**0.050**	**2.0**	**0.211**	**1.073**	**0.43**	**3.0**
Median		**7.4**	**1400.0**	**0.38**	**0.005**	**1.7**	**0.038**	**0.430**	**0.45**	**1.9**
	SCCP Long Term Target			0.1		1				
	SCCP Short Term Target			0.2		2				
	ANZECC Fresh Water	6.5 - 8		0.065		1.2				

Water Quality – Dissolved Metals

Samples were analysed for arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury.

Table 3: Water Quality (Dissolved Metals)

		Metals							
Date	Bore ID	Arsenic mg/L	Cadmium mg/L	Chromium mg/L	Copper mg/L	Lead mg/L	Nickel mg/L	Zinc mg/L	Mercury mg/L
8/07/2010	**MW1E**	0.001	0.0001	0.005	0.003	0.001	0.003	0.01	0.0001
28/10/2010	**MW1E**	0.010	0.0020	0.040	0.057	0.067	0.006	0.02	0.0003
8/07/2010	**MW2E**	0.001	0.0001	0.005	0.003	0.001	0.002	0.01	0.0001
28/10/2010	**MW2E**	0.020	0.0020	0.028	0.033	0.013	0.006	0.01	0.0001
8/07/2010	**MW4E**	0.001	0.0001	0.005	0.002	0.001	0.004	0.01	0.0001
28/10/2010	**MW4E**	0.100	0.0020	0.180	0.024	0.024	0.050	0.02	0.0004
8/07/2010	**MW5E**	0.002	0.0001	0.005	0.001	0.001	0.007	0.01	0.0001
28/10/2010	**MW5E**	0.010	0.0020	0.006	0.005	0.005	0.005	0.01	0.0001
8/07/2010	**MW6 (New)**	0.001	0.0001	0.005	0.002	0.001	0.003	0.01	0.0001
28/10/2010	**MW6 (New)**	0.070	0.0020	0.260	0.450	0.180	0.074	0.16	0.0001
8/07/2010	**MW6**	0.002	0.0001	0.005	0.004	0.001	0.005	0.01	0.0001
28/10/2010	**MW6**	0.050	0.0020	0.120	0.046	0.086	0.043	0.16	0.0003
Average		**0.022**	**0.0011**	**0.055**	**0.053**	**0.032**	**0.017**	**0.04**	**0.0002**
	ANZECC & ARMCANZ Guidelines (2000)*	0.024	0.0002	0.01	0.0014	0.0034	0.011	0.008	0.00006

On average only arsenic was recorded below ANZECC guidelines and cadmium, chromium, copper, lead, nickel, zinc and mercury were all above the guidelines. Variation between bores for certain metals was recorded, in particular arsenic, chromium and nickel which recorded concentrations both within the ANZECC guidelines and exceeding them.

Further monitoring for dissolved metals is recommended.

Summary

- Groundwater flow westerly towards Bollard Bulrush Swamp and the Peel Main Drain;
- Groundwater levels are falling sporadically;
- pH levels are neutral and within ANZECC Guidelines;
- Salinity across the site ranges from fresh to brackish;
- Total Phosphorus and Total Nitrogen exceed the ANZECC guidelines; and
- On average, dissolved metals were above ANZECC guidelines, only Arsenic was recorded below ANZECC guidelines.

Further monitoring of dissolved metals and water quality parameters is to be undertaken.

Should you have questions regarding the above please contact the undersigned on 9214 6100.

Yours sincerely
ENV Australia Pty Ltd

SUZANNE SMART
Senior Environmental Scientist

ATTACHMENT

Bollard Bullrush East Sampling Locations – Bore Locations

REFERENCES

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand 2000, *Australian Water Quality Guidelines for Fresh and Marine Waters, National Water Quality Management Strategy*, Australian and New Zealand Environment and Conservation Council, Canberra.

CLIENT
Greg Rowe

JOB NO.
10.102

AUTHOR:
P. Arthur

DRAWN
S. Rho

DATE
02-07-2010

SCALE
1:10,000 @ A4

PROJECTION
GDA 94 MGA 50

Bollard Bullrush East Sampling Locations

Bollard Bullrush East Bore Locations

FIGURE
1

APPENDIX G
SITE ASSESSMENT, BOLLARD BULRUSH SWAMP (STRATEGEN 2012)

Level 2, 322 Hay Subiaco WA 6008 PO Box 243 Subiaco WA 6904
Phone (08) 9382 5300 Fax (08) 9382 4606
Podium Level, Bunbury Tower, 61 Victoria Street Bunbury WA 6230 PO Box 287 Bunbury WA 6231
Phone 08 9792 4737 Fax 08 9792 4708

To: Darren Evans Date: 15 February 2012

Company: Greg Rowe and Associates Reference No: GRA11202:01

Fax/Email: Enquiries: Julia Morgan / Damon Walsh

Site assessment – Bollard Bulrush Swamp, Wellard

Numbers below each photographic plate correspond with photo point numbers in Figure 1

Sketch 1 Field photo locations

Legend

Photo location & angle

Scale

STRATEGEN

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

Photograph 28

APPENDIX H
BOLLARD BULRUSH SWAMP FLOOD MODELLING (GHD 2010)

Memorandum

10 December 2010

To	Darren Evans, Greg Rowe & Associates		
Copy to			
From	Helen Brookes	Tel	61 8 6222 8702
Subject	Wellard Urban Precincts East and West	Job no.	61/25042/01

Introduction

It is proposed to develop land immediately surrounding the Bollard Bullrush Swamp environmental protection policy lake boundary. The development proposes to amend the environmental protection policy boundary in the Eastern Precinct and extend development into the floodway. In order that development may occur areas of the floodway will have to be filled and so it is necessary to determine the up and downstream impacts of this effective reduction in the flood capacity of the swamp.

GHD have been engaged to undertake preliminary investigations into the impact of the proposed fill for the purposes of rezoning and structure planning.

It is noted that the Water Corporation may have made some revisions to the Peel Main Drain InfoWorks model since the completion of the Jandakot Drainage and Water Management Plan that are not available at this time and that future assessments may need to be done with an updated version of the model. However since this is a comparative assessment of the impact from a specific development proposal it is not likely that any changes to other sections of the model will make substantial difference to the results.

Both the Department of Water and Water Corporation have been consulted during this study to gain approval to use the Peel Main Drain InfoWorks model for this purpose and correspondence with them is attached.

Methodology

The dimensions of the Bollard Bullrush Swamp as modelled for the Jandakot Drainage and Water Management Plan were amended to reflect the proposed filling of the proposed development areas to the south and north east of the swamp as seen in Figure 1. Modelling assumed that the environmental protection policy boundary and buffer are successfully moved in the Eastern Precinct so that the full extent of development can go ahead. In the Western Precinct the environmental protection policy boundary and buffer are maintained.

In addition, because of the proposed change in land use within the development areas, the percentage of impermeable area (and hence generated runoff) was increased according the local structure plan shown in Figure 1. This will give a worst case indication of the likely impact, since it does not take into consideration that the development will provide additional compensation and promote additional infiltration through the use of water sensitive urban design and therefore is likely to retain or reduce predevelopment runoff characteristics.

A second scenario has also been modelled which incorporates detention capacity within the development to maintain the pre-development discharge peak flow rates into the Main Drain.

The modelling parameters used adapted from those established within the Jandakot DWMP and are presented in Tables 1 and 2 below.

Table 1 Land use impervious areas

Land use	Area (m^2)	Percent impervious	Impervious area (m^2)
School	77797	72%	56014
Grouped Dwellings	7682	28%	2151
Aged Persons	10020	35%	3507
Low Density	481644	28%	134860
Existing Residential	223430	28%	62560
Roads	381155	80%	304924
Medium Density	209403	28%	58633
POS	144472	0%	0
Drainage	935238	0%	0
Total	**2,470,841**		**622,649**

Table 2 Runoff surface characteristics

Runoff surface ID	Description	Surface type	Surface roughness (Manning's n)	Initial loss (mm)	Fixed runoff coefficient
61	URBAN (Perv') 2yr	Pervious	0.025	0	0.1
62	URBAN (Perv') 10yr	Pervious	0.025	0	0.15
63	URBAN (Perv') 100yr	Pervious	0.025	0	0.2
7	URBAN (IMP)	Impervious	0.015	15	1

Figure 1 Exiting and Ultimate Wetland Extents with Proposed Landuse

Notes to figure 1:

1. Wetland extents indicated by the hatched lines are the areas available within the pre- and post-development models to accept overflow from the Peel Main Drain.
2. The land use type 'drainage' is used to define runoff parameters only and does not reflect the flooded area predicted by the model.

Results

Table 3 below presents top water levels and peak flow rates from modelling undertaken in support of the Jandakot Drainage and Water Management Plan at critical locations. Tables 4 and 5, also below, present a summary of the results of modelling for the two scenarios described above. Table 6 presents the discharge peak flow rates and required detention capacities within the development.

Table 3 Jandakot Drainage and Water Management Plan modelling results

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Road	7.90	8.20	3.25	3.82
Bollard Bullrush Swamp	4.82	5.61	3.38	4.00
Peel main Drain at Millar Road	4.70	5.59	4.38	5.06

Table 4 Modelling of full extent of proposed development without stormwater detention

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Rd	7.90 *(no change)*	8.20 *(no change)*	3.25 *(no change)*	3.82 *(no change)*
Bollard Bullrush Swamp	4.85 *(+ 30 mm)*	5.65 *(+ 40 mm)*	3.38 *(no change)*	4.00 *(no change)*
Peel main Drain at Millar Road	4.72 *(+20 mm)*	5.62 *(+ 30 mm)*	4.73 *(+ 350 L/s)*	5.77 *(+ 710 L/s)*

Table 5 Modelling of proposed development including provision of on-site detention

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Rd	7.90 *(no change)*	8.20 *(no change)*	3.25 *(no change)*	3.82 *(no change)*
Bollard Bullrush Swamp	4.82 *(no change)*	5.62 *(no change)*	3.38 *(no change)*	4.00 *(no change)*
Peel main Drain at Millar Road	4.70 *(no change)*	5.59 *(no change)*	4.39 *(+ 10 L/s)*	5.14 *(+ 80 L/s)*

Table 6 Discharge peak flows and required detention volumes for the proposed development

ARI storm event	Basin outflow (m^3/s)	Storage volume required (m^3)
10 Year	0.2	30,000
100 Year	0.35	39,000

Notes to table 6:

1. Detention volumes are provided as a guide only for the entire development. Detention areas have not been determined at this time since this will be dependent on the depth and landscaping configuration of the designed basin.

Conclusions

The modelling summarised above indicates that in scenario 1, which is the worst case scenario given no detention capacity within the development area, the top water level within the Bollard Bullrush Swamp changes by less than 100 mm for the 100 year ARI event and that levels both up and downstream also remain relatively unchanged.

The scenario 2 results indicated that by providing a total detention capacity of approximately 39,000 m^3 for a 100 year ARI event (30,000 m^3 for a 10 year ARI event) within the development area the change in top water level will be zero.

Suitable fill levels for development must be determined by detailed site investigations in conjunction with drainage and earthworks design for the site. This modelling indicates that a minimum habitable floor level of 6.12 m AHD will be required to ensure that 500 mm of clearance is provided from the 100 year ARI event flood level in Bollard Bullrush Swamp.

In scenario 1, peak flows within the Peel Main Drain upstream of and within the swamp also remain unchanged, however there is an increase of up to 710 L/s on the downstream peak flow rate in the Peel Main Drain for the 100 year ARI event. This increase in flow rate is related to the increased impervious area and it will be a requirement of development that sufficient detention capacity is provided within the drainage system and public open space areas to ensure that this does not occur.

In scenario 2 the increase in downstream peak flow rate is managed through the provision of 39,000 m^3 total detention capacity within the development area. This results in a downstream peak flow rate in the Peel Main Drain for the 100 year ARI event of 5,140 L/s which is within 80 L/s of the predevelopment downstream peak flow rate.

The indicated detention capacity of 39,000 m^3 for the 100 year ARI event which is required in order to maintain the peak discharge peak flow rates for the development will need to reviewed during the development of drainage designs. It is likely that the drainage design process will be able to reduce this detention capacity through water sensitive urban design practices, providing capacity for minor events throughout the development on lots and in road reserves as well as provision of flood detention areas within the normal public open space provision.

Recommendations:

1. Rezoning submissions should indicate that the change in top water level is predicted to be zero in the 10 and 100 year ARI events as a result of the proposed development.
2. Rezoning submissions should also indicate that there is less than 100 L/s predicted increase in peak downstream flow rates in the 10 and 100 year ARI events as a result of the proposed development, and that this is not likely to cause any downstream impacts.
3. The design of the proposed development should provide sufficient detention capacity within lots, road reserves and/or public open space to ensure that predevelopment peak discharge flow rates are not exceeded (indicatively 30,000 m^3 and 39,000 m^3 respectively for the 10 and 100 year ARI events).
4. The design of the proposed development should incorporate a minimum habitable floor level of 6.12 m AHD.

Helen Brookes

Manager, Waterways

Appendix C – Environmental Assessment – EPA

Report and recommendations of the Environmental Protection Authority

Metropolitan Region Scheme Amendment 1188/57 – Wellard Urban Precinct

Western Australian Planning Commission

Report 1500

January 2014

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
29/3/2010	**Level of Assessment set**	
19/8/2010	**Instructions issued**	**3**
18/6/2013	**Environmental Review Document Released for Public Comment**	**148**
23/8/2013	**Public Comment Period Closed**	**9**
26/11/2013	**Final Responsible Authority response to the issues raised**	**13**
15/1/2014	**EPA report to the Minister for Environment**	**6**
20/1/2014	**Publication of EPA report**	**3 days**
3/2/2014	**Close of appeals period**	**2**

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

In this case, the Environmental Protection Authority (EPA) met its timeline objective in the completion of the assessment and provision of a report to the Minister, noting that the Western Australian Planning Commission requested an extension from the Minister for Planning in order to finalise a response to submissions to the EPA.

15 January 2014

ISSN 1836-0483 (Print)
ISSN 1836-0491 (Online)
Assessment No. 1830

Summary and recommendations

The Western Australian Planning Commission's (WAPC) Metropolitan Region Scheme (MRS) Amendment 1188/57 proposes to rezone 70.37 hectares (ha) of land at Wellard East from 'Rural' to 'Urban Deferred' to facilitate urban development. The amendment will define the boundary between future urban development and Bollard Bulrush Swamp, which is protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) and mapped as a Conservation Category Wetland (CCW).

This report provides the Environmental Protection Authority's (EPA) advice to the Minister for Environment on the environmental factors, conditions and procedures relevant to Amendment 1188/57.

Section 48D of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the key environmental factors for Amendment 1188/57 and on the conditions and procedures to which the amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the EP Act.

Key environmental factors and principles

The EPA decided that the key environmental factor relevant to Amendment 1188/57 that required detailed evaluation in the report is Inland Waters Environmental Quality (Bollard Bulrush Swamp).

The EPA's environmental objective for this factor is *to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected*.

The following principles were considered by the EPA in relation to the proposed scheme amendment:

(a) Precautionary Principle;

(b) Principle of intergenerational equity; and

(c) Principle of the conservation of biological diversity and ecological integrity.

Conclusion

The area subject to Amendment 1188/57 is located in the suburb of Wellard, City of Kwinana, and is situated approximately 35 kilometres (km) south of Perth. The land is located on the eastern side of a Conservation Category Wetland (CCW); Bollard Bulrush Swamp. Approximately 1.3 ha of the CCW is located within the area subject to Amendment 1188/57. The amendment area is also bounded by urban development to the north and east, and the Peel Main Drain to the west and south. The majority of the amendment area has been previously cleared for rural purposes including large lot rural living.

Prior to the lifting of the 'Urban Deferred' zoning, the WAPC will require the preparation of a District Water Management Strategy (DWMS) that has been

approved by the Department of Water (DoW) and a bush fire hazard assessment approved by the Department of Fire and Emergency Services.

A Local Water Management Plan (LWMP) and an Urban Water Management Plan (UWMP) will also be required to be prepared at the local structure plan and subdivision application stages respectively. The DoW has advised that surface water and groundwater impacts can be managed through the preparation and implementation of these water management plans.

A 50 metre (m) wetland buffer has been proposed to protect the wetland from weed infestation and inappropriate access. The EPA notes that this is consistent with the WAPC draft *Guideline for the Determination of Wetland Buffer Requirements* (2005) and the EPA's *Guidance Statement No. 33 Environmental Guidance for Planning and Development* (2008).

A Wetland Management Plan (WMP) will also be required to be prepared and implemented as a condition of subdivision by the WAPC. The WMP will detail the management of the impacts of the proposed development on the wetland, and its flora and fauna values. The WMP will facilitate the enhancement of the wetland core habitat, vegetation and function, including the reduction of weed species. The EPA considers that the preparation and implementation of a WMP in consultation with the Department of Parks and Wildlife (DPaW) and the City of Kwinana will ensure that the EPA's objective for the environmental quality of Bollard Bulrush Swamp will be met. The EPA also considers that the alignment of the proposed 'Urban Deferred' boundary around the wetland and the wetland buffer are adequate to protect the wetland function and wetland habitat (Figure 5).

When Amendment 1188/57 was originally referred to the EPA, urban development was proposed within a significant portion of the EPP Lakes boundary (Figure 3). The EPA considers that the appropriate procedure has been followed in revising the wetland mapping management category and modifying Amendment 1188/57 to rezone only the cleared land outside of the boundary of the CCW.

The EPA further considers that given the current rural land use practices within the amendment area and uncontrolled access to the wetland, it is unlikely that improvements to the wetland would be achieved under current conditions. Future urban development will provide the opportunity to exclude grazing and uncontrolled access, and allow the rehabilitation and recovery of the environmental values within the boundary of the CCW. The EPA also considers that the consolidation and rehabilitation of a central conservation area which encapsulates the wetland function area will provide a more cohesive vegetated area and habitat.

The EPA supports the DoW's advice that surface water and groundwater impacts can be managed through engineering and design in the preparation and implementation of future water management plans; the DWMP, LWMP and UWMP.

The EPA has, therefore, concluded that Amendment 1188/57 can be managed to meet the EPA's environmental objective for Inland Waters Environmental Quality without the requirement for environmental conditions, as the proposal has been substantially modified to reduce the impact on the Bollard Bulrush Swamp and impacts can be managed through future management plans.

Recommendations

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the scheme amendment being assessed proposes to rezone the site from 'Rural' to 'Urban Deferred' under the Metropolitan Region Scheme.
2. That the Minister considers the report on the key environmental factor and principles as set out in Section 3.
3. That the Minister notes that the EPA has concluded that Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East can meet the EPA's environmental objective for Inland Waters Environmental Quality.
4. That the Minister notes that the EPA has not included in this report "conditions and procedures to which Metropolitan Region Scheme Amendment 1188/57 should be subject, if implemented", because the EPA holds the view that the amendment as proposed can meet the EPA's environmental objective.
5. That the Minister notes the EPA's other advice presented in Section 4 in relation to a future Metropolitan Region Scheme amendment to reserve the wetland area, the rehabilitation of the Resource Enhancement Wetland area, and Acid Sulfate Soils.

Contents

1 Introduction

The Western Australian Planning Commission (WAPC), the Responsible Authority, has initiated Metropolitan Region Scheme (MRS) Amendment 1188/57 to rezone approximately 70.37 ha of land in Wellard from 'Rural' to 'Urban Deferred' (Figure 1). This amendment area is referred to as 'Wellard Urban Precinct East'.

Amendment 1188/57, covering 81.53 ha (Figure 2), was referred to the Environmental Protection Authority (EPA) on 2 March 2010. On 29 March 2010, the EPA set the level of assessment as *Scheme Assessed – Environmental Review*. Instructions concerning the scope and content required for the Environmental Review were issued to the WAPC on 30 April 2010 and the appeal period for the Instructions closed 17 May 2010. Appeals were received and upheld by the Minister for Environment and the final Instructions were issued on 19 August 2010. The Environmental Review document was then prepared and advertised concurrently with Amendment 1188/57 from 18 June to 23 August 2013. Twenty six (26) submissions were received from Government departments, members of the public and organisations.

The area subject to Amendment 1188/57 is located in the suburb of Wellard, City of Kwinana, and is situated approximately 35 km south of Perth. The site is located on the eastern side of a Conservation Category Wetland (CCW) called Bollard Bulrush Swamp. Approximately 1.3 ha of the CCW boundary is located within Amendment 1188/57. The amendment area is also bounded by urban development to the north and east, and the Peel Main Drain to the west and south. The majority of the amendment area has been previously cleared for rural purposes including large lot rural living.

At the time of referral, Amendment 1188/57 originally proposed 'Urban Deferred' zoning over a significant portion of Bollard Bulrush Swamp which was mapped as a Resource Enhancement Wetland (REW) under the then Department of Environment and Conservation (DEC) *Geomorphic Wetlands Swan Coastal Plain* dataset, and protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) (Figure 3).

In 2012, on behalf of the EPA, the *Geomorphic Wetlands Swan Coastal Plain* dataset mapping over Bollard Bulrush Swamp was reviewed by the then Department of Environment and Conservation. The majority of the wetland was reclassified from a REW to a CCW. In 2013, Amendment 1188/57 was revised to reflect the updated wetland mapping, reducing the proposed 'Urban Deferred' zoning from 81.53 ha to approximately 70 ha, removing any proposed development from the wetland areas and reducing impacts to the EPP Lakes area (Figure 4).

In compiling this report, the EPA has considered the key environmental factors and principles associated with Amendment 1188/57, issues raised in public submissions, specialist advice from the departments of Water (DoW), Planning (DoP), and Parks and Wildlife (DPaW), the WAPC's response to submissions and the EPA's own research and expertise.

Further details of Amendment 1188/57 are presented in Section 2 of this report while Section 3 discusses the key environmental factor and principles for the proposed scheme amendment. Section 4 presents the EPA's other advice and Section 5 presents the EPA's recommendations.

A list of people and organisations that made submissions is included in Appendix 1. References are listed in Appendix 2 and Identification of key environmental factors and principles are listed in Appendix 3. Appendix 4 contains a summary of the public submissions and the Responsible Authority's responses. The summary of public submissions and the Responsible Authority's responses is included for information only and does not form part of the EPA's report and recommendations. The EPA has considered issues raised in public submissions when identifying and assessing key environmental factors and principles.

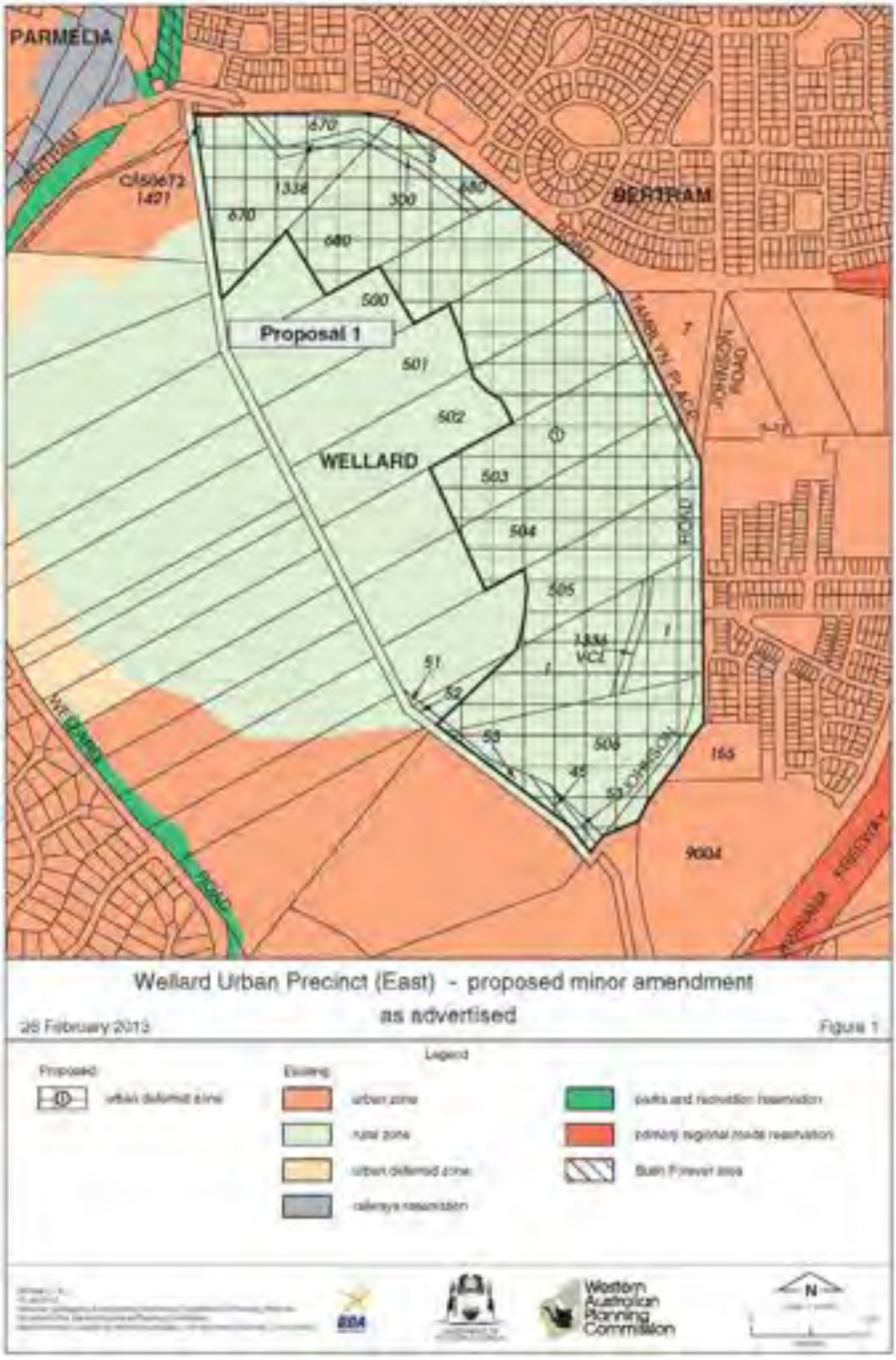

Figure 1: Current MRS Amendment 1188/57 Area

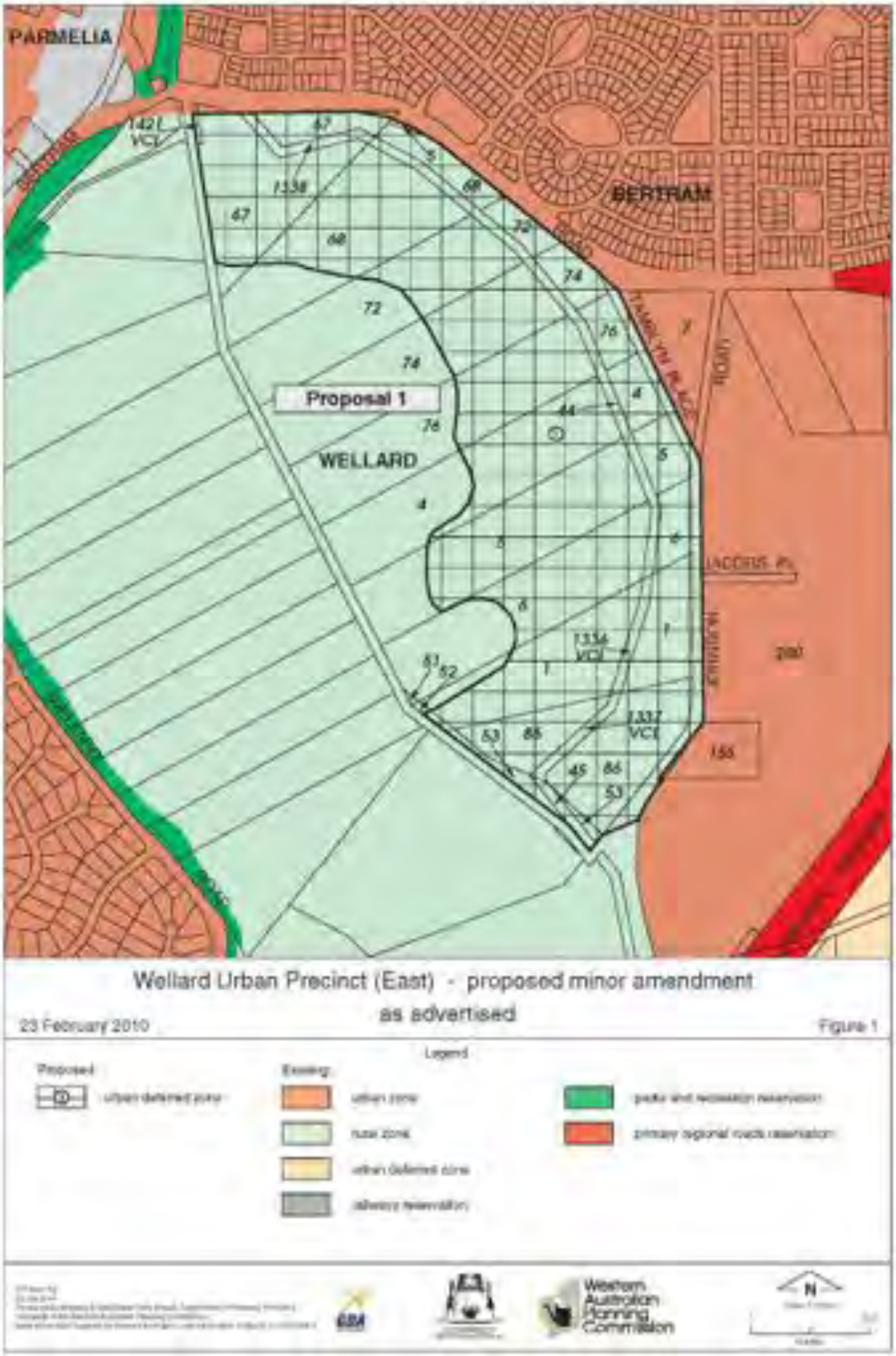

Figure 2: MRS Amendment 1188/57 area as originally referred

Figure 3: MRS Amendment 1188/57 area as referred and wetland management categories

2 The scheme amendment

The purpose of Amendment 1188/57 is to rezone 70.37 ha in Wellard from 'Rural' to 'Urban Deferred' under the MRS (Figure 1). The amendment area is largely privately owned, with the ownership being represented by the Wellard Landowners Group.

The site is currently zoned 'Rural' under both the MRS and the City of Kwinana's Town Planning Scheme No. 2. Amendment 1188/57 proposes to define the boundary between the proposed 'Urban Deferred' zone and the Bollard Bulrush Swamp area, which is to remain in the 'Rural' zone.

'Urban Deferred' zoning provides a strong indication that the land is suitable for urban purposes, although certain requirements have to be met before the WAPC will agree to the land being transferred to the 'Urban' zone. The amendment report states that the following issues are to be addressed prior to the lifting of 'Urban Deferment':

- a district water management strategy (DWMS) is to be approved for the site by the DoW; and
- a bush fire hazard assessment is to be undertaken for the site to the satisfaction of the Department of Fire and Emergency services.

Bollard Bulrush Swamp will remain under the 'Rural' zone in the MRS. The intent is for the proponent to cede Bollard Bulrush Swamp to the Crown free of cost as development progresses. Management of the wetland will initially be undertaken by the developer and it is expected that the responsibility will be assumed by the local authority or the DPaW.

A draft Concept Structure Plan (CSP) has also been prepared for the amendment area (Figure 5). This draft structure plan requires approval once the land has been rezoned and is subject to modification.

The main characteristics of Amendment 1188/57 are summarised in Table 1 below. A detailed description of Amendment 1188/57 is provided in Section 1 of the Environmental Review (ENV Australia, 2013)

Table 1 - Key characteristics of proposed scheme amendment

Element	Description
Urban Deferred Zone, Wellard.	70.37 ha. The CSP proposes residential, recreational and conservation land uses.

3 Key environmental factors and principles

Section 48D of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors for the scheme amendment and the conditions and procedures to which the scheme amendment should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA decided that the key environmental factor relevant to Amendment 1188/57 that required detailed evaluation in the report is the environmental quality of inland waters (Bollard Bulrush Swamp).

The above key environmental factor was identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the Environmental Review document (ENV, 2013) and the submissions received, in conjunction with the scheme amendment characteristics and alternative approvals processes which ensure that the factors will be appropriately managed. On this basis, the EPA considers that the preliminary factors and other issues raised in the submissions do not require further evaluation by the EPA. The identification process is summarised in Appendix 3.

The key environmental factor is discussed in Section 3.1 of this report.

3.1 Inland Waters Environmental Quality

The EPA's environmental objective for this factor is *to maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected*.

Submissions on this factor related to the impact of Amendment 1188/57 on the wetland, retention of the whole EPP Lakes area, the adequacy of the wetland buffer, and the reservation of the wetland as a Parks and Recreation reserve in the MRS.

Bollard Bulrush Swamp lies to the west of the amendment area and largely outside the boundary of the amendment. This wetland is protected under the EPP Lakes, and mapped as a CCW and REW (Figure 4). Surface water exists seasonally adjacent to the site in Bollard Bulrush Swamp and the Peel Main Drain; an artificial drainage line which runs through Bollard Bulrush Swamp and forms part of the regional drainage network. Groundwater flow is expected to be generally south-westerly, towards the Peel Main Drain.

In 2012, the vegetation surveys undertaken for the Environmental Review indicated high conservation value within the wetland area. On behalf of the EPA, the Office of the EPA (OEPA) requested the then DEC to review the management categories assigned to Bollard Bulrush Swamp in the *Geomorphic Wetlands Swan Coastal Plain* dataset. The majority of Bollard Bulrush Swamp was reclassified and upgraded from a REW to a CCW.

The DPaW subsequently advised that a minor Geographic Information System (GIS) error occurred during the 2012 review of the wetland management category mapping. This resulted in 1.3 ha of Bollard Bulrush Swamp not being identified as CCW. The boundary of the Bollard Bulrush Swamp CCW was corrected by the DPaW in May 2013 to reflect the required boundary alignment. However, the boundary correction was done after the WAPC modified the amendment to comply

with the 2012 upgraded mapping and 1.3 ha area of CCW is situated within the amendment area. However, 1.09 ha of this area is within the 50 m wetland buffer, and 0.2 ha is within the area identified in the concept structure plan for future Public Open Space (Figure 5) and therefore will be protected from residential development.

The Environmental Review states that there will be a 252% increase in post-development recharge to the wetland. However, the assumptions behind this projection are not provided in the Environmental Review. Flood modelling undertaken by GHD (2010) indicates that changes in surface flows as a result of development are not anticipated to significantly alter flood levels in the wetland. GHD (2010) further advised that any groundwater level rises as a result of development are anticipated to be within the range of groundwater levels currently experienced as a result of flood events. With the appropriate drainage and groundwater control system, the effects of the development on the wetland water levels should be minimal.

The DoW has advised that significant water planning has been undertaken in this area through the *Jandakot Drainage and Water Management Plan* (DoW, 2009) and the water modelling undertaken in the Environmental Review. The DoW has further advised that additional infiltration associated with urbanisation is considered to be environmentally acceptable. Surface water and groundwater impacts can be managed through engineering and design in the preparation of the future water management plans.

Specifically, these plans are:

- District Water Management Plan (DWMS) required to be completed before the land is changed from 'Urban Deferred' to 'Urban', to be approved by the DoW with DPaW input if required.
- Local Water Management Strategy (LWMS) to be completed at the local structure planning stage and approved by the DoW and the City of Kwinana.
- Urban Water Management Plan (UWMP) to be completed at the subdivision stage and approved by the City of Kwinana on advice from the DoW.

The EPA notes that the management plans will address the following matters:

The District Water Management Plan:

- Design and management objectives.
- A summary of the pre-development environment including a summary of any previous studies; in particular the modelling work completed for this Environmental Review, and the analysis and management options contained within it.
- An analysis of potential development impacts and options for enhancing water conservation in future development at the site.
- A presentation of the site water balance and a discussion on fit-for-purpose water source planning, including allocation of water for different uses and any existing and required infrastructure.
- A water management strategy; including a presentation of the stormwater model and a discussion on the appropriate management of surface water, groundwater, wastewater and drinking water management and how to enhance water efficiency at the site.
- An implementation framework.

The Local Water Management Strategy:

- Principles and objectives of total water cycle management.
- Details of the proposed development.
- Design criteria.
- A description of the pre-development environment.
- Average Annual Maximum Groundwater Levels based on groundwater monitoring.
- Minimum floor levels to provide protection from the groundwater table and local flood levels.
- Description of the conceptual stormwater water modelling.
- Detail structural and non-structural controls for stormwater quality to be used in the development.
- An assessment of potential potable water conservation measures for the site.
- Guidance on future management of the site including requirements for monitoring, roles, responsibilities and construction.

The Urban Water Management Plan:

- A summary of the pre-development environment including a summary of previous studies.
- Design objectives for water management.
- Pre and post-development water balances and a discussion of how the potable water management strategies will be met.
- Summary of the stormwater design undertaken by project engineers to demonstrate that the design complies with Department of Water and Town of Kwinana requirements and accompanying engineer's drawings.
- A groundwater management plan to demonstrate protection of groundwater resources.
- Specific design information regarding engineering design and landscape architecture in the UWMP.
- Proposed nutrient management approaches, including both structural and non-structural controls.
- A plan for management of subdivision works.
- Design of a post-development monitoring programme.
- An implementation plan.

These water management plans will address the total water management of the site, providing a greater level of detail at each stage of the planning process. All development on site will also be connected to reticulated sewerage, removing any risk of sewage input into the wetland area.

The EPA notes that:

- these plans are routinely prepared as part of the usual planning process once the rezoning process has been completed, and
- requirements for post-development water quality monitoring and duration will be addressed through the DWMS process, to be approved by the DoW.

A 50 m wetland buffer is identified in the concept structure plan (Figure 5) to protect the wetland and wetland habitat from weed infestation and inappropriate access. The OEPA notes that this is consistent with the WAPC draft *Guideline for the Determination of Wetland Buffer Requirements* (2005) and the EPA's *Guidance Statement No. 33 Environmental Guidance for Planning and Development* (2008).

The preparation and implementation of a Wetland Management Plan (WMP) will also be required by the WAPC as a condition of future subdivision. The WMP will detail the management of the impacts of the proposed development on the wetland, and its flora and fauna values. The WMP will facilitate the enhancement of the wetland core habitat, vegetation and function, including the reduction of weed species. Details of landscaping and design interface solutions, such as protective fencing and creation of a hard edge to the agreed wetland area, will also be included in a WMP. The WMP will be prepared in consultation with the DPaW and the City of Kwinana.

The REW portion of Bollard Bulrush Swamp will also be included in the wetland enhancement works undertaken in the WMP.

A Construction Environmental Management Plan (CEMP) is also proposed to be prepared. The CEMP will address environmental issues such as protection of wetlands and fauna, reduction of noise pollution, dieback management and revegetation and rehabilitation of preserved areas of native vegetation during the construction phase of the site. CEMPs are not a requirement for development but are standard practice.

The EPA considers that, following the original referral of Amendment 1188/57 which proposed development within a significant portion of the EPP Lakes, the appropriate procedure has been followed in revising the wetland mapping management category and modifying the amendment to rezone only the cleared land outside of the wetland area.

The EPA is aware that the preparation of a WMP is a standard land development practice, and supports the future preparation of a WMP to facilitate rehabilitation of Bollard Bulrush Swamp. The EPA is satisfied that the proposed 'Urban Deferred' boundary around the wetland and the wetland buffer (Figure 4) are adequate to protect the wetland. Furthermore, provision of formal, controlled public access to the wetland will increase the amenity and recreation values available to the surrounding community. The EPA considers that the local community and associated organisations should be engaged in the preparation of the WMP, and involved in its implementation.

The EPA is of the view that, given the current rural land use practices within the amendment area and uncontrolled access to the wetland, it is unlikely that

improvements to the wetland would be achieved under current conditions, in the absence of any formal management. The future urban development will provide the opportunity to exclude grazing and uncontrolled access, and allow the rehabilitation and recovery of the environmental values within the wetland. Potential impacts posed by increased nutrient loading from residential fertiliser use can be addressed through local government education programs and incentives regarding appropriate fertilisers and plant species located near wetlands.

Furthermore, from 1 January 2013, the existing regulations on phosphorus in domestic-use garden fertiliser have been strengthened to reduce the concentration from 2.5 to 2 percent. The amount of phosphorus in all-purpose and lawn fertiliser is limited to one percent. Controlled release and processed organic fertilisers, such as 'blood and bone', composts and composted chicken manure-based products also need to comply with these requirements.

The EPA also notes that the WAPC *Jandakot Structure Plan* (JSP) was finalised in August 2007. The JSP provides a guide to future development of the Jandakot area and management of key environmental values. The proposed amendment zones the final urban cell proposed under the JSP and will complete the urbanisation of the Wellard locality. The EPA considers that, given the above context, MRS Amendment 1188/57 fits appropriately within the surrounding land uses and is consistent with previous EPA decisions.

The EPA also supports the proposal that the WMP will be implemented by the development company, and that the ongoing management of the wetland will be handed over to the City of Kwinana or the DPaW, depending on which agency agrees to future management responsibility for Bollard Bulrush Swamp.

Summary

Having particular regard to:

a) the modification of Amendment 1188/57 to propose development outside of the CCW area, and reduce impacts to the EPP Lakes;
b) the preparation of the future water management strategies and plans at relevant stages of planning;
c) the proposed 50 m wetland buffer to protect the CCW wetland function area and wetland habitat; and
d) the preparation of the WMP to facilitate the enhancement of the wetland core habitat, vegetation and function,

it is the EPA's opinion that Amendment 1188/57 can be managed to meet the EPA's objective for inland waters environmental quality without the requirement for environmental conditions.

Figure 4: Current MRS Amendment 1188/57 Area and wetland management categories

Figure 5: Concept Structure Plan

3.2 Environmental principles

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the EP Act. Table 2 contains a summary of the EPA's consideration of the principles.

4 Other advice

4.1 Future Parks and Recreation Reserve MRS Amendment

The EPA notes that Amendment 1188/57 does not address the reservation of the Bollard Bulrush Swamp as a whole. The EPA understands that the reservation of the wetland is a separate matter to this amendment and may be reserved as Parks and Recreation in the MRS under a future amendment.

The EPA would support the reservation of all of Bollard Bulrush Swamp as a Parks and Recreation reserve to provide a consolidated wetland conservation area, and a valuable community asset.

4.2 Bollard Bulrush Swamp - Resource Enhancement Wetland section

A small area of Bollard Bulrush Swamp mapped as a REW under the DPaW *Geomorphic Wetlands Swan Coastal Plain* dataset is proposed for development (Figure 4). This area is in a degraded to completely degraded condition and is considered to have limited fauna habitat value. The EPA notes that the habitat values of the balance of the REW will be retained and enhanced through the design, revegetation and management of the wetland interface. Revegetation will focus of creation of suitable habitats for Quenda, Cattle Egret and Eastern Cattle Egret.

The EPA expects that the portion of the REW within the wetland buffer be managed, restored and protected with the aim of achieving Conservation Category status.

4.3 Acid Sulfate Soils

The EPA notes that the amendment area also occurs within an area of high risk for Acid Sulfate Soils (ASS). With regard to ASS, the Environmental Review states that dewatering, soil disturbance, compaction or lateral displacement in areas of ASS during development will be avoided where possible. It is highly likely that fill will be required during development to achieve the required separation from groundwater levels, and to reduce flooding risk. If disturbance of ASS occurs during development, a compliant investigation and an ASS and Dewatering Management Plan is proposed as a condition of subdivision.

5 Recommendations

Section 48D of the EP Act requires the EPA to report to the Minister for Environment on the key environmental factors for the proposed scheme amendment and on the conditions and procedures to which the proposed scheme amendment should be subject, if implemented. The EPA is also required to have regard for the principles

set out in section 4A of the EP Act. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the scheme amendment being assessed proposes to rezone the site from ‘Rural’ to ‘Urban Deferred’ under the Metropolitan Region Scheme.
2. That the Minister considers the report on the key environmental factor and principles as set out in Section 3.
3. That the Minister notes that the EPA has concluded that Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East can meet the EPA’s environmental objective for Inland Waters Environmental Quality.
4. That the Minister notes that the EPA has not included in this report “conditions and procedures to which Metropolitan Region Scheme Amendment 1188/57 should be subject, if implemented”, because the EPA holds the view that the amendment as proposed can meet the EPA’s environmental objective.
5. That the Minister notes the EPA’s other advice presented in Section 4 in relation to a future Metropolitan Region Scheme amendment to reserve the wetland area, the rehabilitation of the Resource Enhancement Wetland area, and Acid Sulfate Soils.

Appendix 1

List of submitters

Organisations:

Beeliar Regional Park Community Advisory Committee
City of Kwinana
Department of Aboriginal Affairs
Department of Agriculture and Food
Department of Education
Department of Fire & Emergency Services
Department of Health
Department of Mines and Petroleum
Department of Parks and Wildlife
Department of State Development
Department of Transport
Department of Water
Main Roads Western Australia
Peel-Harvey catchment Council
Rowe Group on behalf of Wellard landowners Group
State Heritage Office
South West Aboriginal Land & Sea Council
Urban Bushland Council
Western Australian Police
Western Power
Wetlands Conservation Society
Wildflower Society of Western Australia

Individual:

Keil McCreery
Marinus and Jillian Van Asselt
Robyn Pickering

Appendix 2

References

DEC (2012) *Review of Wetland Mapping Displayed in the Geomorphic Wetlands Swan Coastal Plain Dataset for Bollard Bulrush Swamp, Wellard,* The Department of Environment and Conservation, 2012.

DoW (2009) *Jandakot Drainage and Water Management Plan.* Department of Water, 2010.

ENV Australia Pty Ltd (ENV) (2011) *Bollard Bulrush East Fauna Assessment.* Prepared for Wellard Landowners Group, 2011.

ENV Australia Pty Ltd (ENV) (2013) *Environmental Review Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East.* Prepared for Wellard Landowners Group, 2013.

EPA (1992) *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*. Environmental Protection Authority Bulletin, December 1992.

EPA (2006) *Guidance Statement No. 10 Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region.* Environmental Protection Authority Bulletin, June 2006.

EPA (2008) *Guidance Statement No.33 Environmental Guidance for Planning and Development.* Environmental Protection Authority Bulletin, May 2008.

GHD (2010) Bollard Bulrush Swamp Flood Modelling in ENV 2013 *Environmental Review Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East*. Prepared for Wellard Landowners Group, 2013.

Government of Western Australia (2000) *Bush Forever Volume 2: Directory of Bush Forever sites.* Department of Environmental Protection, Perth 2000.

WAPC (2005) draft *Guideline for the Determination of Wetland Buffer Requirements.* Western Australian Planning Commission.

WAPC (2007) *Jandakot Structure Plan*. Western Australian Planning Commission.

WAPC (2013) *Metropolitan Region Scheme Amendment 1188/57 Wellard Urban Precinct East Amendment Report.* Western Australian Planning Commission.

Appendix 3

Identification of Key Environmental Factors and Principles

Identification of Key Environmental Factors and Principles

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
BIOPHYSICAL			
Inland waters environmental quality		***Department of Water*** • Significant water planning has been undertaken in this area through the Jandakot Drainage and Water Management Plan (DoW, 2009) and specifically to Bollard Bulrush through modelling presented in the report Wellard Urban Precincts East and West (GHD, 2010). • The proposed rezoning of the site to urban deferred is considered appropriate, subject to a District Water Management Strategy being prepared and approved prior to the lifting of urban deferment. ***Department of Parks and Wildlife*** • Further investigation is required to determine the boundaries of the wetland area to be retained and protected, including determination of the appropriate buffer distance. • Recommend that the boundary of the CCW (UFI 15866) be updated to reflect the revised 2013 mapping of the Geomorphic Wetlands Swan Coastal Plain dataset. • Recommend that the proposed Concept Plan be redesigned to ensure protection of the CCW (UFI 15866) and REW (UFI 15867) and a minimum 50 metre buffer. • Recommend that the proponent commits to fencing the outer edge of the buffer and ensuring a “hard edge” between the wetland and buffer development. • Recommend the proponent commits to the development and implementation of a Wetland Management Plan to the satisfaction of the OEPA and DPaW.	**Considered to be a key environmental factor.**

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
		• Recommend that the proponent commits to development of a Construction Environmental Management Plan. • The DPaW would not be supportive of any infrastructure in the wetland or buffer that would potentially result in increased impacts to the wetland. • Recommend that the proponent present the surface water monitoring data prior to any development approval. • Recommend that the proponent commits to locating all new constructed drainage infrastructure outside of the CCW and REW and associated buffer. • Recommend the proponent commits to development of a surface water and ground water monitoring programme. • The DPaW should be consulted on the District and Local Water Management Strategies and the Urban Water Management Plan with regard to potential impacts to Bollard Bulrush Swamp. • Recommend that the proponent present the surface water monitoring data prior to any development approval. • Recommend that the proponent commits to locating all new constructed drainage infrastructure outside of the CCW and REW and associated buffer. • Recommend the proponent commits to development of a surface water and ground water monitoring programme. • The DPaW should be consulted on the District and Local Water Management Strategies and the Urban Water Management Plan with regard to potential impacts to Bollard Bulrush Swamp.	

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
		City of Kwinana • The ER does not address the statement in the Jandakot Drainage and Water Management Plan which does not appear to support new urban development in the Bollard Bulrush Swamp area. • The ER does not explain what will be done to avoid the need for a buffer (greater than 50 metres for a CCW) that will give adequate protection from hydrological change to the wetland. • The ER states that a District Water Management Strategy (DWMS) will be prepared on lifting of urban deferment. Given the risks associated with the site it would be more appropriate to have a DWMS prepared before rezoning. • The ER states that water quality monitoring will be for three years post development. The Jandakot Drainage and Water Management Plan states that monitoring should be undertaken for at least five years. ***Public and non-government organisations*** • Inability of wetland impacts to be mitigated. • Bollard Bulrush swamp should be protected under Parks and Recreation reservation under the MRS. • The proposal excludes portions of the freehold lots which contain portions of Bollard Bulrush Swamp. • The wetland values need to be set in the context of the entire Bollard Bulrush Swamp. • Redefinition of the functional boundary of Bollard Bulrush Swamp. All of the CCW and REW should be protected. • The current proposed wetland buffer is inadequate and needs to be reviewed. • The ER states that a Wetland Management Plan will be	

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
		prepared at the subdivision stage. The Wetland Management Plan should be prepared at the Structure Plan process. • No urban development within the EPP wetland boundary. • Hydric soils mapping should be undertaken for the whole of the site to assess the location of the buffer. • The ER has demonstrated that the surface water hydrology of the site will be significantly altered. • The ER does not state what contingency measures will be put in place if pre-development groundwater levels are significantly altered. • The ER does not demonstrate that the nutrient reduction targets can be met on site. • The ER does not aim to meet the Peel-Harvey Water Quality Improvement Plan phosphorus reduction target. • It is recommended that the Environmental Conditions to the scheme amendment state that Local Water Management Strategy and Urban Water Management Plans are to achieve a 38% reduction in phosphorous loads leaving the site. • The ER has not adequately addressed the current relationship between groundwater on the Site and flows in the Peel main Drain. • The post-development groundwater monitoring program as proposed in the ER will not be able to determine if the development will meet the objectives of the Water Quality Improvement Plan. • The Environmental Conditions attached to the amendment should require that all fill brought on the Site have a Phosphorous Retention Index of at least 15.	

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
Flora and vegetation		***Department of Parks and Wildlife*** • Recommend that a targeted flora survey for declared rare and priority flora known to occur in wetland habitats in the local area be undertaken in areas proposed for development. • Recommend that the proponent commits to the rehabilitation of the wetland conservation and buffer area, including locally native revegetation of degraded area and weed control as necessary. • Recommend the proponent considers revegetating the Public Open Space along the Peel Main Drain to create a wildlife corridor. ***Public and non-government agencies*** • The vegetation surveys have not been conducted correctly and do not reflect the vegetation condition correctly. • The amendment area should be resurveyed. • Bollard Bulrush Swamp should be fully rehabilitated and rezoned Parks and Recreation and be included in the Beeliar Regional Park as an important wetland. It is the last major wetland in the chain connecting the Beelier Wetlands to the Rockingham lakes. It is important for supporting wildlife migration up and down the Swan Coastal Plain. • Not correct as proponents imply, that degraded wetland cannot be successfully restored. • The importation of soil on site for development also has the potential to cause changes to wetland vegetation. • Fencing off of the wetlands has shown to be successful in the regeneration of wetland understorey and eco-system functions.	The site consists of land that has been cleared and consistently grazed since the 1920s.ENV considers it “very unlikely that the subject site supports flora conservation significance or provides the habitat for conservation significant flora and therefore the potential for Threatened, declared rare or Priority Flora is low”. The areas of the site that contain remnant vegetation are being retained. Should Threatened, Declared Rare or Priority Flora occur within the remnant vegetation, then it will be retained and preserved. The proposed MRS amendment does not address the reservation of the retained wetland area. The reservation of this area is a separate matter to the current amendment. The Wetland Management Plan as identified on page 34 of the ER states “Details of landscaping and design interface solutions, such as protective fencing and creation of a hard edge to the agreed wetland area, will be also included in a Wetland Management Plan”. The Wetland Management Plan will be developed as a condition of subdivision in consultation with the DPaW and the City of Kwinana. Not considered to be a key

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
			environmental factor. Factor does not require further EPA evaluation.
Terrestrial fauna		***Department of Parks and Wildlife*** • Recommend that the proponent reassesses the habitat values of Bollard Bulrush Swamp. The ER states that the Melaleuca Dampland has a 'low' value. This is not supported by the information provided in the technical appendices. • Recommend that the proponent commits to a range of management and mitigation measures for potential impacts to conservation significant fauna, both with respect to the construction phase impacts and ongoing impacts. This could be addressed in the Wetland Management Plan. • Recommend the proponent considers the implementation of a "Cat Prohibited Area".	The site consists of land that has been cleared and grazed since the 1920s. The areas of the site that contain remnant vegetation that have habitat value will be retained. The value of the wetland providing habitat for Quenda has been identified and acknowledged. Revegetation will focus on creating appropriate habitat for significant species, including Quenda. The Wetland Management Plan will be prepared at the subdivision stage of the development, and addressing issues such as rehabilitation, weed and feral animal control. The *Cat Act 2011* has now come into effect, requiring owners to exercise more control in the movement of cats and increase sterilisation rates. A cat prohibition area can be further addressed at the local structure planning stage with input from the DPaW and the City of Kwinana. The Peel main drain will remain as a linkage for species utilising the area. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
POLLUTION			
Terrestrial Environmental Quality	The proposal may disturb Acid Sulfate Soils (ASS).	***Public and non-government organisations*** • Believes the disturbance of ASS could lead to the acidification of the groundwater and wetlands, resulting in loss of biodiversity. ***Town of Kwinana*** • The ER provided is inadequate to provide confidence that the risk of ASS are able to be satisfactory mitigated.	Acid Sulfate Soils will be identified and managed consistent with the DoP and WAPC 2008b *Acid Sulfate Soils Planning Guidelines* and DEC 2013 *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes.* These processes require ASS to be assessed at the LSP stage. If ASS are identified then additional investigations and management plans will be required. Management plans will be required as a condition of subdivision. This process is used to effectively manage ASS in Western Australia. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.
OTHER			
Heritage	Potential impact on Aboriginal heritage sites and European heritage values.	***Department of Aboriginal Affairs*** •The area does not intersect with the boundaries of any known Aboriginal heritage sites or places. Previous heritage surveys over areas in close proximity to Wellard Urban precinct (East) have Identified Aboriginal Cultural material within a sub-surface context. ***South West Aboriginal Land & Sea Council*** Not identified any Registered Aboriginal Heritage Sites within the vicinity of the amendment.	The Department of Aboriginal Affairs recommends prior to any development occurring prospective developers should refer to the States Cultural Due Diligence Guidelines. The *Aboriginal Heritage Act 1972* protects Aboriginal heritage sites and materials. Not considered to be a key environmental factor.

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
		State Heritage Office •No comment.	Factor does not require further EPA evaluation.
Landforms	Potential Impact on landform and biodiversity.	***Department of Mines and Petroleum*** The agency's environmental geological map for Rockingham indicates that the land in its present form may be unsuitable for residential development. The underlying clayey silt and high water table of the area, as mapped by this agency, suggest th that the land is prone to flooding and will not absorb liquid waste.	The Department of Water, the agency responsible for flooding matters, has not raised any objections to the development. Hydrological investigations have identified that some areas of the site could be subject to waterlogging or inundation during an average winter (Appendix F of Environmental Review). Appropriate management of this issue will be addressed in the District Water Management Strategy (DWMS). The DWMS will be prepared to support the rezoning of the site from 'Urban Deferred' to 'Urban' under the MRS. The DWMS will be consistent with Planning Bulletin 92: *Urban Water Management* (WAPC 2008) and *Better Urban Water Management* (WAPC and DPI 2008a) and will address protection of infrastructure and assets from high water tables under peak groundwater level conditions. The DWMS will include: • assessment of pre- and likely post-development groundwater and surface water levels • assessment of the need for groundwater control

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
			• potential outlet locations and invert levels of outlets for groundwater control systems. The DWMS will require approval by Department of Water prior to rezoning to 'Urban' under the MRS. The Local Water Management Strategy (LWMS) will be prepared at the Local Structure Plan (LSP) stage and will address: • refinement of post-development groundwater levels • fill requirements (including existing and likely final surface levels) to address waterlogging and flooding requirements • areas in which subsoil drainage is to be utilised or excluded from use because of environmental sensitivities. The LWMS will require approval by Department of water and City of Kwinana prior to the LSP being approved. Urban Water Management Plans (UWMPs) will be required at the subdivision stage. The UWMPs will include: • confirmation of final surface levels and post-development groundwater levels

PRELIMARY ENVIRONMENTAL FACTORS	AMENDMENT COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF KEY ENVIRONMENTAL FACTORS
			• detailed design of subsoil drainage system, including design and potential impacts near sensitive environments. As the development will be connected to reticulated sewerage, disposal of liquid waste will not occur on site and is consequently not an issue. Not considered to be a key environmental factor. Factor does not require further EPA evaluation.

PRINCIPLES		
Principle	**Yes/No**	**Consideration**
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In the application of the precautionary principle, decisions should be guided by —* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(a) an assessment of the risk-weighted consequences of various options.*		
	Yes	

2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*		
	Yes	
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*		
	Yes	
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *(3) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.* (4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.		
	No	
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.		
	Yes	

Appendix 4

Summary of Submissions

and Responsible Authority's Response to Submissions

Appendix D – Combined LWMS / UWMP – PDC

Combined LWMS and UWMP

Lot 502 Tamblyn Place - Wellard

Prepared by PDC for:
Ascari Developments

Reporter:
Martin Wright

Report Number: 5009_REP_001_B

Job Number: 5009

Report Date: 13/10/2015

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Authority to Release

This document is authorised for release only when the following signatures have been obtained.

Authored

M. Wright — Signed

Martin Wright — Civil Engineer

12.11.15 — Date

Approved *(Quality)*

AB — Signed

Andrew Barry — Senior Civil Engineer

12.11.15 — Date

Authorised *(Management)*

Signed

Marino Evangelisti — General Manager – Property and Infrastructure

12.11.2015 — Date

Revision	Date	Revision Description	Authored	Approved
A	09/09/15	Issue to authorities	MW	AB
B	13/10/15	Amended for Comments	MW	AB

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FIGURES

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I. Summary

Key LWMS/UWMP Elements	Design and Compliance Objectives
Topography (Section 3.2)	• The site slopes towards the Peel Main Drain from approximately 9m AHD in the East to 4.2m AHD in the West.
Geology and Soils (Section 3.3)	• The majority of the site is underlain by Bassendean sand with an increasing layer of topsoil and clay/peat content as the site approaches the Bollard Bullrush swamp.
Acid Sulphate Soil (Section 3.4)	• DER regional mapping shows that the majority of the site has a high risk of encountering Acid Sulphate Soils (ASS) within 3m of the natural soil surface. • An Acid Sulphate Soils and Dewatering Management Plan (ASSDMP) will need to be prepared and approved prior to any construction activities being undertaken
Wetlands and Surface Water (Section 3.5)	• Pre-development hydrology a result of inclined topography and low permeability topsoil causing surface sheet flow towards the Bollard Bullrush swamp • The Peel Main Drain (PMD) Bisects the Bollard Bullrush swamp and forms part of the regional drainage network, ultimately discharging in to the Peel-Harvey Estuary • Pre-development flood levels provided in the Jandakot Drainage and Water Management Plan (JDWMP) give a 100 Year flood level for the site of 5.62m AHD. Finished Lot Levels require a minimum 500mm freeboard above the 100Yr flood level. • The site is bound to the West by the Bollard Bullrush swamp, a Conservation Category Wetland (CCW) and to the South-West by a Resource Enhancement Category Wetland (REW) associated with the Bollard Bullrush Swamp. The remaining Western portion of the site is classified as Multiple Use Wetland.
Groundwater Elevation and Flow Direction (Section 3.6)	• The Perth Groundwater Atlas and on-site monitoring bore indicate that groundwater grades towards the Southwest. • Extensive pre-development groundwater monitoring has been undertaken in the area between 2010 - 2011 with additional monitoring being undertaken by RPS in adjacent sites and dedicated monitoring within the site by PDC to capture the 2015 annual peak groundwater level. • The 2010-2011 groundwater monitoring program indicates that the critical AAMGL in the development area is approximately 4.1m AHD.
Stormwater and Flood Management (Section 4)	• Water Sensitive Urban Design Principles (WSUDP) have been implemented to follow the design objectives in the JDWMP and outcomes from consultation with the City of Kwinana and Department of Water. • Minimum habitable floor levels will be set with a minimum freeboard to the 100Yr flood level of 500mm, giving a recommended minimum lot level of 6.12m AHD • The 1Yr 1hr event will be treated and infiltrated at source in roadside swales/raingardens lined with biofilter media. • Events that exceed the 1 Yr 1 hr ARI will be directed into a slotted pipe drainage network to promote in-transit exfiltration en-route to discharge for extreme rainfall events into the POS. Stormwater discharges via the POS and occurs as sheet flow across a vegetated surface to replicate the pre-development hydrology. • Flows that exceed the 5Yr event will be directed via overland flow paths in the road reserve towards the Bollard Bullrush Swamp. • No drainage infrastructure or outfalls are to be constructed in the CCW or the 50m buffer.
Groundwater Management (Section 5)	• Minimum finished lot levels provide in excess of 1.2m clearance to AAMGL • Subsoil drains in the site form part of the drainage network and does not actively control groundwater levels.

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Water Quality Management (Section 6)	• It is not proposed to impact on the pre-development hydrology. Subsoil drains are to be provided above the MGL • As part of the panning process 50m Wetland buffer is provided around the CCW to protect the wetland core changes in hydrology and reduce the risk of migration of non-native species into the wetland. • Education of lot owners in recommended fertilising practices and the use of loamy topsoil to increase fertiliser efficiency
Water Conservation Strategy (Section 7)	• Several water saving initiatives have been implemented to reduce water consumption to under the 100KL/person/year *State Water Plan* consumption target. These initiatives include: o Water wise landscaping principles will be implemented in all landscaped areas and promoted to to lot owners through educational material. o Use of native vegetation, hydrozoning and use of only bore water for irrigation within the POS
Management of Subdivision Works (Section 8)	• Dust Management is to be in accordance with Department of Conservation (DEC) and City of Kwinana guidelines. • An ASSDMP will be required prior to dewatering or earthworks due to the risk of ASS on the site.
Monitoring (Section 9)	• Post-development groundwater monitoring will be under taken for a minimum of 5 years following completion of the development • Inspection of BMPs will be carried out during and 3 years post construction by the City of Kwinana

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1 Introduction

1.1 Background

The residential development of 64 lots is proposed for Lot 502 Tamblyn Place Wellard. The site is approximately 40km south of the Perth Central Business District and is located on the Eastern fringe of the Bollard Bullrush Swamp, 1 Km West of the Kwinana Freeway. The area proposed for development covers approximately 10Ha and is located in the municipality of the City of Kwinana.

1.2 Planning Approval

Metropolitan Regional Scheme (MRS) Amendment 1188/57 for the Wellard Urban Precinct (East) rezoned approximately 70ha of land from "Rural" to "Urban Deferred" to assist in facilitating urban land uses. The MRS amendment 1188/57 included Lot 502 Tamblyn Place within the amendment area.

To support the lifting of the "Urban Deferred" zoning, the Western Australian Planning Commission (WAPC) required the preparation of a District Water Management Strategy, to be approved by the Department of Water (DoW) and a Bushfire Hazard Assessment, to be approved by the Department of Fire and Emergency Services. These requirements have now been assessed and the land is now zoned "Urban"

A District Water Management Strategy (DWMS) (Emerge Associates 2015) was prepared in January 2015 in support of the DSP. This has defined the water management objectives at a district level. The management objectives from the DWMS have been incorporated into this combined Local Water Management Strategy (LWMS) and Urban Water Management Plan (UWMP).

The site is located within the City of Kwinana local government area and is currently zoned as "development" under the most recent Town Planning Scheme (TPS No. 2). The Local Structure Plan (LSP) for the site is shown in Figure 1.2.

Following discussions with Brett Dunn (Dow) and Nino Scidone (CoK) a combined LWMS and UWMP has been prepared to support both the LSP and pave the way for subdivision approval.

1.3 Content of this LWMS and UWMP

This combined LWMS and UWMP provides management techniques to address the following;

- Compliance with the design objectives in the DWMS.
- Detailed stormwater management design including the size, location and design of public open space areas, integrating flood management capability.
- Specific structural and non-structural best management practices and treatment trains.
- Management of groundwater levels.
- Management of groundwater contamination and other specific site conditions.
- Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages.
- Measures to achieve water conservation and efficiencies of use.
- Management of subdivisional works (to ensure no impact on conservation areas and management of dust).

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- Management of disease vector and nuisance insects (mosquitoes and midges).
- Monitoring program and/or contribution.
- Implementation including roles, responsibilities, funding and maintenance arrangements.

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2 Principles and objectives

This document should be read in conjuction with the Jandakot Drainage and Water Management Plan (JDWMP) (DoW, 2009) and the DWMS (Emerge Associates, 2015) prepared for the District Management Plan.

This combined LWMS and UWMP has been developed to follow the principles and design objectives based on the requirements in the following documents:

- Jandakot Drainage and Water Management Plan (JDWMP) (DoW, 2009)
- District Water Management Strategy Wellard Urban Precinct East (Emerge Associates, 2015)
- Australian Rainfall and Runoff (ARR) (Engineers Australia, 2001)
- Stormwater Management Manual for Western Australia (DoW, 2007)
- Better Urban Water Management Framework (WAPC, 2008)

Specific design objectives for the site are outlined in the table below

Table 2.1: Design Objectives

Design Criteria & Principles	Design Objectives
Water Conservation • Consider all potable water sources in water supply planning • Integrate water and land use planning • Maximise stormwater reuse • Minimise use of potable water	• Minimise potable water usage outside of homes and buildings • Achieve a water consumption target of 100KL/person/year • If possible, achieve a potable water consumption target of40-60KL/person/year
Groundwater levels and Quality • Manage subsurface groundwater levels and minimise change in peak winter levels at groundwater dependant wetlands due to change in groundwater flux associated with urbanisation • Improve groundwater quality in subject land	• Post-development peak groundwater levels at wetlands to be maintained at pre-development levels • As compared to a development that does not actively manage water quality: o 60% reduction in TP o 45% reduction in TN • Address DEC and EPA requires for sensitive environments
Surface Water Quality • Post development peak flows are to be maintained at predevelopment conditions, unless otherwise established through determination of EWR for sensitive environments	• For ecological protection, the 1Yr flow will be treated and infiltrated on site • For flood management, manage the catchment runoff for up to the 100Yr event to pre-development peak flows • The flood path for water exceeding the design level of the flood storage area to be directed away from the development by providing overland flow paths and maintain a minimum of 500mm freeboard between the 100Yr ARI flood level and finished floor levels.
Surface Water Quality • Reduce average annual load of stormwater pollutants as compared to with development that uses traditional, directly connected stormwater drainage design	• Surface water for events up to 1Yr 1 hour ARI should be treated at source

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• Maintain or improve surface water quality within subject land	• As compared to typical urban developments which do not have stormwater treatment measures, the following nutrient reductions in surface water quality are to be achieved ○ 80% reduction in TSS ○ 60% reduction TP ○ 45% reduction in TN ○ 70% reduction in gross pollutants
Structural and non-structural BMP's • To improve surface water quality and prevent pollution of surface water within the subject land	• Implement source controls to prevent pollution or treat stormwater as high in the catchment as possible • Install in-transit measures to treat stormwater though the conveyance systems • Implement end-of-pipe measures to mitigate any contaminants remaining in the stormwater prior to discharging to receiving environments
Wetland and Waterway Protection • Retaining and restore waterways and wetlands	• Ensure no constructed stormwater infrastructure within conservation category wetlands or their buffers
Vector and Nuisance Management • Prevent favourable conditions for mosquito breeding	• Ensure, as far as practical, the design of constructed wetlands, road gullies and bioretention basins etc. do not contribute to onsite mosquito breeding • Provide ongoing maintenance and management of stormwater system to ensure that it continues to operate as designed, thereby reducing the risk of creating conditions likely to promote mosquito breeding

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3 Predevelopment Environment

3.1 Site Location and Existing Land Use

The site is located approximately 40km south of the Perth CBD within the City of Kwinana and encompasses 10Ha of land, 1 km West of Kwinana Freeway. The site is presented in Figure 1.1 and is bound by Tamblyn Place to the North East and Bollard Bullrush Swamp to the South West.

The North Eastern half of the site is currently utilised as farmland with large paddock for grazing cattle. A residence and stables is located adjacent to Tamblyn Place. The South Western portion of the site is the wetland that forms part of the Bollard Bullrush swamp, with the Peel Main Drain (PMD) running along the length of the South West boundary of the site.

3.1.1 Surrounding Land Use

The site is bound to the South West by the PMD, which bisects the Bollard Bullrush swamp and Tamblyn Place to the North East. The site is bordered by large rural lots however a local structure plan is in place for the development of the lands to the South and the North East of the site, as part of the Wellard District Structure plan.

The Bollard Bullrush swamp, inclusive of a portion of the PMD is classified as a conservation category wetland and is protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy Approval Order 1992.

The PMD flows in a Southerly direction before discharging into the Serpentine River and ultimately the Peel – Harvey Estuary.

3.2 Topography

The topography of the site uniformly declines in elevation from the Tamblyn Place in the North East to Bollard Bullrush swamp in the South West. The ground elevation at Tamblyn place is approximately 9m AHD, which declines to approximately 4.2m AHD at the border of the Bollard Bullrush swamp. The remainder of the site grades towards the Peel Main Drain, which adjacent to the site has in invert level of approximately 3.5m AHD. Survey of the existing topography of the site is shown in Figure 3.1.

3.3 Geotechnical Investigations

A geotechnical investigation of Lot 502 was conducted by CMW Geosciences to review ground conditions and provide recommendations relating to a ground remediation strategy required to achieve a Class A footing to facilitate urbanisation. The geotechnical report is attached in Appendix B

The North Eastern portion of the site along Tamblyn Place is characterised by a poorly developed sandy topsoil layer typically 0.2m thick , overlaying medium dense Bassendean sand interbedded with silt, sand and clay alluvium of the Guildford Formation (below 8m from existing ground level). Towards the South Western boundary, where the existing ground level falls below 6.5m AHD the topsoil layer is dominated by clayey/peet topsoil up to 0.5m thick. The upper Bassendean sand across the site is loose to medium dense, with relative density increasing with depth. A summary of the ground conditions and bore hole and cone penetrometer test (CPT) locations are shown in Figure 3.2

Falling Head Permeability Tests were carried out on the underlying Bassendean sand material to give an estimate of the coefficient of permeability of 10m/day.

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3.4 Acid Sulphate Soils and Contamination

The Perth Metropolitan Acid Sulphate Map, developed by the Department of Environmental Regulation (DER), refer to Figure 3.3 indicates that the vast majority of the site is located in a "high risk area for ASS occurring within 3m of the natural surface". The North Eastern Fringe of the site along Tamblyn Place is categorised as "moderate risk area for ASS occurring within 3m of the natural surface"

Actual and Potential ASS are likely to be prominent across the majority of the site. Disturbance of any insitu material exceeding 100m^3 of soil below the water table or dewatering during the earthworks and civil construction will require an Acid Sulphate Soil and Dewatering Management Plan (ASSDMP).

An ASSDMP will be required to outline the soil management measures; the groundwater and dewatering effluent measures; and contingency management measures require to minimise any potential environmental impacts. The ASSDMP will be required to be forwarded to the DER prior to the commencement of Earthworks.

A review of the DER's Contaminated Sites database on the18 August 2015 indicated that there was no registered contaminated sites within the site. Given the age of the property and the agricultural nature of the site, there is some risk of encountering asbestos material as a result of demolition of existing structures on site. Any asbestos as a result of demolition will be removed in accordance with Work Safe Australia Code of Practice - Demolition Works (March 2015)

3.5 Wetlands and Surface Water

3.5.1 Pre-development Drainage

The hydrology of the site is chiefly dominated by the proximity to the Peel Main Drain (PMD), the low permeability topsoil and the gently inclined topography. The low permeability of the clayey/ peaty topsoil results in low infiltration and high volumes of run-off, in the form of sheet flow travelling towards the lower lying swamp and PMD (see Figure 3.4). The low infiltration rates of the topsoil layer is evident in localised ponding in depressions on the site towards the Bollard Bullrush swamp.

The PMD is a Water Corporation owned and maintained main drain which bisects the Bollard Bullrush swamp and forms part of the regional drainage network. The PMD flows in a southerly direction adjacent to the South Western Boundary of the site and links to the Serpentine River, discharging into the Peel-Harvey Estuary.

Predevelopment flood levels within the PMD and the extent of flooding within the Bollard Bullrush swamp have been provided in the JDWMP (DoW 2009). Flood levels at the culvert upstream of the Bollard Bullrush swamp for the 10 and 100Yr ARI events are 4.99m AHD and 5.60m AHD respectively. At the midpoint of the Bollard Bullrush swamp, directly adjacent to the site, the 10 and 100Yr ARI events are 4.81m AHD and 5.62m AHD respectively. The 100Yr flood levels set the minimal allowable habitable structure floor levels which require 500mm freeboard to the 100 year ARI flood level.

3.5.2 Pre-development Surface Water Quality

Water quality monitoring has been undertaken in the PMD just downstream of the site as part of the JDWMP.

The JDWMP suggest that between 2002 & 2004 the concentration of Total Phosphorous (TP) and Total Nitrogen (TN) within the PMD are low (TP <0.065 mg/L) relative to the trigger values specified in the *Australian and New Zealand guidelines for fresh marine water quality* (ANZECC, 2000).

However, more recent water quality data collected between 2008 and 2009 within the PMD downstream of the development area showed relatively high concentrations of TP and TN. The *Water Information Reporting* (DoW) PMD average water quality data for these downstream locations is represented in Table 3.1 Below.

Table 3.1: Average Water Quality

Site Location	Temperature	pH	No_3-N (mg/L)	PO_4-P (mg/L)
Downstream	13.13	6.13	0.28	0.54

Downstream DoW sites: WIN 23027580 and 23027581 (DoW 2014)

The JDWMP proposes long-term targets for nutrient concentrations in the PMD are 0.1mg/L for Total Phosphorous and 1.0mg/L for Total Nitrogen.

3.5.3 Wetlands

Lot 502 is bound to the West by the conservation category wetland (CCW) Bollard Bullrush swamp (UFI 15466) and a resource enhancement (RE) wetland (UFI 15867) associated with the Bollard Bullrush swamp to the South of the site. The remaining portion of the site is classified as Multiple Use Wetland. The Swan Coastal Plain geomorphic wetland mapping (DoW) for the site is presented in Figure 3.5 and includes the 50m wetland buffer required for the CCW and MRS Amendment No 1188/57.

3.6 Groundwater

A study of the Perth Groundwater Atlas (DoW, 2015) and current onsite monitoring bores indicate that groundwater levels on the site grade in a south-west direction, with superficial groundwater flowing towards the PMD. Seasonal groundwater fluctuations of 1.2m in combination with the depressed terrain and low permeability topsoil towards the Bollard Bullrush swamp result in water logging towards the edge of the swamp.

Underlying the site is the following succession of aquifers:

- Perth-Superficial Swan (unconfined) aquifer
- Perth Leederville (confined) aquifer
- Perth Yarragadee North (confined) aquifer

Recharge of the shallowest Superficial Swan occurs through direct infiltration of rainfall through the overlying Bassendean sand. The Leederville Aquifer is a major confined aquifer that consists of sandstones, siltstones and shales up to 250m thick. The deeper Yarragadee occurs at a depth of approximately 450m below ground surface.

3.6.1 Predevelopment Groundwater Monitoring

Groundwater levels from the site and the surrounding area have been compiled, with locations of monitoring bores shown in Figure 3.6. Raw Monitoring data has been provided in Appendix C and a summary of the monitoring programs is as follows:

- From July 2010 to December 2011 ENV monitored groundwater from six bores (MW1-E to MW6-E) located in surrounding lots
- A ground water monitoring event was conducted by Bayley Environmental Services in August 2012 on 5 monitoring bores in lot 900 Tamblyn Place
- Starting May 2015 and ending October 2015, RPS is currently monitoring groundwater bores in the southern lots adjacent to the site.

- In July 2015 three additional monitoring bores (W1 - W3) were been installed exclusively for this LWMS/UWMP in the site

Groundwater level monitoring from 2010 - 2011 has been used to determine the Maximum Groundwater Levels (MGL) and Average Annual Maximum Groundwater Levels (AAMGL) for the site as it contains two annual groundwater peaks. The ground water levels recorded between September to October 2011 for this monitoring program represent a year with above average rainfall (BoM, 2015). The estimated pre-development AAMGL and MGL is summarised in Table 3.2 below.

Table 3.2 Estimated Pre-development AAMGL and MGL

Monitoring Program	2010 - 2011							August - October 2015		
Site ID	MW1-E	MW2-E	MW3-E	MW4-E	MW5-E	MW6-E (old)	MW6-E (new)	W1	W2	W3
AAMGL (mAHD)	6.515	4.11	NA*	4.11	4.00	4.69	4.625	-	-	-
MGL (mAHD)	6.59	4.20	NA*	4.14	4.04	4.84	4.64	6.82	5.67	4.99#

*Bore MW3-E is dry and has no groundwater level data recorded

Groundwater level at surface

At the South Western boundary of the site the groundwater level is approximately 4.1m AHD, which is approximately the existing ground level in the Bollard Bullrush swamp adjacent to the PMD. Moving away from the PMD, ground water mounding is apparent as a result of the inclined topography, with groundwater levels at the Western end of the development area at approximately 5m AHD. The groundwater level adjacent to Tamblyn Place (the high point of the site) is approximately 6.8 m AHD.

A preliminary analysis of the groundwater quality at the site to date is included in the table below. It should be noted that the guideline values referred to in the following points are the guidelines given in the Australian and New Zealand guidelines for freshwater quality ANZECC (2000). These guidelines are for application on un-modified or slightly modified ecosystems and do not readily apply to stormwater management. They are reference guidelines only and while they may indicate areas where further investigation is warranted, they should be taken in the contact of the JDWMP which is specific to this area.

- As expected given the historical use of the site, groundwater is nutrient enriched. This is the primary water quality issue that requires management. Elevated nutrient loads pose a risk to the ecological health of receiving environments immediately surrounding the site as well as lower in the Serpentine River and Peel-Harvey Estuary.
- Median concentration of phosphorous are significantly higher than relevant guideline values.
- Median concentrations of TN, oxidised nitrogen and ammonium nitrogen are higher than relevant guideline values.

Table 3.3 Average Pre-Development Groundwater Quality

Field data, Nutrients and Pesticides	Monitoring Period	EC (field)	pH (Field)	TDS	Nitrogen (Total)	Nitrogen (Total	Ammonia as N	Phosphorus (Total)	Reactive Phosphorus	Disolved Oxygen	Redox
Units		uS/cm		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mV
MW1-E	2010-2011	762.5	7.55		3.2	0.99	0.05	1.02	0.21		
MW2-E	2010-2011	1144	7.54		2.07	0.27	0.41	0.4	0.02		
MW4-E	2010-2011	927	7.76		3.86	0.24	0.68	0.23	0.02		
MW5-E	2010-2011	1605	7.49		4.59	0.15	0.47	0.25	0.02		
MW6-E	2010-2011	2082	6.97		8.13	1.6	0.37	0.39	0.02		
MW6	2010-2011	1840	7.24		7.52	1.74	0.29	0.31	0.03		
W1	July- October 2015	322.4	6.26	200.12						0.65	101.07
W2	July - October 2015	302.28	5.72	206.10						0.18	0.87
W3	July - October 2015	251.58	5.56	167.80						0.17	38.95
ANZECC Lowland River Guidline Values		120-300	6.5-8		1.20	0.15	0.08	0.065	0.04		

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3.7 Flora and Fauna

A Flora and Vegetation Assessment was undertaken in 2010 by ENV as part of the assessment for the MRS Amendment 1188/57. The Assessment found that within Lot 502 the majority of the site was in a Completely Degraded condition and that no threatened or Priority species, nor Threatened or Priority Ecological Communities were recorded.

No Bush forever sites are located within the Development area. The closest bush forever site is located approximately 1 km south of the site.

3.8 Aboriginal Heritage

A search of the department of Aboriginal Affairs (DAA) Aboriginal Heritage Inquiry System was undertaken on the 24 September 2015 and no matches were recorded for the site. Coupled with the highly-modified nature of the site (primarily used for grazing and horses) it is considered a low risk that aboriginal artefacts would be identified/unearthed within the site during the development process.

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4 Storm Water Management

4.1 Flood Management

Stormwater discharge from Lot 502 Tamblyn place is intended to discharge to the Bollard Bullrush swamp, discharging in turn to the PMD. The land surrounding the Bollard Bullrush swamp is not highlighted for development within the JDWMP (DoW 2009) therefore no storage requirements within the swamp are detailed.

Post development hydraulic modelling of the floodplain was undertaken by GHD as part of the DWMS to assess the impact of developing within the wetland defined in the JDWMP (DoW 2009). A summary of the GHD flood modelling is provided in Appendix D

A comparison of the Pre and Post-development top water levels from the JDWMP and GHD modelling for the extent of the PMD within the bollard Bullrush swamp is shown in Table 4.1 below.

Table 4.1: PMD Pre vs. Post-Development Peak Top Water Levels

Location	JDWMP Pre-development Peak Top Water Level		Post-development Peak Top Water Level	
	10 Year ARI Peak Top Water Level (mAHD)	100 Year ARI Peak Top Water Level (mAHD)	10 Year ARI Peak Top Water Level (mAHD)	100 Year ARI Peak Top Water Level (mAHD)
Peel Main Drain at Bertram Road	7.90	8.20	7.90	8.20
Bollard Bullrush Swamp	4.82	5.61	4.82	5.62
Peel Main Drain at Millar Road	4.70	5.59	4.70	5.59

The post development flood modelling results show that there is a negligible increase in the pre-development top water level in the PMD, particularly in the extent of the PMD adjacent to the site (Bollard Bullrush Swamp).

Minimum habitable floor levels will be set with a minimum freeboard to the 100Yr flood level of 500mm, giving a recommended minimum lot level of 6.12m AHD. The finished lot levels across the site are illustrated in Figure 5.2

4.2 Subdivisional Stormwater Management

The surface water objectives for the proposed development are achieved by implementing the following:

- Implement WSUD and structural BMP treatment trains for pre-treatment of stormwater prior to discharge to Bollard Bullrush swamp.
- Flows for events up to 1 year 1 hour ARI will be treated through bioinfiltration swales/rain gardens at source.
- Flows in excess of the 1 year 1 hour and less than the 5Yr ARI will be infiltrated in rain gardens/swales, overflowing into soakwells for events in excess of the 1 year 1 hour and directed via a pipe network to discharge into the POS.

- Discharges for the 5Yr ARI event and greater should occur as sheet flow across a vegetated surface towards the wetland buffer, replicating pre-development surface flow regimes.
- The 100 year ARI event overland flows will be directed to the Bollard Bullrush Swamp.
- No stormwater infrastructure will be located within the CCW/RE wetlands or buffers.
- The minimum habitable lot level is 6.12mAHD, which is 500mm above the 100Yr ARI top water level of the Peel Main Drain adjacent to the site
- No direct groundwater control measures (ie subsoil drains) are to be implemented to create a controlled groundwater level. A relief system is to be provided under bioinfiltration swales/rain gardens which will not actively control groundwater levels and are to be placed above the MGL.

These strategies will be achieved by implementing the following items in the detailed design.

4.2.1 Lot Runoff

No drainage connections will be provided to convey runoff from roofs to pit and pipe systems. As the proposed lots are greater than 300 meters square, impervious areas such as driveways, roofs and paving will be connected to soakwells to detain up to the 1 in 20Yr ARI event as per City of Kwinana requirements. This system is achievable due to the adequate separation to the groundwater table and the hydraulic conductivity of the underlying Bassendean sand.

Soakwells are to be provided by builders to detain flows at the lot level as part of the development application process

4.2.2 Stormwater Drainage Design

The proposed stormwater drainage strategy for the site follows WSUD principles to promote infiltration of stormwater at source and to minimize the pit and pipe network. Roadside rain gardens have been proposed to fulfil the above requirements in addition to providing aesthetic amenity to the development.

Flows < 1 Year ARI Event

Runoff from events up to the 1 Yr 1 hour ARI will be conveyed through kerb breaks located at the upstream ends of the raingarden and into the garden itself, which serves to detain and infiltrate the first flush of stormwater though a layer of bio-media. Runoff from the road adjacent to the POS will be conveyed via sheet flow to a roadside bioremediation swale (using flush kerbing) running the length of the POS. These areas are designed to capture and infiltrate the 1Yr 1 hour ARI storm event and provide treatment/bioinfiltration to runoff.

A key part of the design is the reduction of turbulence to achieve greater settling out of particulates within the rain garden. The base of the raingardens are filled to a depth of 670mm with aggregate to trap particulates within the voids and separate rubbish at the surface for easy disposal. The aggregate also limits to the possible trip height and to ensure that when full of water does not pose a drowning hazard for small children.

The 1Yr 1Hr water levels and required basin areas and volumes are shown in Figure 4.1. The Rain gardens have been sized to accommodate 1Yr 1Hr ARI event volume and a minimum 300mm clearance between the invert of the garden and the MGL is achieved.

Details of the rain gardens are shown in Figure 4.3.

Flows: 1Yr 1hour < 5Yr ARI

For events greater than the 1Yr 1 hour ARI the raingardens fill to the gutter level and stormwater is directed past the entrance of the raingarden and into the bypass pit. In line with WSUD principles, slotted pipes have been used in lieu of traditional sealed drainage pipes to promote in-transit exfiltration of stormwater en-route to the outfall, refer Figure 4.2.

Flows exit the drainage network in the POS via a bubble up pit (BUP) where stormwater will overland flow into the Bollard Bullrush swamp. The overland flow paths through the POS will be required to minimise scouring and erosion during discharge events

Rain gardens have been located at all low points and on the upstream side of intersections to limit the appropriate gutter flow spread rates to 1.5m (for a 2-way cross fall) in accordance IPWEA guidelines

Flows: > 5 Year ARI Event

Flows in excess of the critical 5 Yr ARI event are conveyed via the drainage network and overland flow paths in the road reserve towards the Bollard Bullrush swamp. Gutter flow widths for flows in excess of the 5Yr ARI will exceed 1.5m.

Flows: >100 Year ARI Event

The roads have been graded to convey flows from the 100Yr ARI towards the Bollard Bullrush swamp. As per Section 4.1 lot levels have been provided a 500mm freeboard to the 100Yr top water level.

4.3 Hydrologic and Hydraulic modelling

4.3.1 XP Storm Modelling

Hydrologic and hydraulic modelling has been undertaken to determine peak flow rates and detention requirements of the stormwater drainage system.

Hydrologic and hydraulic modelling was carried out using XP-Storm software. XP-Storm is a drainage design package capable of carrying out both hydrologic and hydraulic modelling of urban and rural catchments. It consists of a link-node model, with the conduit system being idealised as a series of links or conduits which are connected at nodes or junctions. Links and nodes have well defined properties which, when taken together, permit representation of the entire drainage network.

The hydrologic module is based on the XP-RAFTS package by XP Software and carries out runoff analysis. This module generates surface runoff hydrographs, which interface directly with the hydraulic module. The hydraulic module is based on the XP-EXTRAN software package and carries out dynamic hydraulic routing as determined by the physical parameters of the drainage network.

4.3.2 Hydrologic Modelling

4.3.2.1 Subcatchment Area and Land Uses

Post development subcatchment boundaries for the detailed design of the subdivisional stormwater drainage system are shown in Figures 4.1 and 4.2 for the 1Yr and 5Yr ARI events respectively.

4.3.2.2 Rainfall

Hydrologic modelling was undertaken using Intensity Frequency Duration (IFD) data from the Bureau of Meteorology database with the design storms used for the analysis presented in Table 4.1 below.

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Table 4.1: Wellard Rainfall Data

ARI (years)	Rainfall (mm) Duration (hours)									
	15min	30min	1hr	2hr	6 hr	12 hr	24 hr	36 hr	48 hr	72 hr
1			17.12							
5	15.80	21.03	26.70	35.18	53.12	69.96	92.16	106.92	118.08	115.92
100			47.41		89.05	119.52	152.04	178.91	198.2	227.55

4.3.2.3 Runoff Generation

Table 4.2 presents the directly connected impervious portions of the various land use zones that were assumed for the modelling.

Table 4.2: Post-development land use impervious area assumptions

Land use type	Impervious portion (%)	Pervious portion (%)
POS/Conservation	0	100
Road Reserve	80	20
Residential Lots 5Yr	No Runoff	No Runoff
Residential Lots 100Yr	28	72

From the geotechnical analysis completed and from ground water monitoring undertaken, conditions are favourable for the infiltration of roof runoff to soakwells given the presence of well-draining sand and significant separation between predevelopment maximum groundwater levels and proposed pad levels. Thus it was assumed in the modelling that soakwells within lots will directly infiltrate runoff generated from residential lots.

The initial losses and fixed runoff coefficients applied to the pervious and impervious areas are presented in Table 4.3.

Table 4.3: Loss model assumptions

Land use type	Initial loss (mm)	Fixed Runoff Coefficient
Impervious	1.5	1
Pervious	0	0
Residential Lot Pervious	0	0.2
Residential Lot Impervious	15	1

4.3.2.4 Roughness Coefficients

The Manning's 'n' roughness coefficients used for the study were:

- 0.010 for sealed pipes.
- 0.014 for slotted pipes.
- 0.015 for road surfaces.
- 0.025 for all pervious surfaces

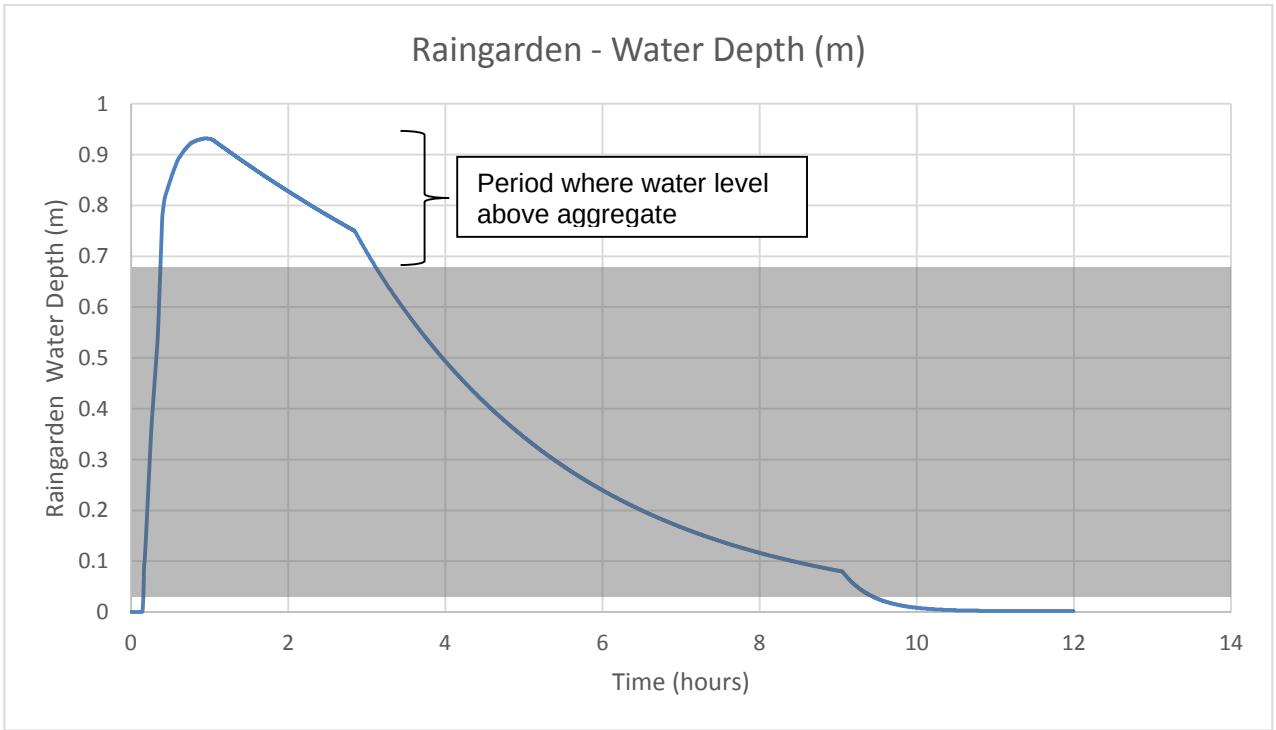
4.3.2.5 Infiltration Rates

PCSump (shallow log model) was used to determine infiltration curves, and determining the hydraulics using XPSWMM. Permeability values within bio retention areas (e.g. raingardens and swales) were taken to have a 100mm thick clogged layer with a permeability of 0.15m/day to account for the clogging of the bio filtration media between maintenance intervals. The permeability of the underlying sands were taken as 10m/day as per the CMW infiltration recommendations in Appendix B.

4.3.3 Modelling Results

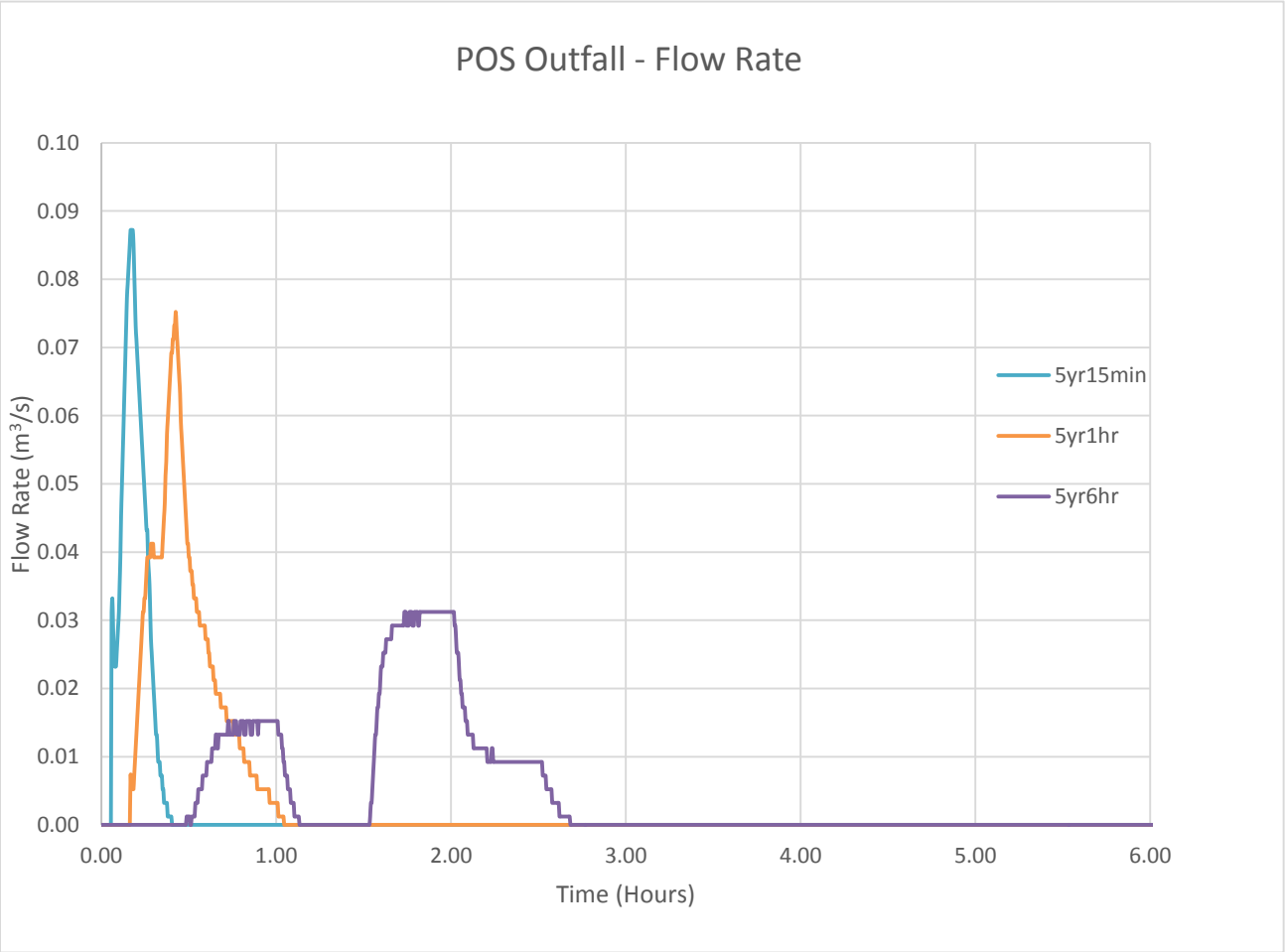
Stormwater modelling indicates that the roadside raingardens and swale have sufficient volume available in order to adequately treat and attenuate flows for storm events up to the 1 year 1 hour ARI storm event emanating from the catchments, refer to Figure 4.1 for details.

Analysis has been conducted in time to empty for the raingardens. In accordance with the infiltration modelling for a clogged scenario, the system will drain from full to empty in less than 12 hours. In addition, the exposed water above the aggregate layer drains in less than 4 hours, refer to Graph 4.1 below.



Graph 4.1 - Raingardens - Time to Empty

Gutter flows have been limited to 1.5m and minor discharge into the Bollard Bulrush Swamp occurs for events up to the critical 5 year ARI. Overflows occur during high intensity, short duration storms. The peak discharge from the site is 90L/s and takes place for the 5 Yr 15 minute storm event. However this peak floe only occurs for a very short period (10 mins) and volumetrically does not represent a significant discharge to the POS. For events with durations longer than 6 hours the total infiltration in the system exceeds the rate of runoff and flows are infiltrated on site. Refer to Graph 4.2 for the critical 5 Yr ARI discharge to the POS.



Graph 4.2 – Critical 5 Yr ARI Discharge to POS

Analysis of 100Yr ARI Discharge to the PMD has been calculated in accordance with the JDWMP (DoW 2009) and the GHD Flood Modelling Summary in Appendix A. The peak flood discharge leaving the site into the PMD is 0.3m³/s for the 100Yr 1 hour storm event. For events with a duration greater than 2 hours the peak discharge drops to 0.1 m³/s. Refer to Graph 4.3 for the critical 100Yr ARI discharge to the PMD

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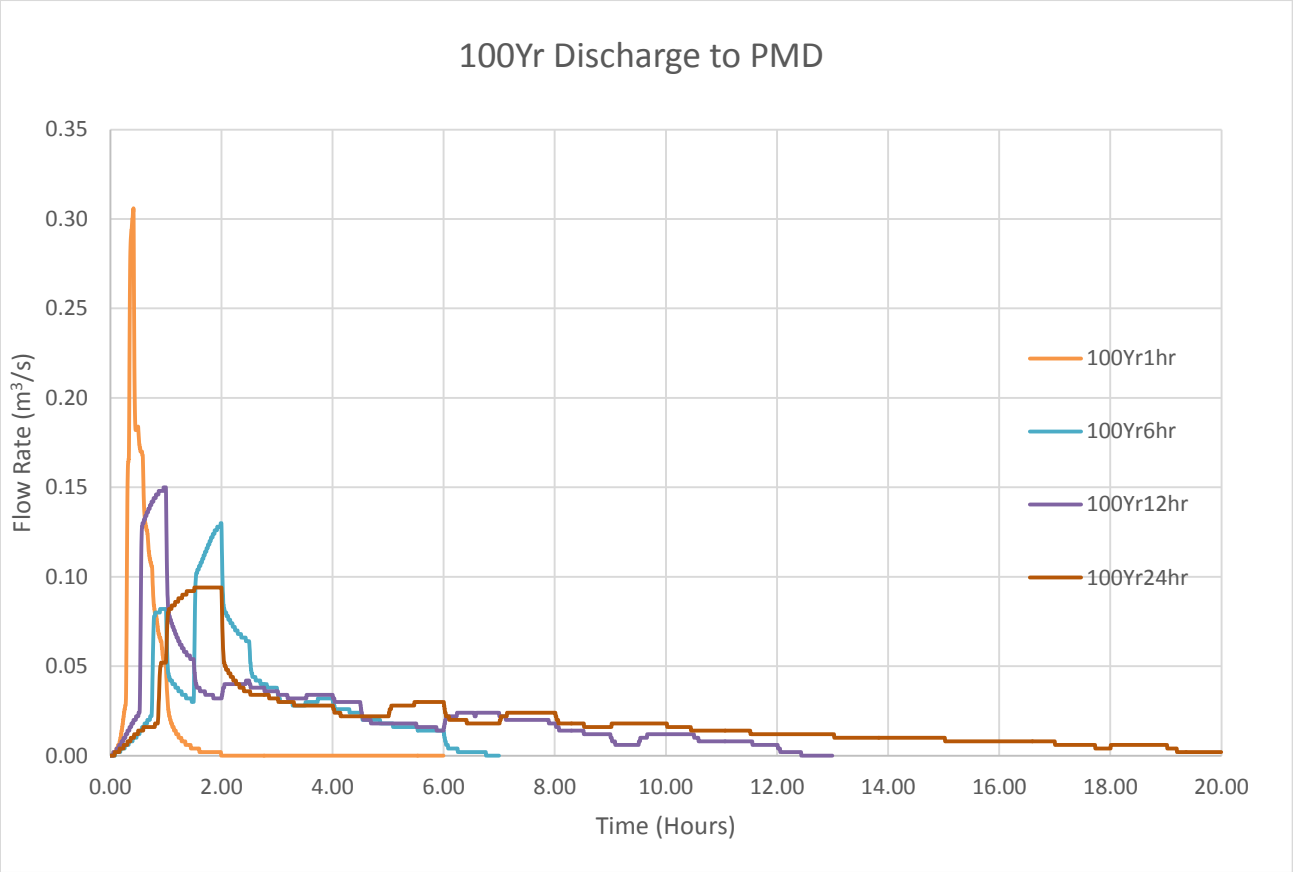

Graph 4.3 –100 Yr ARI Discharge to PMD

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5 Groundwater Management

5.1 Groundwater Levels

Groundwater contours based on local and regional data are presented in Figure 3.6.

5.1.1 Subsoil Drains

Although the site has sufficient clearance to groundwater, subsoil drainage will be used as part of the drainage network to provide in-transit exfiltration of flows in excess of the raingardens storage capacity. The extent of the subsoil pipe in the drainage network is shown in Figure 5.2. Subsoil pipe inverts have been located above the MGL with the exception of the length under the road adjacent to the POS. The subsoils here is provided below MGL in order to promote exfiltration, with the lid level of the BUP the ultimate groundwater level control. Note BUP lid levels are located above the MGL to ensure that there is no drawdown to the Bollard Bulrush Swamp CCW and buffer zone.

5.1.2 Earthworks levels

There is sufficient structural fill material to achieve a Class A footing in accordance with AS2870. Filling of the site however will be required to provide sufficient freeboard to the 100 year flood level. Preliminary finished earthworks levels based on minimum clearance to the 100 year flood level and preliminary road levels are shown in Figure 5.2.

6 Water Quality Management

6.1 Surface water quality

The design objective for surface water quality is to achieve the following theoretical nutrient reduction targets, as compared with development that does not actively manage water quality:

- at least 80 per cent reduction of Total Suspended Solids (TSS)
- at least 60 per cent reduction of Total Phosphorus (TP)
- at least 45 per cent reduction of Total Nitrogen (TN)
- at least 70 per cent reduction of Gross Pollutants (GP)

The methodology established in the *Stormwater management manual for Western Australia* (DoW, 2007) recommends that the above targets are achieved though adopting a treatment train approach including:

- on-site retention of 1-year-1-hour average recurrence interval event
- non-structural measures to reduce applied nutrient loads.

Bioinfiltration systems as proposed are in excess of these requirements.

6.2 Groundwater Quality

The design objective for groundwater quality is to achieve the following theoretical nutrient targets as compared with a development that does not actively manage water quality:

- at least 60% reduction of Total Phosphorous (TP)
- at least 45% reduction of Total Nitrogen (TN)

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Subsoil drains at the proposed development form part of the drainage network and provide in-transit exfiltration for stormwater. The storm events that enter the subsoil drains will have had the first flush intercepted by the rain garden bioinfiltration area and any further sediment trapped in the base of the connecting bypass pit

To further improve groundwater quality information packages will be provided by the developer to individual lot owners recommending the use of loamy topsoil to increase the efficiency of fertilisers and retain a proportion of phosphorous that would otherwise have percolated through the Bassendean sands and into the groundwater.

6.2.1 Treatment of Infiltrated Water

Where stormwater is collected from directly connected impervious areas, it is directed to roadside rain gardens or a bioinfiltration swale. These structures are sized to accommodate flows from the 1 in 1 year, 1 hour storm, and can therefore be expected to contain the vast majority (over 95%) of stormwater, including the first flush of any larger storms. Raingardens and Indicative POS infiltration areas are shown in Figure 4.1.

6.2.1.1 Biofilter Media

Bioinfiltration areas should be lined with a minimum of 300mm of biofilter media. This media should be a limestone derived sand, or sand and crushed limestone mix in a ratio of 65:35 (sand to limestone). Limestone acts as a buffer and alkaliser of acid sulphate soils lowering the pH. Note that limestone must be tested for phosphorus content and should have PRI > 80.

This media shall be placed in a single lift, and compacted by hand in a single pass – heavy compaction or multiple passes must not be used.

6.2.1.2 Bioinfiltration Area Planting

Plants selected for use in the bioinfiltration areas will be required to be suitable for periodic inundation but also able to survive dry periods without irrigation. Due to the course aggregate in the raingardens, drought tolerance is a higher priority than tolerance to inundation, hence plant species should be selected primarily for this feature, as irrigation will not occur after establishment. The selected plants should be good at stripping nutrients and easy to maintain. Aesthetically, the planting should deter the public from entering the area, so plants should not be smaller than 10cm, and features like prickly leaves are desirable. Department of Water recommend planting a variety of species to maximise the chances of success. The City of Kwinana's Parks department should be consulted for their most recent recommendations.

6.3 Wetland and Waterway Protection

The stormwater receiving environments are the CCW and RE wetlands (shown in Figure 3.5) and the Peel-Harvey estuary downstream of the PMD. Protection of these environments involves managing the post-development nutrient levels and the export of pollutants offsite.

As part of the MRS amendment 1188/57 a 50m wetland buffer has been implemented to protect the integrity of the wetland core as indicated by the EPA report 1500 (WAPC 2014). The buffer helps to provide protection from hydrological changes as a result of development and minimises the potential for migration of non-native species from adjoining landscaped areas. No drainage infrastructure is to be located within the wetland buffer nor piped drainage directly connected to the buffer or wetland.

Surface water and runoff from regular storm events (up to 1Yr 1 hour ARI), will be treated at source in bioinfiltration systems to ensure water quality objectives are met. This will protect water quality in the Bollard Bullrush swamp and the PMD.

Stormwater runoff from major events that exceed the capacity of the bioinfiltration areas (rain gardens and swale) will be directed via the slotted drainage network and overflow into the POS. The stormwater discharge into the POS will be conveyed via sheet flow over a vegetated surface towards the wetland to replicate the predevelopment surface flows.

A Wetland Management Plan (WMP) will be required to specify the exact requirements to protect the wetland such as fencing, weed management and rehabilitation. The WMP will be prepared as a condition to subdivision and outline the interface treatments and management strategies adjacent to the wetland and identify parties responsible for the management of these areas.

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7 Water Conservation

The *State Water Strategy* (Government of Western Australia, 2003) target for scheme water usage was to achieve a reduction from 180 KL/person/year to 155 KL/person/year. As this target has been achieved in recent years, the more recent *State Water Plan* (Government of Western Australia, 2007) set a water consumption target of 100kL/person/yr.

Further to this target, an aspirational consumption target of 40-60kL of scheme water per person per year has been set for new developments. In order to achieve this target, all outdoor water use would need to be supplied by non-potable sources.

7.1 Domestic Water Use

Using the Water Corporations Water Supply Consumption Tool (Excel-based spreadsheet), a preliminary estimate of the development potable water consumption was made. The potable water consumption is expected to be approximately 62 KL/person/year, which is within the State Water Plan consumption target. This assumes that no groundwater is used for irrigation of residential areas and that rainwater tanks are not installed in lots for either irrigation or in-house (non-drinking) use.

The installation of rainwater tanks, while encouraged by the developer, will not be mandatory. However if individual lot owners install rainwater tanks, potable water consumption is estimated to reduce to 57 KL/person/year.

The Water Corporation's Water Supply consumption tools is included in Appendix E, showing scheme water consumption patterns if rainwater tanks are not installed.

7.2 Public Open Space

Public Open Space (POS) will be irrigated using groundwater. The POS at Lot 502 is approximately 1.04 ha of which 0.74 ha is wetland buffer and 0.30 ha is unrestricted POS. It is estimated that around 50% of the unrestricted POS will be used for turf and irrigated at a rate of 7500 KL/ha/yr, with the remaining 50% used for native[1] (or other water wise) garden beds and irrigated at 5000 KL/ha/yr. The wetland buffer will be planted with indigenous species which will not be irrigated beyond the establishment phase.

Bore abstraction will follow the requirements set out in the City of Kwinana's Sustainable Water Management Plan as; ultimately, the POS will be ceded to council and will form part of their requirement under these documents. Specifically the following will be undertaken:

- Metering of all production bores,
- Hydrozoning: 1) grouping plants of similar water requirements to conserve water, 2) designing the irrigation system for these plant species,
- Soil moisture sensors within all POS and within changes in landscape (hydrozone). The length of watering required will be determined based on the information collected from soil moisture sensors within each hydrozone,
- Define watering program based on the amount of water able to be abstracted,

[1] This refers to planted waterwise gardens as opposed to retained indigenous vegetation, which will not be irrigated beyond the establishment phase.

- Planting appropriate trees that require minimal water,
- Watering outside the hours of 9am-6pm (excluding the establishment of vegetation; inspection testing and maintenance; and watering in of fertilizer or pesticides),
- Winter sprinkler ban between 1 June and 31 August. During this time irrigation will only be used for turf maintenance (fertilizing, weed/pest control, verti-mowing) and installation, repair, testing and maintenance of irrigation system.

It is also envisaged that heavy water use (twice daily outside 9am-6pm) will be required within the first 28 days of POS establishment.

7.3 Irrigation Source

The site is located in the Jandakot Mound 2 sub-area of the Serpentine Groundwater Management Area. There is currently no existing groundwater licence for Lot 502, but a review of the DoW Water Register indicates that there is water availability for the Superficial Swan aquifer. PDC has lodged a Form 1 and Form 3G (September 2015) requesting a groundwater licence with an allocation of 2273 KL/year which would make sufficient provision for the water supply needs of the developments POS.

If the application for groundwater for Lot 502 is unsuccessful, there is the option to source groundwater from the existing groundwater licence (Licence No. GWL159291) of the adjacent Lots 503, 504, 505, 507 and 900 which have an allocation volume of 19695KL/year. If Lot 502 is unable to source groundwater though an addendum to the adjacent lots groundwater licence then xeriscaping will be implemented within the POS.

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8 Management of Subdivision Works

The issues that will require management in order to ensure the construction activities will not detrimentally impact on the environment are:

- Management of dust
- Dewatering
- Acid sulphate soils

8.1 Dust Management

The Department of Environment and Conservation (DEC) current guideline regarding the management of dust is *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities* (DEC, 2011). This document provides guidelines for dust management provisions, contingency arrangement and monitoring requirements for dust producing activities.

The City of Kwinana's Standard Conditions of Planning Approval 2012 also require that dust control measures be put in place prior to any works being undertaken.

8.1.1 Site Specific Implications

The DEC guidelines recommend the completion of dust generating activities during winter to minimise the risk of dust generation. However the completion of earthworks outside of winter months may not necessarily feasible, due to the level of the groundwater table.

The requirement to minimise dewatering to manage potential acid sulphate soils together with the cost of dewatering outweighs the additional effort required to mitigate the dust resulting from construction activities during summer. As a result, it is recommended that there be no restrictions to earthworks being undertaken during summer months.

8.2 Dewatering and Acid Sulphate Soils

Dewatering is likely to be required in some areas to enable subdivision works to proceed (predominantly sewer installation). It will be necessary for dewatering licences to be obtained from the DoW prior to dewatering works to proceed.

There is a potential for works requiring dewatering and/or excavation of soils below the groundwater tables to cause acid generation in areas where acid sulphate soils are present.

As highlighted in Section 3.4 disturbance of any insitu material exceeding 100m^3 of soil below the water table or dewatering during the earthworks and civil construction will require an ASSDMP to be submitted to the DER prior to any works earthworks being carried out.

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9 Monitoring Program

The basis for the post-development water quality monitoring program is outlined in the JDWMP (DoW 2009) and the *Water Quality Improvement Plan for Rivers and Estuary of the Peel Harvey System* (WQIP) (EPA, 2008). In addition, Water quality results will be compared against the ANZECC & ARMCANZ (2000) Freshwater guidelines for slightly-moderately disturbed wetlands in south-west Australia.

As outlined in Table 9.2 of the JDWMP the developer shall have responsibility for the monitoring program for a period of 5 years post development, including at least 1 year following the completion of 80% of the development. This shall include but is not limited to:

- Monitor key criteria for maintenance of hydrologic regimes, buffers and ecological corridors/linkages of environmental assets
- Monitor local superficial aquifer groundwater levels
- Monitor flow and water quality (including nutrients, total suspended solids, and gross pollutants) at regular intervals
- Monitor peak flows within developments and wetlands
- Monitor performance of new drainage structures

Hence, the duties outlined within the JDWMP and WQIP documents for the first 5 years post development are the responsibility of the developer. After 5 years, the responsibility for monitoring is borne by the City of Kwinana, through the Development contribution Scheme No.3.

The recording of monitoring results as well as any exceedances and actions taken will be required for the comparison of post and pre-development data for reporting to the City of Kwinana and DoW at the end of the 5 year program. The report will provide details on the effects the development had on the hydrological conditions and propose necessary contingency actions if required.

9.1 Surface water monitoring

There is no surface water within Lot 502 Tamblyn Place and as such there will be no requirement to complete post development monitoring.

The PMD is a Water Corporation Drain and lies outside of Lot 502. Monitoring of the PMD is thus the responsibility of the Water Corporation, with collected data to be passed onto the DoW.

9.2 Groundwater Monitoring

Ongoing water monitoring will be required during construction, as a condition of the dewatering licence and ASS management of the site. This will take place in the vicinity of service installation works during and after dewatering activities.

Ongoing construction phase and post-development water monitoring will be undertaken to ensure the baseline conditions have not worsened due to development of the site and to maintain continuity between the pre and post-development results.

Groundwater monitoring locations in the site will be those identified in Figure 3.6. Should development works destroy the existing locations, replacement bores will be installed to aim to replicate the predevelopment monitoring locations.

Groundwater levels are to be measure monthly for the first 5 years with sampling occurring quarterly for that period. This is the responsibility of the developer. Thereafter it is the responsibility of the City of Kwinana to conduct measurements and sampling.

9.3 BMP Monitoring

Various Best Management Practices (BMPs) are proposed within the development to minimise stormwater pollutant loads, groundwater pollution, pollution to adjoining wetlands and variations in hydrology. Some of these are structural (e.g. raingardens, roadside swales etc.) while others are non-structural (eg. Education of fertiliser use, xeriscaping etc.). Chapter 10 of the Stormwater Management Manual for Western Australia provides advice on the performance of monitoring such BMPs (Dow, 2007)

Monitoring in the form of inspections by the Developers' representative (i.e. civil engineering consultant) and the City of Kwinana are recommended to ensure that BMP designs are fully implemented in accordance with the approved drawings and UWMP. Such inspections could occur during construction and upon completion of each stage of development and at handover of the POS/infrastructure after initial bedding down and maintenance period by the developer. Following the completion of the development and handover of the POS/infrastructure, the City of Kwinana is required to monitor performance of the BMPs from 3 years post development.

9.4 Contingency Procedures

If post development monitoring finds that water quality related objectives are not being met, the following procedures would be undertaken by the developer:

- Immediately sample the groundwater to confirm that the exceedance is not a result of mishandling or contamination.
- Determine whether the exceedance is attributed to the development or regional factors.
- Inform the City of Kwinana.

After the above procedure has been completed, the following contingency actions in consultation with the City of Kwinana and DoW will be undertaken:

- Ensure that the development has fully complied with development conditions relating to water quality management (i.e. installation and operation of BMPs). If such BMPs have not been design and installed as approved, then the developer would do so or council would be entitled to take regulatory action for a breach of development conditions.
- Investigate opportunities to apply additional BMPs to the study area (e.g. education programs, street sweeping nutrient management plans, alteration of maintenance procedures, soil amendment, local rainwater tank scheme etc.). Funding for such additional measures may require extraneous finding and further liaison with state government and relevant agencies.
- The DoW would be advised and recommended to review their calibration of water modelling and their advice in respect to subsequent or similar development proposals.

10 Roles and responsibilities

Table 7.1: Roles, responsibilities and funding for water management strategies

Organisation	Role	Funding
Developer	Satisfies relevant WAPC conditions including preparation of UWMP. Undertakes pre-development groundwater monitoring. Designs and constructs the potable water supply and sewer supply to Water Corporation standards. Designs, constructs and maintains (maintenance period to be negotiated between the Developer and the LGA) public open spaces. Undertakes post-development monitoring activities for submission to regulatory authorities. Carries out construction and management consistent with UWMP. Promote Water-wise appliances and fittings in Display Homes and through the Design Essentials package (details still in development). Collect and manage all monitoring data.	Developer
LGA	Review and approval of all reporting and design documentation for subdivision.	Developer
LGA	Assumes responsibility for roads and stormwater drainage infrastructure constructed including the ongoing operations and maintenance. Maintains the public open space (including irrigation) at the completion of the developer's maintenance period. Takes over groundwater license for POS irrigation and either complies with or amends Basic Operating Strategy to the satisfaction of the Department of Water.	Rates
Water Corporation	Assumes responsibility for the potable water supply and sewerage infrastructure constructed including the ongoing operations and maintenance.	Rates
Land Owner	Responsible for meeting all requirements of the relevant local authority and building codes during the built form phase (including construction and maintenance of soakwells for onsite stormwater disposal). Compliance with Water Corporation's waterwise program.	Land Owner

11 Appendices

Appendix A – Figures

Appendix B – Geotechnical Investigation Report

Appendix C – Ground Water Monitoring Data

Appendix D – GHD Flood Modelling Summary (GHD 2010)

Appendix E – Water Supply Consumption Tool

Appendix F – Landscaping Concept Plan

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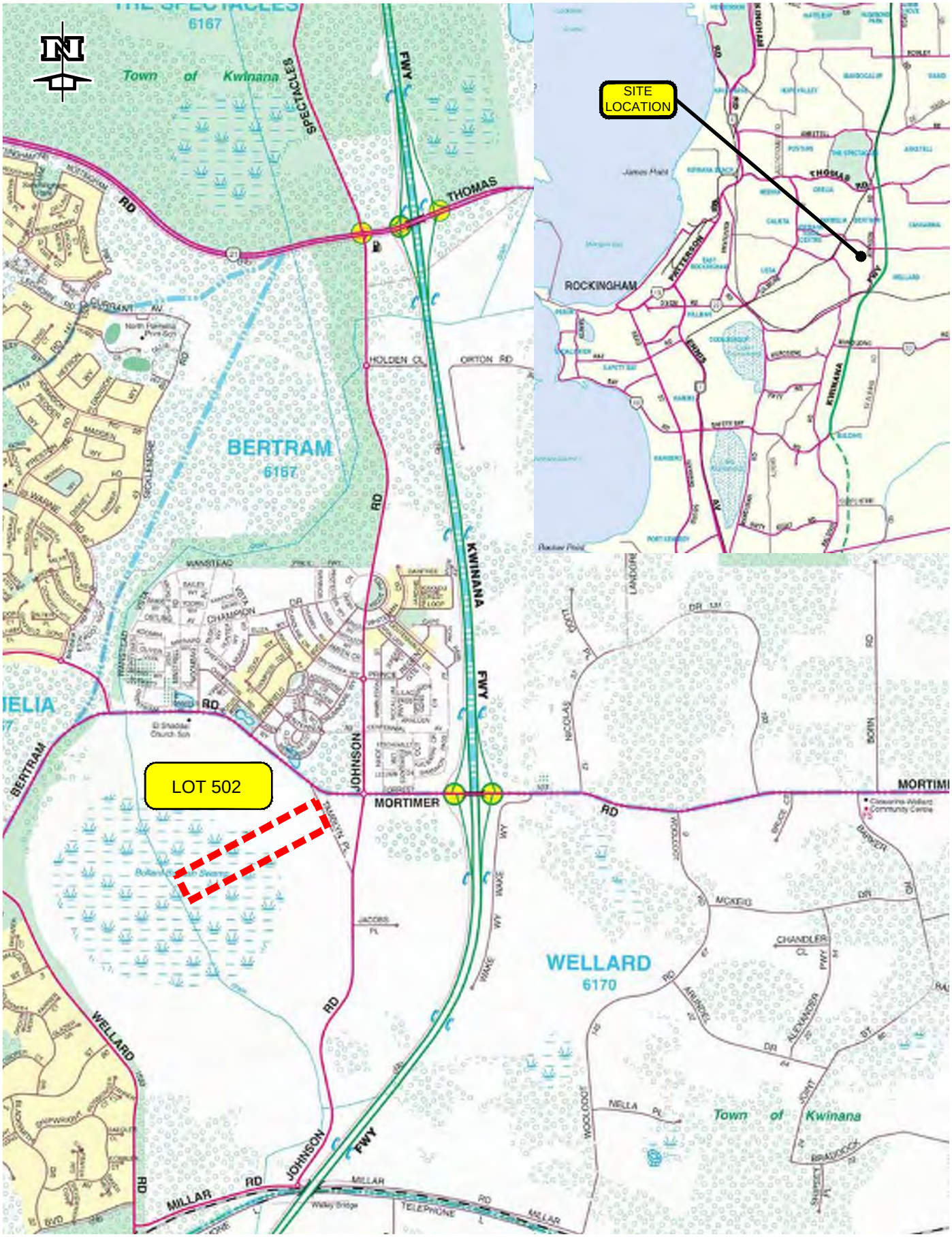
Appendix

A

Figures

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard



CLIENT ASCARI DEVELOPMENTS
DATE 20/08/15
DRAWN M.PERKINS
CHECKED M.WRIGHT

48 Kishorn Rd, Applecross Western Australia 6153
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LOT 502 TAMBLYN PLACE WELLARD
LOCALITY PLAN
FIGURE 1.1
REVISON A

pdc Engineering Evolved

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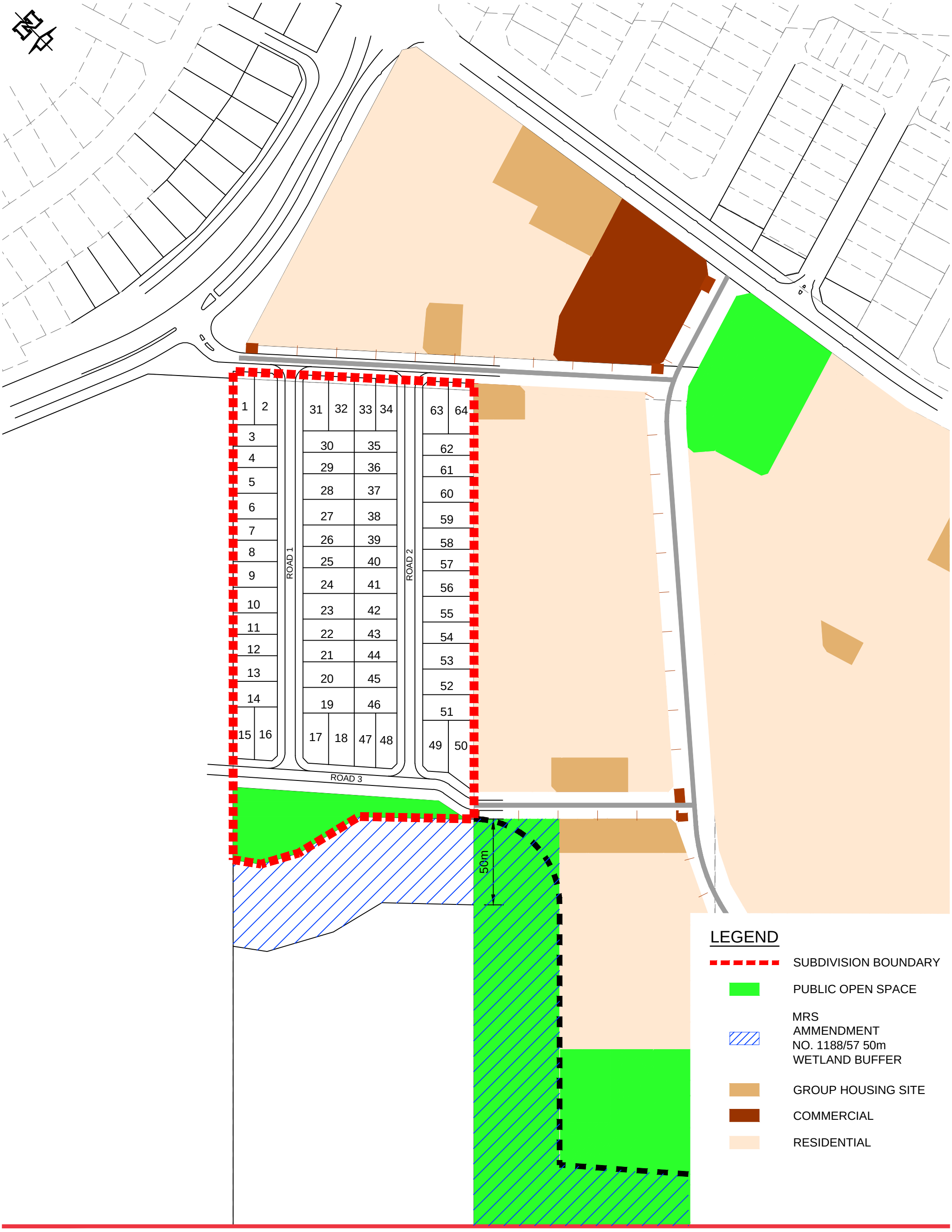

CLIENT ASCARI DEVELOPMENTS
DATE 20/08/15
DRAWN M.PERKINS
CHECKED M.WRIGHT

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SCALE (m)

LOT 502 TAMBLYN PLACE WELLARD
LOCAL STRUCTURE PLAN
FIGURE 1.2
REVISION A

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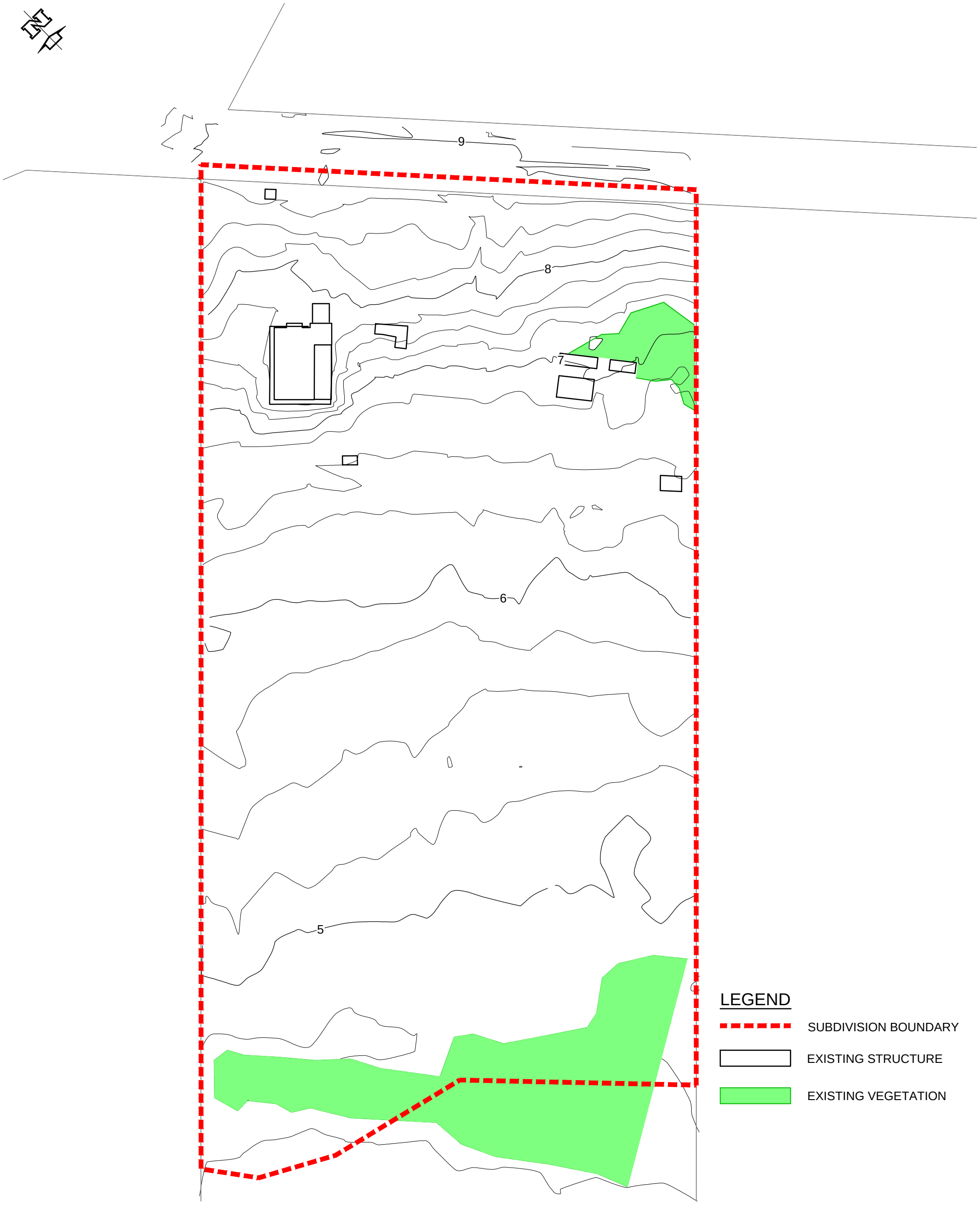

CLIENT	ASCARI DEVELOPMENTS
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CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

TOPOGRAPHY AND EXISTING LAND USE

FIGURE 3.1

REVISION A

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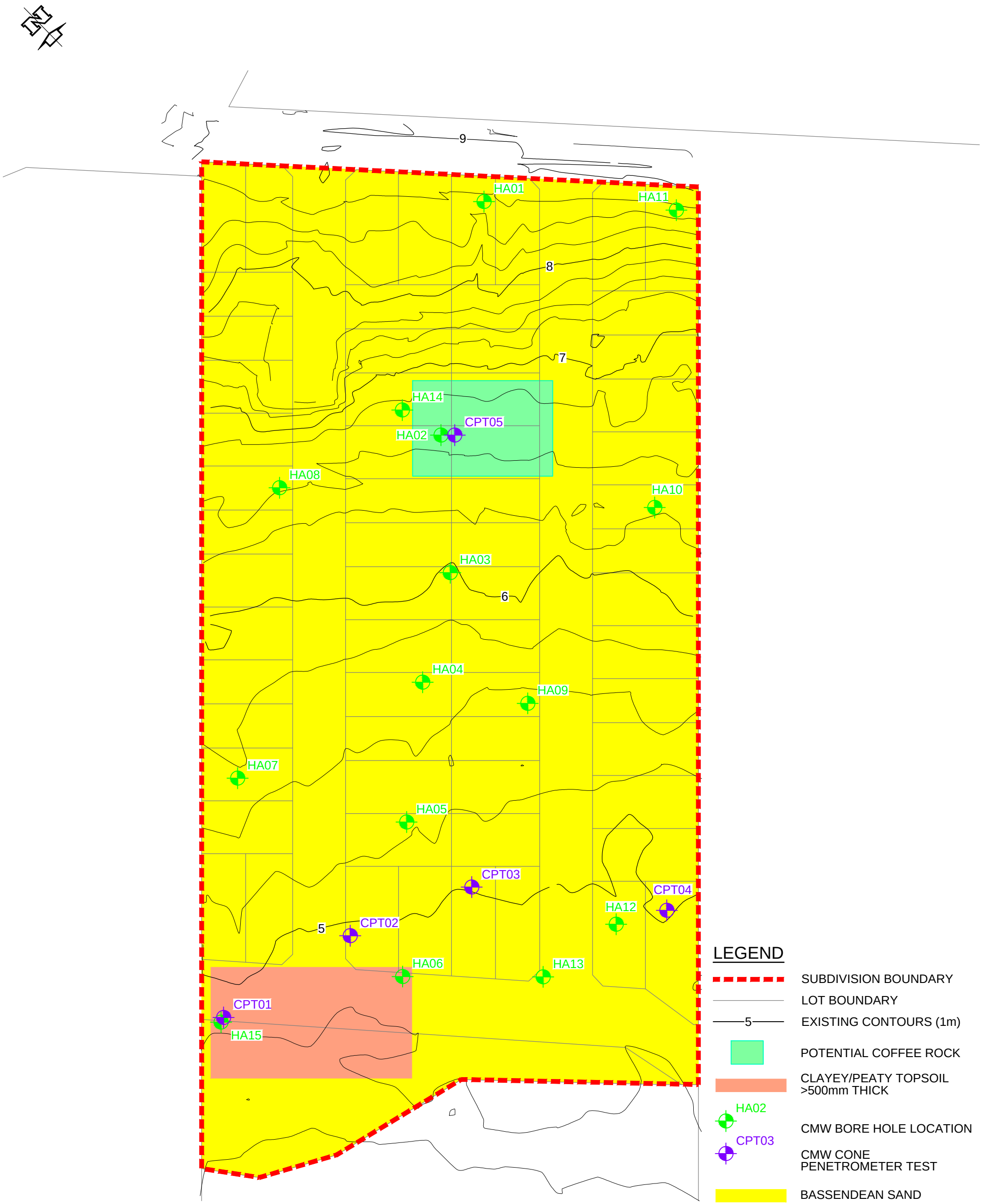

NOTE:
REFER TO APPENDIX B FOR BORE HOLES, CONE PENETROMETER TESTS AND PERMEABILITY TESTS.

CLIENT	ASCARI DEVELOPMENTS
DATE	20/08/15
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CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

GEOTECHNICAL FEATURES

FIGURE 3.2

REVISION A

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Full Size 1:1000
SCALE (m)

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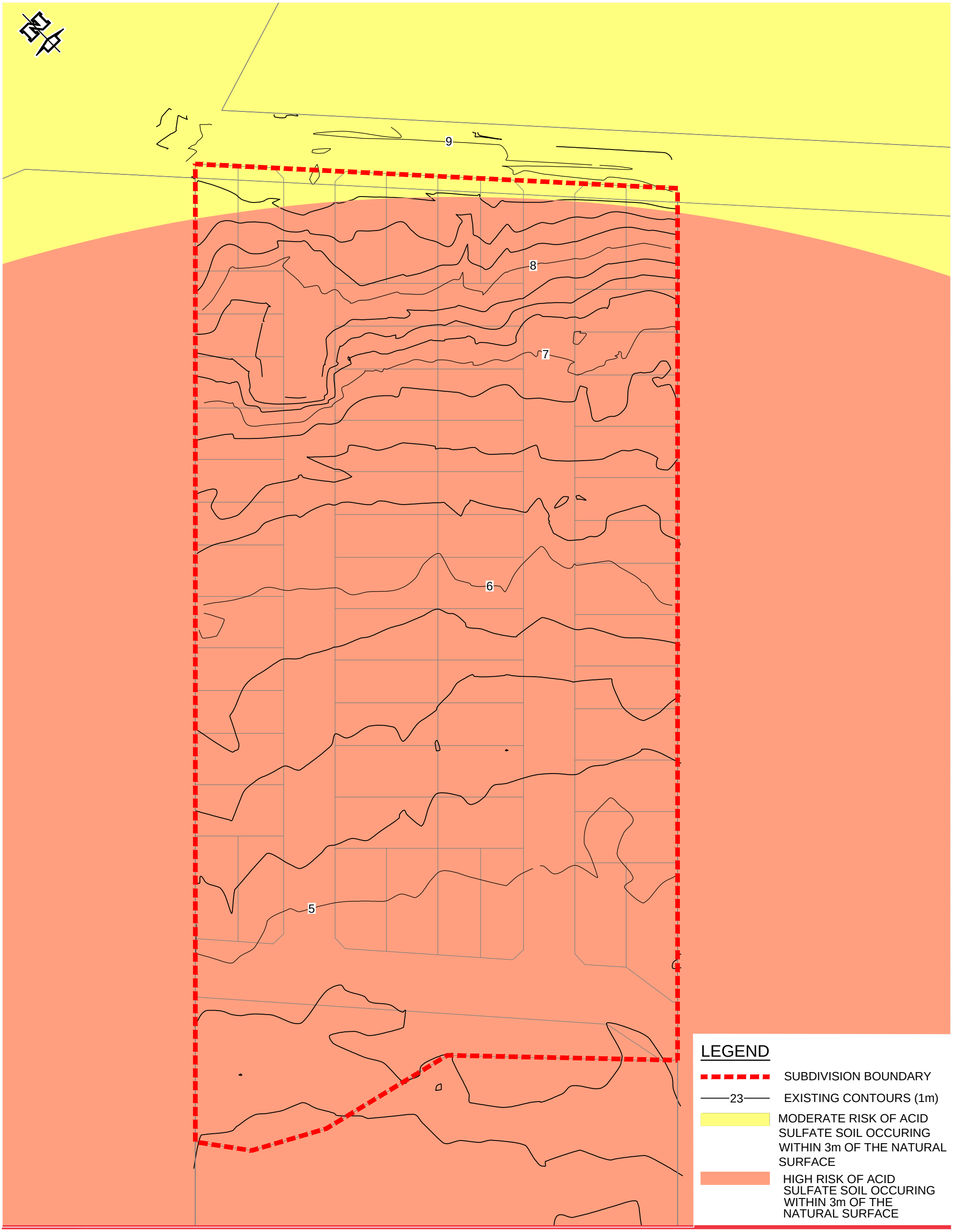

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DATE 20/08/15
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LOT 502 TAMBLYN PACE WELLARD
ASS MAPPING
FIGURE 3.3
REVISION A

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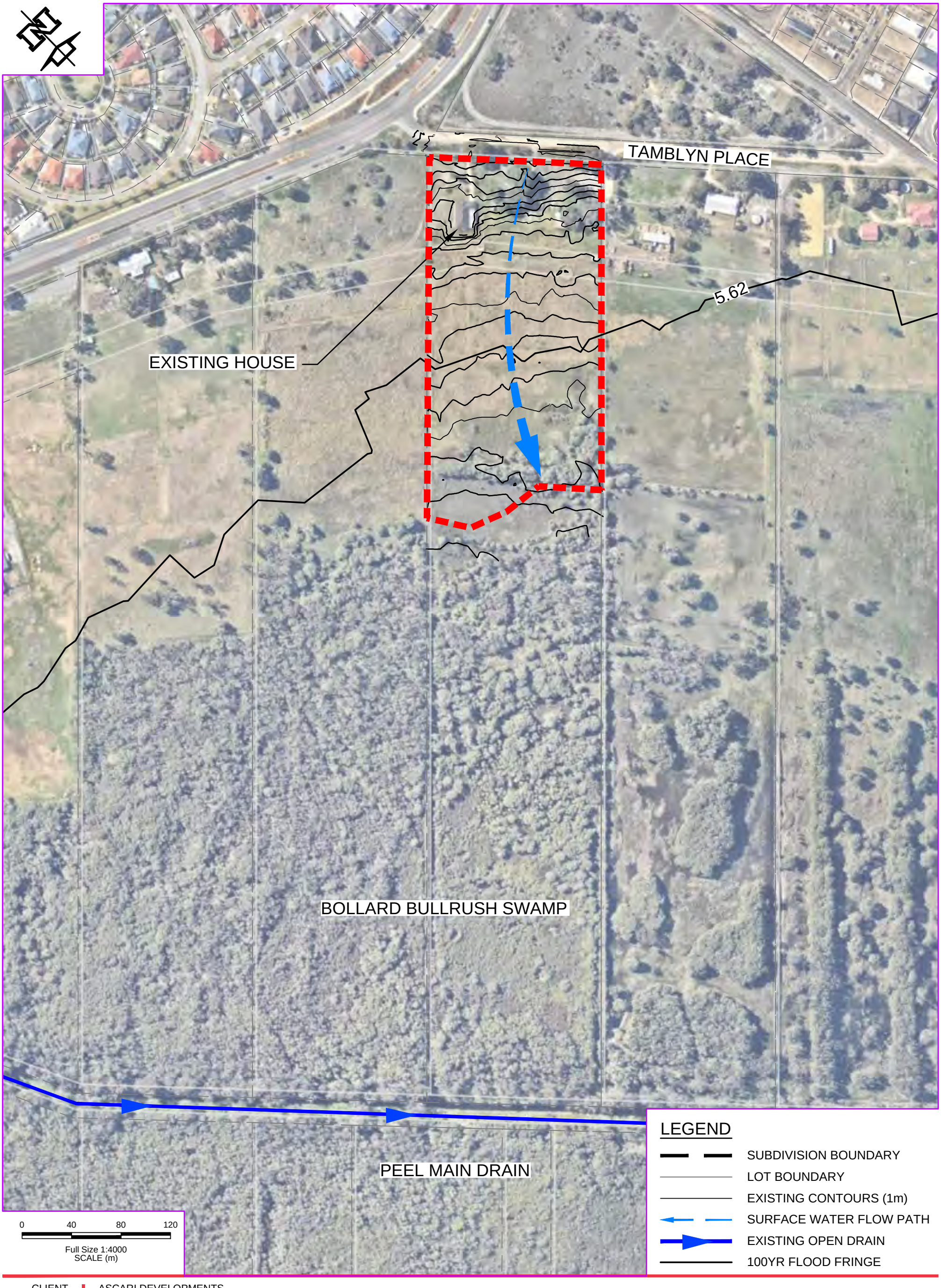

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LOT 502 TAMBLYN PLACE WELLARD

SURFACE WATER DRAINAGE FEATURES

FIGURE 3.4
REVISION B

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CLIENT ASCARI DEVELOPMENTS
DATE 20/08/15
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LOT 502 TAMBLYN PLACE WELLARD
WETLAND MAPPING
FIGURE 3.5
REVISION A

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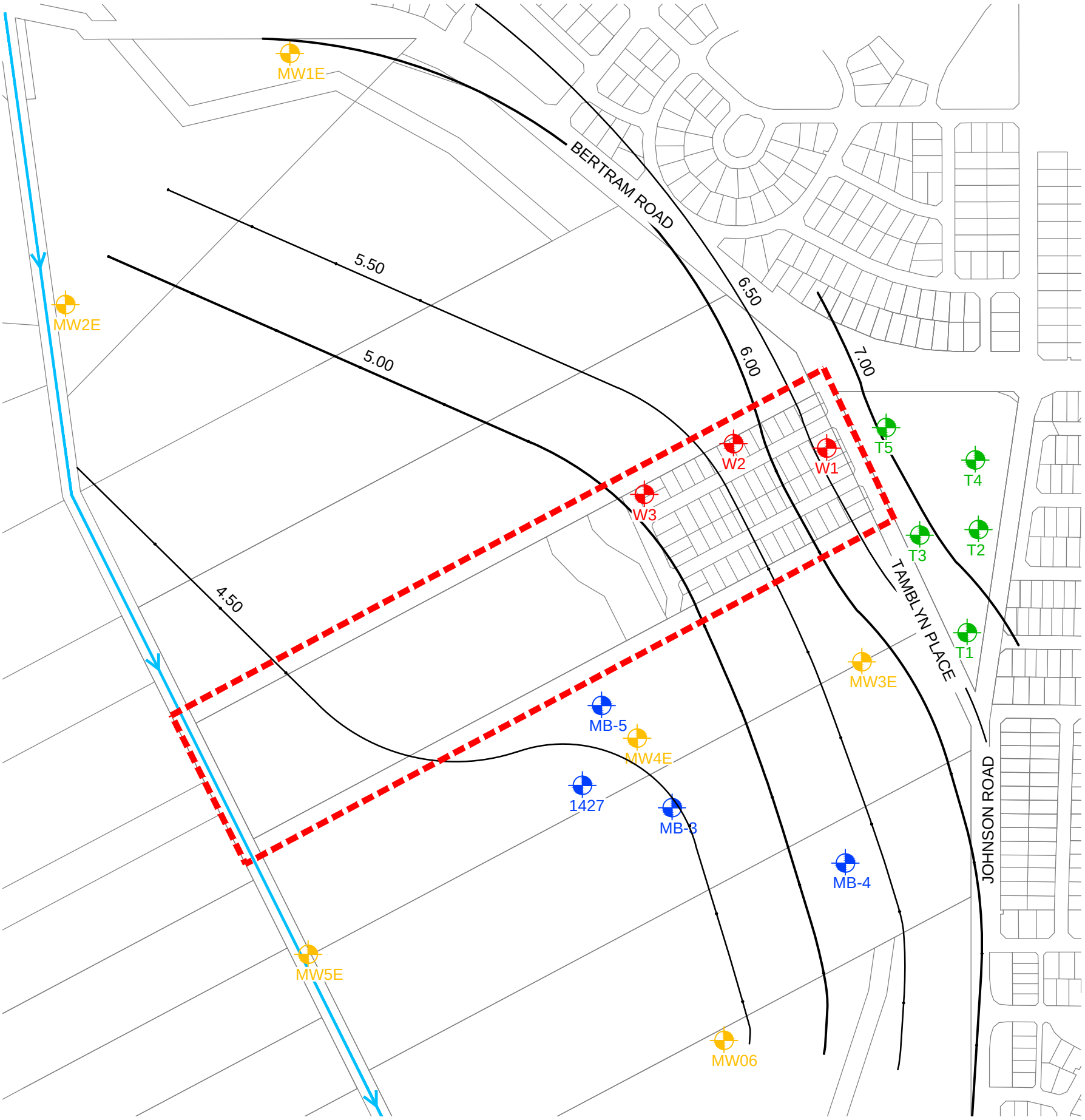
LEGEND

- SITE BOUNDARY
- GROUNDWATER CONTOURS (mAHD)
- RPS MONITORING BORE (MB5)
- BAYLEY ENV SERVICE MONITORING BORE (T1)
- ENV MONITORING BORE (MW1E)
- PDC MONITORING BORE (W1)
- PEEL MAIN DRAIN



CLIENT	ASCARI DEVELOPMENTS
DATE	20/08/15
DRAWN	M.PERKINS
CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

GROUNDWATER MONITORING BORE LOCATIONS

0 50 100 150

Full Size 1:5000
SCALE (m)

FIGURE 3.6
REVISION B

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pdc Engineering Evolved

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Plotted By: renaud Plot Date: 12/11/15 - 11:34

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TwL: 6.92 AHD
AREA: 8.40m²
VOLUME: 5.06m³

BASIN IL: 6.08 AHD
TwL: 6.92 AHD
AREA: 8.40m²
VOLUME: 5.06m³

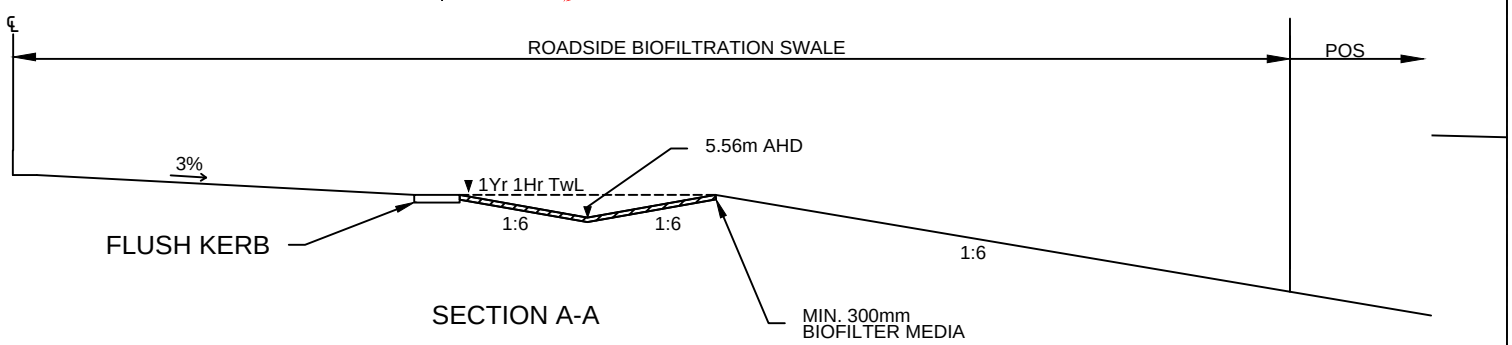
BASIN IL: 5.38 AHD
TwL: 6.17 AHD
AREA: 7.35m²
VOLUME: 3.95m³

BASIN IL: 5.38 AHD
TwL: 6.17 AHD
AREA: 7.35m²
VOLUME: 3.95m³

BASIN IL: 4.98 AHD
TwL: 5.83 AHD
AREA: 14.0m²
VOLUME: 7.76m³

BASIN IL: 4.98 AHD
TwL: 5.83 AHD
AREA: 14.0m²
VOLUME: 7.76m³

BASIN IL: 5.56 AHD
TwL: 5.71 AHD
AREA: 181.5m²
VOLUME: 12.5m³



LEGEND

- SUBDIVISION BOUNDARY
- CATCHMENT BOUNDARY
- ① CATCHMENT NUMBER
- SURFACE FLOW PATHS
- BIO-FILTRATION AREA
- SHEET FLOW

CLIENT	ASCARI DEVELOPMENTS
DATE	20/08/15
DRAWN	M.PERKINS
CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

DETENTION AND FLOW PATHS 1 IN 1Yr ARI

0 10 20 30
Full Size 1:1000
SCALE (m)

FIGURE 4.1
REVISION B

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pdc Engineering Evolved

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TwL: 7.00 AHD
AREA: 8.40m²
VOLUME: 5.21m²

BASIN IL: 6.08 AHD
TwL: 7.00 AHD
AREA: 8.40m²
VOLUME: 5.21m²

BASIN IL: 5.38 AHD
TwL: 6.30 AHD
AREA: 7.35m²
VOLUME: 4.66m²

BASIN IL: 5.38 AHD
TwL: 6.30 AHD
AREA: 7.35m²
VOLUME: 4.66m²

BASIN IL: 4.98 AHD
TwL: 5.90 AHD
AREA: 14.0m²
VOLUME: 8.11m²

BASIN IL: 4.98 AHD
TwL: 5.90 AHD
AREA: 14.0m²
VOLUME: 8.11m²

BASIN IL: 5.56 AHD
TwL: 5.71 AHD
AREA: 181.5m²
VOLUME: 12.5m³

LOT 503

LEGEND

- SUBDIVISION BOUNDARY
- CATCHMENT BOUNDARY
- SURFACE FLOW PATHS
- BIO-FILTRATION AREA
- SLOTTED PIPE FLOW
- SHEET FLOW

CLIENT ASCARI DEVELOPMENTS
DATE 20/08/15
DRAWN M.PERKINS
CHECKED M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

DETENTION AND FLOW PATHS 1 IN 5Yr ARI

0 10 20 30
Full Size 1:1000
SCALE (m)

FIGURE 4.2
REVISION B

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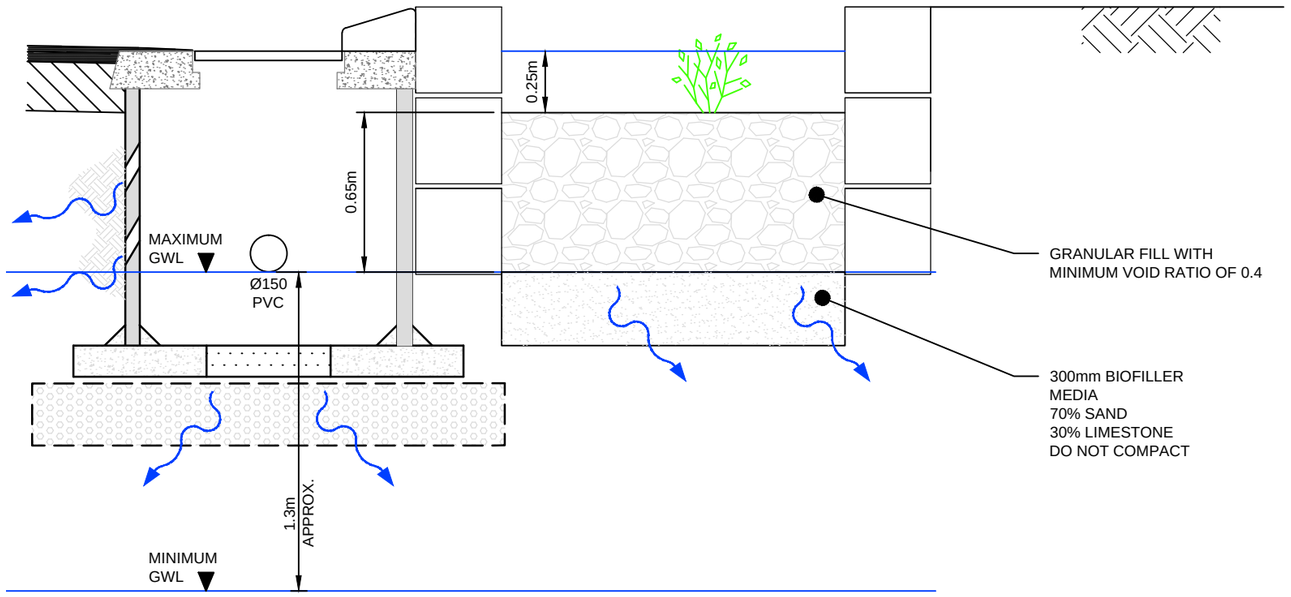

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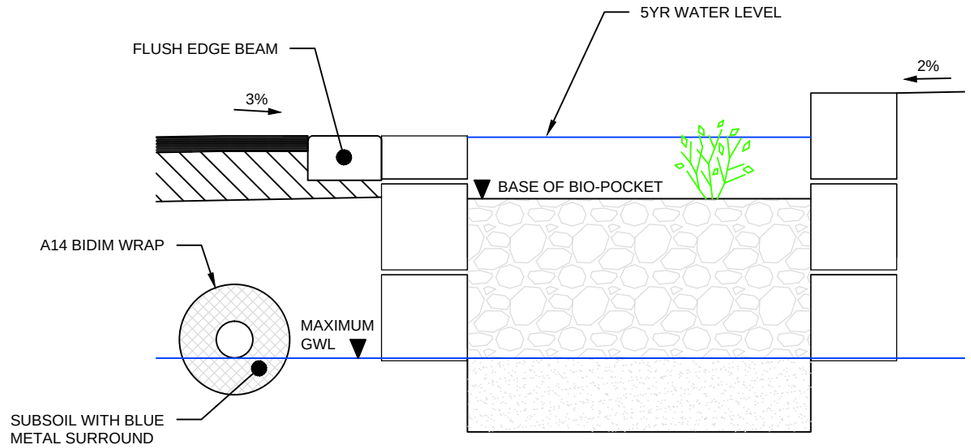
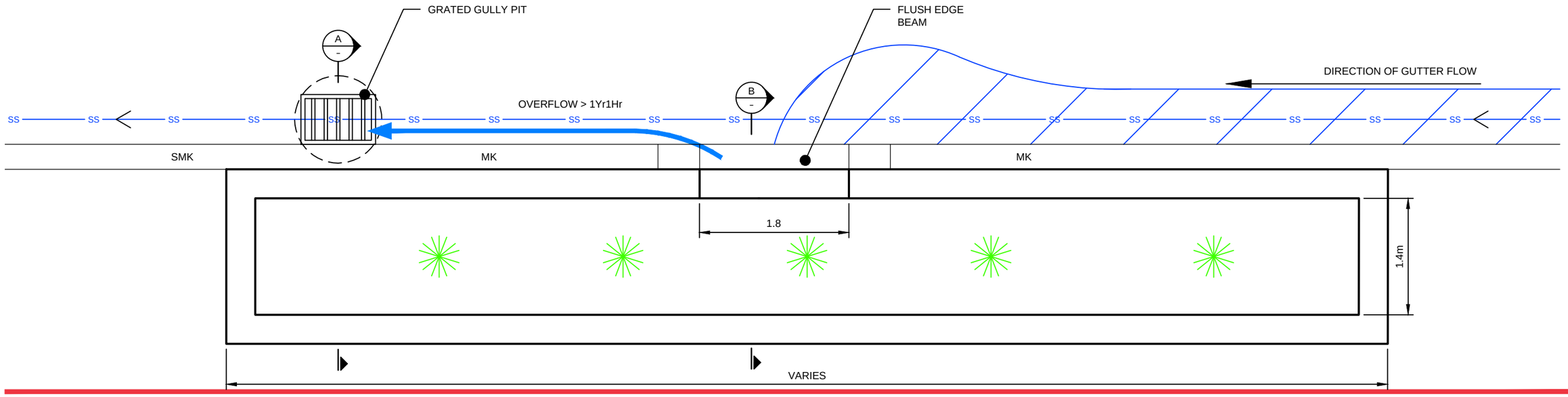


SECTION B

NOTE: DRAINAGE DETAILS INDICATIVE ONLY. ALL DETAILS TO COMPLY WITH THE CITY OF KWINANA STANDARD DRAWINGS.



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CHECKED	M.WRIGHT

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SCALE (m)

0 0.25 0.5 0.75
Full Size 1:25
SCALE (m)

LOT 502 TAMBLYN PLACE WELLARD

RAIN GARDEN DESIGN

FIGURE 4.3

REVISION B

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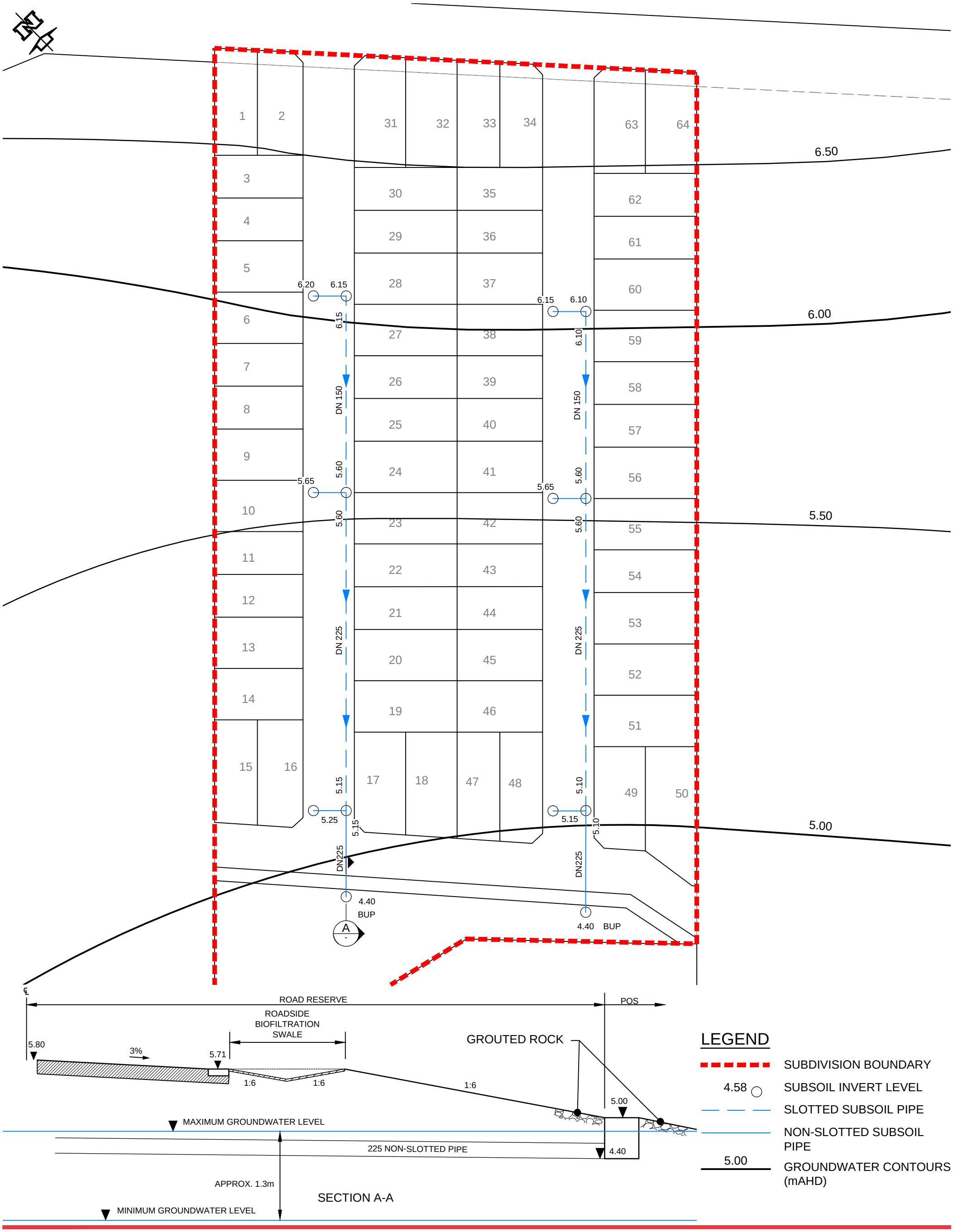

CLIENT	ASCARI DEVELOPMENTS
DATE	20/08/15
DRAWN	M.PERKINS
CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

DRAINAGE LAYOUT

FIGURE 5.1

REVISION B

0 10 20 30

Full Size 1:1000
SCALE (m)

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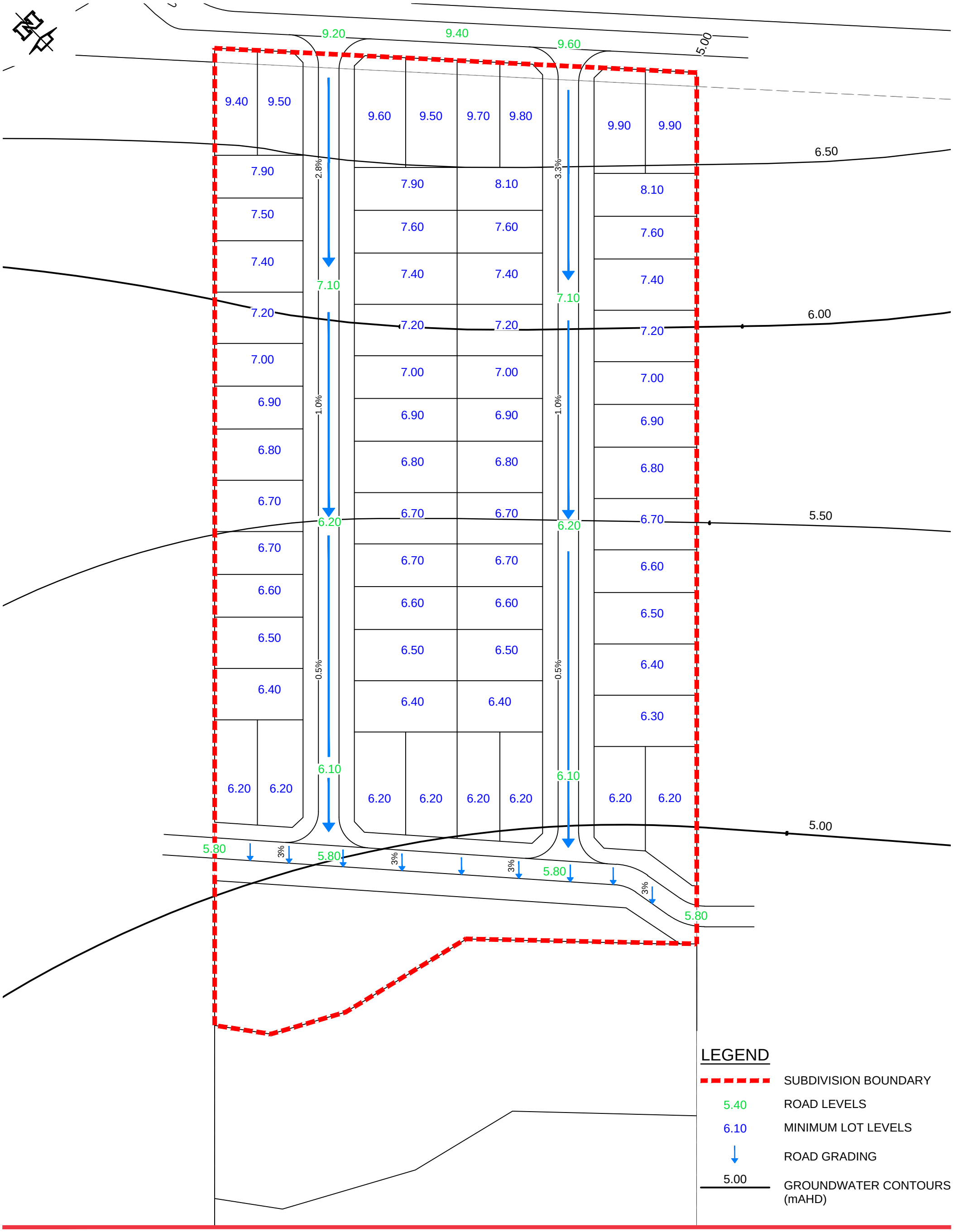

CLIENT	ASCARI DEVELOPMENTS
DATE	28/08/15
DRAWN	N.RENAUD
CHECKED	M.WRIGHT

LOT 502 TAMBLYN PLACE WELLARD

PRELIMINARY EARTHWORK LEVELS

0 10 20 30

Full Size 1:1000
SCALE (m)

FIGURE 5.2

REVISION B

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Cad File: T:\5009\900 Working Documents\901 Engineering\00\5009-00-502.dwg
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Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Appendix

B

Geotechnical Investigation Report

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

CMW Geosciences Pty Ltd
Chapman Morton Woodward

23 July 2015

PROPOSED RESIDENTIAL DEVELOPMENT
LOT 502 TAMBLYN PLACE, WELLARD, WA
GEOTECHNICAL INVESTIGATION REPORT

Ascari Developments

Ref. 2015-0625AB, Rev0

Unit 19 Wembley Green Offices,
127 Herdsman Parade, Wembley, WA 6014

www.cmwgeosciences.com

Table of Contents

Figures

Appendices

1 EXECUTIVE SUMMARY

This report presents the results of a geotechnical site investigation carried out at Lot 502 Tamblyn Place, Wellard, WA. The concept plan provided indicates that the proposed development will comprise 59 residential lots, a public open space, a wetland plus associated roads and accessways.

Based on the investigation results, the site is assessed to be underlain, to the depth investigated, by clayey/peaty sand topsoil up to 0.5m thick overlying medium dense Bassendean Sand Interbedded silt, sand and clay alluvium was encountered below 8m to 9m depth. Groundwater was encountered between 0.1m and 1.0m below existing ground levels during the investigation with surface water noted at the south-western end of the proposed development.

Recommendations pertaining to geotechnical aspects of the development are summarised as follows:

- Class A Site Classification to AS2870, subject to the recommendations provided in Section 7.2;
- Following a 150mm topsoil/vegetation strip, the remaining “deeper” topsoil may be reused subject to it being mixed with clean sand at a ratio of up to 4:1 (sand:topsoil);
- Earthworks comprising topsoil stripping, topsoil mixing, proof rolling and compaction of sand fill in layers must be carried out in accordance with AS3798 and the recommendations provided in Section 7.2;
- A design subgrade CBR value of 12% for the sandy soils across the site is considered suitable subject to our earthworks recommendation detailed in Section 7.2.1 and 7.2.2; and,
- Due to the presence of an elevated groundwater, on-site soak wells are not considered suitable at existing ground levels. However, if the site is raised with engineered fill, for soakage design purposes, a soil permeability of 10m per day may be applied to the natural sands above the groundwater table.

2 INTRODUCTION

CMW Geosciences Pty Ltd (CMW) was commissioned by Ascari Developments Pty Ltd to carry out a geotechnical investigation at Lot 502 Tamblyn Place, Wellard, WA by way of a signed authorisation dated 2 July 2015. The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter 2015-0625AA, Rev1 dated 2 July 2015.

The purpose of this report is to describe the investigation completed, ground conditions encountered and provide recommendations with respect to geotechnical aspects of the proposed residential development including site preparation, subgrade CBR and site classification, as detailed in our proposal letter.

3 SITE DESCRIPTION

The proposed development site comprises an area of approximately 10Ha and is located at Lot 502 Tamblyn Place, Wellard, WA as shown on the attached Site Location Plan – Figure No. 1.

It is located on the eastern margin of the Bollard Bulrush Swamp wetland. Ground surface elevations range from in excess of 8mAHD along the eastern boundary of the site down to approximately 5mAHD along the western margin of proposed residential development. Tamblyn Place forms the north-eastern boundary with existing farmland to the east and west. Bollard Bulrush Swamp is located beyond the south-western boundary.

The southern portion of the proposed development area is currently utilised as farmland with thick grass cover and a number of medium sized trees. South of the proposed development area can be described as a wetland. There is a residential dwelling and a farm shed in the north.

4 PROPOSED DEVELOPMENT

The plans supplied depict the approximately 3.5ha development comprises 59 residential lots plus associated roads and accessways. We also understand that a 0.4ha public open space (POS) will be developed south-west of the lots adjacent to a buffer zone which separates the development from 6.3ha of the lower lying wetland.

No engineering design drawings have been supplied to date, however, based on nearby developments, we have assumed that the site will be raised with imported sand fill materials to form finished ground levels.

5 FIELD INVESTIGATION

Following a dial before you dig search, the field investigation was carried on 6 and 7 July 2015. All fieldwork was carried out under the direction of CMW in general accordance with AS1726 (1993), Geotechnical Site Investigations. The scope of fieldwork completed was as follows:

- Undertake a walkover survey of the site to assess the general landform and site conditions;
- Fifteen hand auger boreholes, denoted HA01 to HA15, were drilled using a 100mm diameter auger to depths of between 0.8m and 1.4m below existing ground levels to visually observe the near surface soil profile and to facilitate in-situ permeability testing. Engineering logs of the hand auger boreholes are presented in Appendix A;
- Perth Sand Penetrometer (PSP) tests were carried out adjacent to relevant hand auger boreholes, in general accordance with AS1289.6.3.2, to depths of up to 2.10m to provide soil density profiles and to provide a subgrade CBR value for pavement design purposes. Graphical results of the PSP testing are presented on the borehole logs in Appendix A; and,
- Five Cone Penetrometer Tests (CPT's) to depths of up to 10.8 metres were completed to assess the depth of loose sands, the presence and depth of lacustrine deposits and the depth to suitable bearing strata for foundation design. The results of the CPT tests are presented in Appendix B; and,
- In-situ falling head permeability tests were completed in the open standpipe piezometers established in HA10 and HA14 at depth of 1.1m. The results of the permeability tests are presented in Appendix C.

The approximate locations of the respective investigation sites referred to above are shown on the attached Site Investigation Plan (Figure No. 02).

6 GROUND MODEL

6.1 Geology

A review of the geological references for the area suggests the site is underlain by peaty topsoil associated with the adjacent wetlands which is underlain by a thin layer of Bassendean Sand which at depth transitions into the clayey sands / clays of the Guildford Formation.

Based on the known history of the site and surrounding land levels, some superficial depths of fill could be anticipated as a result of previous earthworks to create pad for the existing buildings/sheds.

6.2 Subsurface Conditions

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area and can be generalised below.

The north-eastern part of the site along Tamblyn Place is characterised by deep sand conditions with a poorly developed sandy topsoil layer typically 0.2m thick. Towards the west where the ground surface level falls below about 6.5mAHD the sandy topsoil layer becomes more dominated by organic clay and gradually increases in thickness extending up to 0.5m thick along the south-western margin of the proposed development area.

The upper sands were typically loose to medium dense with the relative density increasing with depth. At test location CPT5, near the north-eastern boundary, CPT refusal occurred at 3.5m. This is inferred to possibly be the result of cemented sand (Coffee Rock) within the sequence. At depth along the south-western margin of the proposed development area the subsurface sand profile grades into the interbedded sands and sandy clays of the Guildford Formation.

The distribution of these units is summarised in Table 1 below:

Table 1: Summary of Soil Stratigraphy

Description	Depth to top of layer (m)		
	Minimum	Maximum	Average
TOPSOIL	0		
BASSENDEAN SAND	0.2	0.5	0.3
GUILDFORD FORMATION	8.2	8.4	8.3

6.3 Groundwater

Groundwater elevations measured at a nearby site in November 2014 ranged from approximately RL 7mAHD on the eastern edge of Bollard Bulrush Swamp to approximately RL 4mAHD in the lower lying areas of the wetland. These November groundwater levels are considered to be close to the mid-point of the seasonal range between end of winter (high) and end of summer (low).

During our site investigation (July) groundwater was recorded at between 0.1m and 1.05m depth which equates to elevations of approximately RL 7mAHD to 5mAHD. It is also important to note that surface water was observed at the south-western margin of the proposed development area.

6.4 Laboratory Test Results

6.4.1 Civil Engineering

Results of the civil engineering laboratory tests provided in Appendix D are summarised in Table 2 below:

Table 2: Summary of Civil Engineering Laboratory Test Results

Test Location	Depth (mbgl)	Fines (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	LS (%)
HA03	0.15-0.30	28	72	0	65	52	13	5.5
HA04	0.20-0.30	24	76	0	73	61	12	5.5
HA06	0.20-0.40	28	72	0	48	37	11	5.0

Note: Gravel, sand and fines percentages are by weight, LL = liquid limit, PL = plasticity limit, PI = plasticity index, LS = linear shrinkage, NO = Not obtainable, NP = Non Plastic

6.4.2 Organic Content

The organic content test results are summarised in Table 3 below:

Table 3: Organic Soil Test Results		
Test Location	**Depth (m)**	**Loss on Ignition (%)**
HA01	0.05-0.20	1.1
HA02	0.05-0.20	7.0
HA03	0.05-0.15	3.4
HA04	0.05-0.20	19
HA05	0.05-0.20	15
HA06	0.05-0.20	27
HA07	0.05-0.20	8.7
HA08	0.05-0.20	3.7
HA09	0.05-0.20	20
HA11	0.05-0.15	1.4
HA15	0.05-0.30	9.8

Based on the loss on ignition test results the organic content of the topsoil is inferred to range between 2% and 40% (by volume). The relatively high results from boreholes HA04, HA06 and HA09 suggest that these samples may have included fragments of root matter that may not be representative of the overall topsoil material.

6.5 Permeability

The results of the falling head permeability tests carried out were used to estimate the soil coefficient of permeability in accordance with the method described in CIRIA Report No. 113 (falling head test). Table 4 below summarises the results obtained.

Table 4: Summary of Rising Head Permeability Tests					
Standpipe	**Screen Depth (mbgl)**	**Screened Formation**	**Test Method**	**Approximate Permeability**	
				(m/sec)	**(m/day)**
HA10	0 to 1.1	Bassendean Sand	CIRIA	1.19×10^{4}	10
HA14	0 to 1.1	Bassendean Sand	CIRIA	2.09×10^{4}	18

7 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

7.1 Site Classification

We have assessed the site classification for the Lot 502 Tamblyn Place residential development in accordance with Australian Standard AS 2870-2011, “Residential Slabs and Footings”. It is assessed that subject to our remediation recommendations in Section 7.2, the sandy soils beneath the site within the depth investigated will have little to no characteristic surface movements (Ys) due to moisture changes. The site can therefore be classified as CLASS A in accordance with AS2870

We understand that in parts of the development significant amounts of fill are to be placed and compacted to form finished ground levels. If the imported fill is sandy in nature, free of organic or deleterious inclusions with a fines content of less than 12% and is compacted in accordance with Section 7.2, a CLASS A Site Classification will remain applicable.

7.2 Earthworks

We understand that cut and fill earthworks will be required to form finished ground levels. This activity is considered appropriate for the site subject to the earthworks construction recommendations described below.

7.2.1 Topsoil Remediation

Approaches that have been used for topsoil remediation at similar sites including others adjacent to Bollard Bulrush Swamp, incorporate the stripping of all topsoil materials and blending with clean imported or site won sand at ratios to produce a suitable structural fill material with less than 2% organic material (by weight).

The extent to which the above topsoil remediation can extend to the south-west across the site will be limited by groundwater elevation at the time of earthworks and the clay content of the peaty topsoil material. The area within the eastern half of the site where the existing ground surface level is above approximately RL 5.5mAHD is considered amenable to remediation as outlined above for most of the year, possibly excluding the winter groundwater peak period. Organic contents of the topsoils within the north-eastern portion of the site above approximately RL 6.5mAHD are expected to range from about 1% to 7% (by weight) resulting in a required blending ratio in the order of 1 (clean sand) to 1 (topsoil).

Within the lower lying south-western portion of the site, where the existing ground surface falls below 6.5mAHD the topsoil material becomes thicker, more variable and includes layers that are dominated by organic clay. It is recommended that topsoil stripping within the south-western half of the site is limited to the late summer/autumn months (Feb to April) when groundwater levels will be at their seasonal low point. Topsoil stripping during this period will allow a greater area to be completely remediated. Organic contents across the south-western half of the site are variable, ranging from about 3% to as high as 30% (by weight). This variability will require close monitoring during stripping to ensure optimal blending is achieved.

The upper limit for efficient topsoil blending is likely to be a ratio of approximately 4 (clean sand) to 1 (topsoil) resulting in an upper organic content in the order of 10% (by weight). Efficient excavation and placement of this material will be limited to the end of summer/autumn period when conditions are dry. Once the winter rains commence, topsoil stripping earthworks and filling within the south-western end of the site will need to be suspended. The viability of the above topsoil remediation approach is contingent on being able to schedule these works during the late summer/autumn period.

7.2.2 Topsoil Strip and Subgrade Preparation

We recommend the following during topsoil strip and subgrade preparation:

- All vegetation and the top 150mm of topsoil material/rootmat must be stripped and removed from site or reused for landscaping purposes;
- Existing trees must be removed and it must be ensured that their root systems are completely grubbed out. The soil beneath all tree root systems must be recompacted and filled to the method specification. This is especially important for the large trees located near the south-western boundary of the proposed development;
- The remaining dark brown topsoil/clayey sand; must be completely stripped, exposing the underlying clean sands and stockpiled prior to blending;

- Topsoil blending must be carried out a ratio of up to 4 (clean sand) to 1 (topsoil);
- Following topsoil stripping, the upper 300mm of the exposed subgrade must be moisture conditioned and compacted with a suitable roller to achieve at least 8 blows per 300mm penetration with a PSP, which is equivalent to a dry density ratio of at least 95% based on Modified Compaction (AS1289 5.2.1). Any loose, weak, cohesive or organic materials observed during this proof roll shall be removed and replaced with compacted clean sand fill;

7.2.3 Bulk Earthworks

We recommend the following during bulk earthworks:

- General fill layers should be placed in maximum 500mm thick loose layers, moisture conditioned to within ±3% of the optimum moisture content and compacted with a suitable roller to achieve a dry density ratio of at least 95% based on modified compaction (AS1289 5.2.1);
- Site won material from proposed excavations is considered suitable for use in bulk earthworks subject to the material being well graded, granular in nature, free of organic or deleterious inclusions with a fines content of less than 12% and a maximum particle size of 300mm; and
- Imported general sandy fill should contain less than 5% by weight of soil <0.075mm and have 100% of clasts smaller than 200mm;

7.2.4 Retaining Wall Backfill

We recommend the following during retaining wall backfilling:

- Backfill layers should be placed in maximum 300mm thick loose layers, moisture conditioned to within ±3% of the optimum moisture content and compacted with a suitable vibrating plate compactor to achieve a dry density ratio of at least 95% based on modified compaction (AS1289 5.2.1); and
- Backfill must comprise the same material as the retained lot to reduce the risk of differential settlements.

7.2.5 Earthworks Monitoring

Variations in ground conditions may occur between test locations. If conditions other than those described above are encountered, then further advice should be sought without delay. During earthworks, site visits should be made by a Geotechnical Engineer or Engineering Geologist who is familiar with the contents of this report to ensure that topsoil stripping and blending is carried out adequately, proof compaction and cut to fill earthworks are conducted in accordance with AS3798-2007, and to audit the compaction of earthworks. Earthworks control testing should be undertaken in accordance with the guidelines set out in AS3798-2007. CMW would be pleased to perform this function if required.

7.3 Preliminary Foundation Recommendations

Foundations may be preliminarily designed on the basis of a maximum allowable bearing pressure of 100 kPa for foundations as per AS2870.

Foundation bearing pressures should be re-evaluated for each individual lot following the completion of bulk earthworks to align recommended bearing pressures and settlement profiles with the thickness of fill placed.

7.4 Retaining Wall Design

Localised cut and fill earthworks are envisaged along proposed property boundaries for subdivision layout and drainage purposes. Recommended retaining wall design parameters are summarised in Table 5 below:

Table 5: Retaining Wall Design Parameters (No wall friction)

Soil Type	Density (kN/m^3)	Ø' (deg.)	K_0	K_a	K_p	E' (MPa)
Medium dense Sand	18	33	0.50	0.29	3.4	50

Notes:
1. Ø' - angle of internal soil friction; K_0 - coefficient of earth pressure at rest based on normally consolidated soils, K_a - coefficient of active earth pressure, K_p - coefficient of passive earth pressure; E' – long term Youngs modulus.
2. The above parameters are based on the condition of a horizontal ground surface behind the retaining structure. Applicable surcharge loads behind the wall must also be considered in the design.

Retaining structures should be designed in accordance with AS 4678-2002 "*Earth Retaining Structures*" or an alternate approved factor of safety approach. Should any fill be placed against the permanent retaining walls after construction, it is expected that the compaction induced pressures will be much greater than the above active earth pressures. The compaction equipment used to compact backfill behind the wall must be carefully selected and preferably light-weight compaction equipment with reduced lift heights should be used. The load on the retaining wall due to compaction equipment may be estimated from Figure J5 in AS4678-2002 *"Earth Retaining Structures"*.

7.5 Soak Wells

Due to near surface groundwater levels, on-site soak wells are not considered suitable at existing ground levels. If the site is raised with engineered fill, for soakage design purposes, a soil permeability of 10m per day may be applied to the natural sands above the groundwater table.

Soak well efficiency reduces where the depth to groundwater is less than 1.5m. Where the depth to groundwater is expected to be less than 1.0m, the provision of a stormwater over flow connection to the lots is recommended.

7.6 Pavements

Based on the laboratory test results and PSP testing carried out in the field, a design subgrade CBR value of 12% for the sandy soils across the site is considered suitable. A design subgrade CBR value of 15% is considered suitable for compacted sand fill.

These design CBR values are subject to the exposed subgrade being moisture conditioned to within ±3% of the optimum moisture content and compacted with a large (minimum 10 tonne static weight) suitable roller. It is recommended that appropriate QA / QC testing be undertaken on subgrade and pavement materials during construction.

7.7 Acid Sulphate Soils

The Perth Metropolitan Acid Sulfate Soils Map shows that the site is located in a "high risk area for ASS occurring within 3m of natural surface". Therefore, if earthworks are to include disturbance of the in situ materials exceeding $100m^3$ of soil from below the water table or if any dewatering is required during earthworks or civil construction, an acid sulfate soils investigation is likely to be required. We are able to recommend a suitably qualified and experienced environmental consultant for this work if required.

8 ADDITIONAL INVESTIGATION WORK

More detailed information is required to refine the topsoil remediation strategy. The current data base for the site includes only ten organic content tests on the topsoil materials. It is recommended that an intensive topsoil investigation programme be undertaken to assess in more detail the topsoil layer thickness, sand content, organic content and variation of organic content with depth. A total of approximately 30 shallow hand excavated test locations with a commensurate number of organic content and percentage fines tests are recommended to allow for the optimal design of topsoil remediation.

9 CLOSURE

The findings contained within this report are the result of limited discrete investigations conducted in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, can it be considered that these findings represent the actual state of the ground conditions away from our investigation locations.

If the ground conditions encountered during construction are significantly different from those described in this report and on which the conclusions and recommendations were based, then we must be notified immediately.

This report has been prepared for use by Ascari Developments in relation to the proposed residential development at Lot 502 Tamblyn Place in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. Use of this report by parties other than Ascari Developments and their respective consultants and contractors is at their risk as it may not contain sufficient information for any other purposes.

For and on behalf of
CMW Geosciences Pty Ltd

Matthew Watts
Engineering Geologist

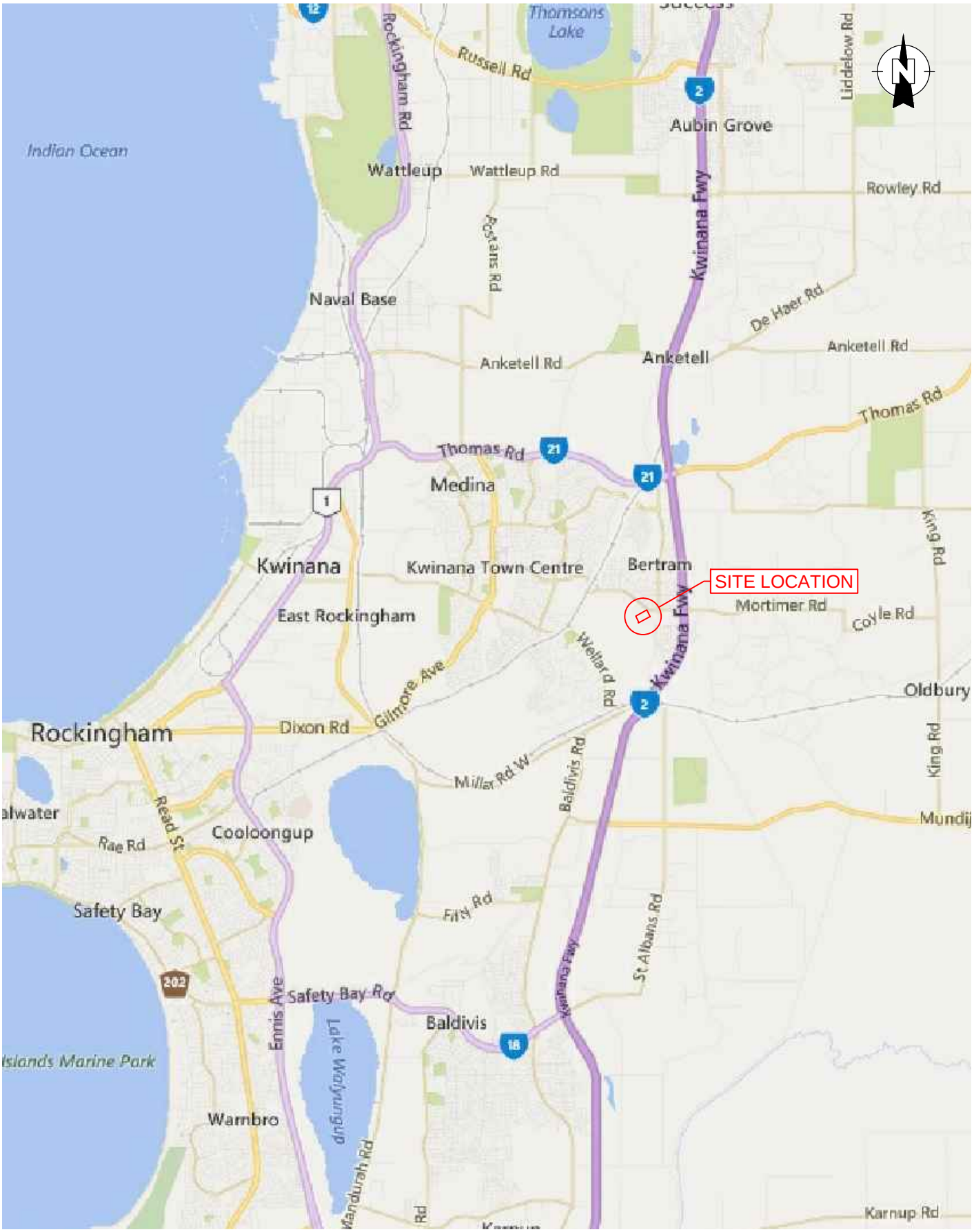
Philip Mather
Principal

Distribution: 1 copy to Ascari Developments Pty Ltd (electronic)
Original held by CMW Geosciences Pty Ltd

10 REFERENCES

- Appendix 4, Control of Groundwater for Temporary Works (CIRIA Report No. 113)
- AS 1289, *Methods of testing soils for engineering purposes,* Standards Australia, Sydney
- AS 1726 (inc. amendments 1 & 2), *Geotechnical Site Investigations,* Standards Australia, Sydney, 1993
- AS 2870, *Residential slabs and footings,* Standards Australia, Sydney, 2011
- AS 3798 (inc. amendment 1), *Guidelines on earthworks for commercial and residential developments,* Standards Australia, Sydney, 2007
- AS 4678 (inc amendments 1 & 2), *Earth retaining structures,* Standards Australia, Sydney, 2002
- *Perth Groundwater Atlas,* Second Edition, Perth: Department of Environment, 2004
- *Rockingham, Sheet 2033,* Perth Metropolitan Region 1:50000 Geology Series, Geological Survey of Western Australia, 1986
- Schmertmann, 1970 and Schmertmann et al, 1978.
- Terzaghi, K. (1943). Theoretical soil mechanics. 1st ed. New York: J. Wiley and Sons, Inc.
- WA Online Atlas, Shared Land Information Platform – ASS Risk Map, https://www2.landgate.wa.gov.au/bmvf/app/waatlas/.

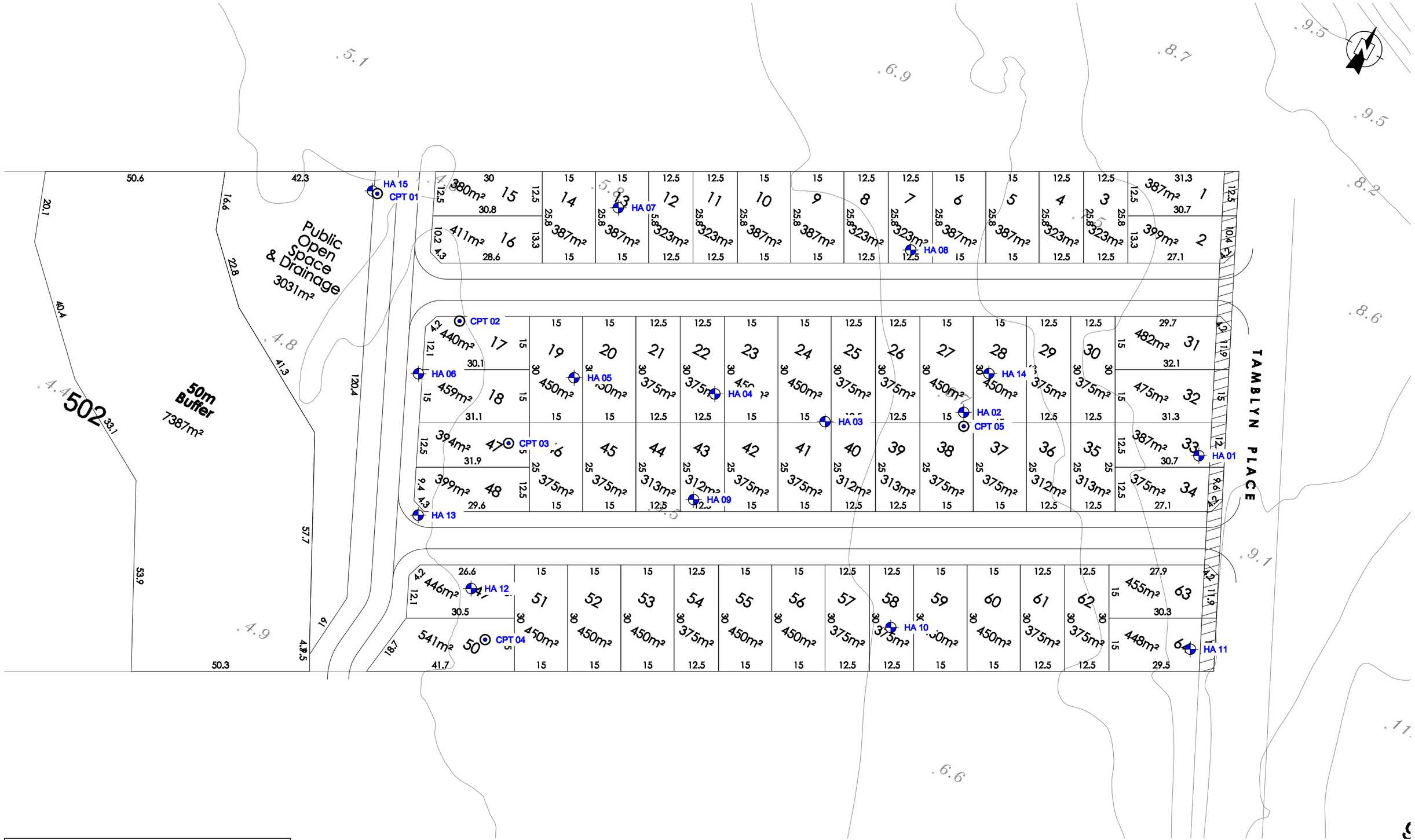
Figures



NOTE: IMAGERY SOURCED FROM BING.COM

CMW Geosciences Pty Ltd
Chapman Morton Woodward

CLIENT: ASCARI DEVELOPMENTS		DRAWN: CJ	PROJECT: 2015-0625
PROJECT: LOT 502 TAMBLYN PLACE WELLARD, WA		CHECKED: MW	FIGURE: 01
		REVISION: 0	SCALE: 1:100 000
TITLE: SITE LOCATION PLAN		DATE: 22/07/2015	SHEET: A4 P



LEGEND:

- HA 01 DENOTES HAND AUGER (HA) LOCATION
- CPT 01 DENOTES CONE PENETROMETER TEST (CPT) LOCATION

1:1000 0 10 20 30 40 50 m

NOTE: BASE PLAN ADAPTED FROM: SUBDIVISION CONCEPT PLAN, DATED: 08/07/2015

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CLIENT: ASCARI DEVELOPMENTS		DRAWN: CJ	PROJECT: 2015-0625
PROJECT: LOT 502 TAMBLYN PLACE WELLARD, WA		CHECKED: MW	FIGURE: 02
		REVISION: 0	SCALE: 1:1000
TITLE: SITE INVESTIGATION PLAN		DATE: 22/07/2015	SHEET: A3 L

Appendix A
Hand Auger Borehole Logs

BOREHOLE LOG - HA01

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

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1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391242m N.6430590m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
		0.0 - 0.2	1 B		0		TOPSOIL: SAND: fine to medium grained, dark-grey; trace fines.	M	L		
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.				
		1.2 - 1.4	2 B		1				MD		
							Borehole terminated at 1.40 m				
					2						
					3						
					4						

Termination Reason: Target Depth Reached.

Remarks: Groundwater not encountered. Backfilled.

BOREHOLE LOG - HA02

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391178m N.6430569m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
		0.0 - 0.2	1 B				TOPSOIL: SILTY SAND: fine to medium grained, dark-grey to dark brown; silt, low plasticity.				
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	M	VD		
					1			W			
							Borehole terminated at 1.40 m				
					2						
					3						
					4						

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA03

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391145m N.6430548m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
	▼	0.0 - 0.2	1 B		1		TOPSOIL: SAND: fine to coarse grained, brown to dark-brown; trace fines; trace organic rich lenses.	M	D	5 10 15	
		0.2 - 0.3	2 B				SM: TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay, high plasticity; trace rootlets.				
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W			
					2		Borehole terminated at 1.40 m				
					3						
					4						

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA04

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391114m N.6430540m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
		0.0 - 0.2	1 B		0		TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay high plasticity; with roots and rootlets.	M			
		0.2 - 0.3	2 B				SP: SAND: fine to medium grained, grey to pale-grey; trace fines.				
	▼						*...from 0.80m, sand is pale brown-grey.*	W	D		
					1		Borehole terminated at 1.40 m				
					2						
					3						
					4						

Perth Sand Penetrometer (Blows/150mm): 5 10 15

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA05

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW
Position: E.391077m N.6430525m (MGA 51)
Elevation:
Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
	▼	0.0 - 0.2	1 B		1		TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay, high plasticity; with roots and rootlets.	M			
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W	D		
							Borehole terminated at 1.40 m		VD		
					2						
					3						
					4						

Perth Sand Penetrometer (Blows/150mm): 5 10 15

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA06

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW
Position: E.391038m N.6430505m (MGA 51)
Elevation:
Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
	▼	0.0 - 0.2	1 B		0		TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay, high plasticity; with roots and rootlets.	W			Groundwater perched on the surface.
		0.2 - 0.4	2 B					M			
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W	D		
					1						
							Borehole terminated at 1.30 m				
					2						
					3						
					4						

Perth Sand Penetrometer (Blows/150mm): 5 10 15

Termination Reason: Target Depth Reached.

Remarks: Backfilled. Groundwater level rose from 0.40m to 0.10m BGL.

BOREHOLE LOG - HA07

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391065m N.6430573m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
		0.0 - 0.2	1 B		1		TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay, high plasticity, with rootlets.	M	MD		
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	M to W			
								W	D		
							Borehole terminated at 1.40 m		VD		
					2						
					3						
					4						

Perth Sand Penetrometer (Blows/150mm): 5 10 15

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA08

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391143m N.6430602m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
		0.0 - 0.2	1 B				TOPSOIL: SAND: fine to coarse grained, brown; with roots and rootlets; trace fines.				
		0.2 - 0.3	2 B				SM: TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay high plasticity; with roots and rootlets.	M			
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.		D		
							...from 0.80m white to pale-grey.	W			
					1						
							Borehole terminated at 1.40 m		VD		
					2						
					3						
					4						

Perth Sand Penetrometer (Blows/150mm): 5 10 15

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA09

Client: Ascari Developments

Project: Lot 502 Tamblyn Place

Location: Wellard, WA

Project ID: 2015-0625

Date:06/07/2015

Sheet 1 of 1

Logged By:ACE	Postion: E.391123m N.6430511m (MGA 51)	Hole Diameter:100mm
Checked By:MW	Elevation: (AHD)	Angle from Horizontal:90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Charasteristic; Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Structure & other observations
		0.05 - 0.20	B				TOPSOIL: Organic CLAYEY SAND: fine to medium grained, black; clay, high plasticity; with roots and rootlets.	M		
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W		
					1		End of borehole at 1.40 m			
					2					
					3					
					4					

Termination Reason: Target Depth Reached.

Remarks: Backfilled.

BOREHOLE LOG - HA10

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 07/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391189m N.6430506m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
					0		TOPSOIL: SILTY SAND: fine to coarse grained, dark-brown; silt, low plasticity; with organics.				
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	M			
	▼				1			W			
							Borehole terminated at 1.40 m				
					2						
					3						
					4						

Termination Reason: Target Depth Reached.

Remarks: In-situ permeability test undertaken within test hole. Backfilled.

BOREHOLE LOG - HA11

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 06/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391266m N.6430541m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
		0.0 - 0.2	1 B		1		TOPSOIL: SAND: fine to medium grained, dark-grey to grey; trace fines.	M	MD	5 10 15	
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.				
							...from 0.80m, white to pale-grey.				
					2		Borehole terminated at 1.40 m				
					3						
					4						

Termination Reason: Target Depth Reached.

Remarks: Groundwater not encountered. Backfilled.

BOREHOLE LOG - HA12

Client: Ascari Developments
Project: Lot 502 Tamblyn Place
Location: Wellard, WA
Project: 2015-0625
Date: 07/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

1:20 Sheet 1 of 1

Logged by: ACE
Checked by: MW

Position: E.391080m N.6430459m (MGA 51)
Elevation:

Hole Diameter: 100mm
Angle from horizontal: 90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	▼				1		TOPSOIL: Organic CLAYEY SAND: fine to coarse grained, dark brown; clay, high plasticity.	M			Groundwater perched on the surface.
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W			
					2		Borehole terminated at 1.40 m				
					3						
					4						

Termination Reason: Target Depth Reached.
Remarks: Backfilled.

BOREHOLE LOG - HA13

Client: Ascari Developments

Project: Lot 502 Tamblyn Place

Location: Wellard, WA

Project ID: 2015-0625

Date:07/07/2015

Sheet 1 of 1

Logged By:ACE	Postion: E.391057m N.6430470m (MGA 51)	Hole Diameter:100mm
Checked By:MW	Elevation: (AHD)	Angle from Horizontal:90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Charasteristic; Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Structure & other observations
	▼				0		TOPSOIL: Organic CLAYEY SAND: fine to coarse grained, dark-brown; clay, high plasticity.	M		Groundwater perched on the surface.
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	W		
					1					
							End of borehole at 1.40 m			
					2					
					3					
					4					

Termination Reason: Target Depth Reached.

Remarks: Backfilled.

BOREHOLE LOG - HA14

Client: Ascari Developments

Project: Lot 502 Tamblyn Place

Location: Wellard, WA

Project ID: 2015-0625

Date:07/07/2015

Sheet 1 of 1

Logged By:ACE	Postion: E.391179m N.6430582m (MGA 51)	Hole Diameter:100mm
Checked By:MW	Elevation: (AHD)	Angle from Horizontal:90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Charasteristic; Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Structure & other observations
					0		TOPSOIL: SAND: fine to coarse grained, dark-brown; with fines; with organics.			
							SP: SAND: fine to medium grained, grey to pale-grey; trace fines.	M		
	▼				1			W		
							End of borehole at 1.40 m			
					2					
					3					
					4					

Termination Reason: Target Depth Reached.

Remarks: In-situ permeability test undertaken within test hole. Backfilled.

BOREHOLE LOG - HA15

Client: Ascari Developments

Project: Lot 502 Tamblyn Place

Location: Wellard, WA

Project ID: 2015-0625

Date:07/07/2015

Sheet 1 of 1

Logged By:ACE	Postion: E.391002m N.6430544m (MGA 51)	Hole Diameter:100mm
Checked By:MW	Elevation: (AHD)	Angle from Horizontal:90°

Well	Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Charasteristic; Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Structure & other observations
	▼	0.20 - 0.30	B		0		TOPSOIL: Organic CLAYEY SAND: fine to coarse grained, dark-brown; clay, high plasticity.	M		
							...from 0.40m, sand content increasing.	W		
							SP: SAND: fine to medium grained, grey to pale grey; trace fines.			
							End of borehole at 0.80 m			
					1					
					2					
					3					
					4					

Termination Reason: Target Depth Reached.

Remarks: Backfilled.

Appendix B
CPT Test Results

info@cptwest.com.au
www.cptwest.com.au
T: 0403 370 045
F: 08 6278 1595

CPT 1
Total depth: 10.77 m, Date: 7/07/2015
Surface Elevation: 5.15 m
Coords: X:391003.52, Y:6430543.99
Cone Operator: Andrew

Project: Lot 502 Tamblyn Way (Project No.: 2015-0625)
Location: Wellard (Client: Ascari Developments)

info@cptwest.com.au
www.cptwest.com.au
T: 0403 370 045
F: 08 6278 1595

CPT 2
Total depth: 8.58 m, Date: 7/07/2015
Surface Elevation: 5.15 m
Coords: X:391041.05, Y:6430523.58
Cone Operator: Andrew

Project: Lot 502 Tamblyn Way (Project No.: 2015-0625)
Location: Wellard (Client: Ascari Developments)

info@cptwest.com.au
www.cptwest.com.au
T: 0403 370 045
F: 08 6278 1595

CPT 3
Total depth: 9.68 m, Date: 7/07/2015
Surface Elevation: 5.17 m
Coords: X:391069.64, Y:6430499.97
Cone Operator: Andrew

Project: Lot 502 Tamblyn Way (Project No.: 2015-0625)
Location: Wellard (Client: Ascari Developments)

info@cptwest.com.au
www.cptwest.com.au
T: 0403 370 045
F: 08 6278 1595

CPT 4
Total depth: 8.61 m, Date: 7/07/2015
Surface Elevation: 5.16 m
Coords: X:391090.34, Y:6430448.26
Cone Operator: Andrew

Project: Lot 502 Tamblyn Way (Project No.: 2015-0625)
Location: Wellard (Client: Ascari Developments)

info@cptwest.com.au
www.cptwest.com.au
T: 0403 370 045
F: 08 6278 1595

CPT 5
Total depth: 3.69 m, Date: 7/07/2015
Surface Elevation: 6.76 m
Coords: X:391179.89, Y:6430565.56
Cone Operator: Andrew

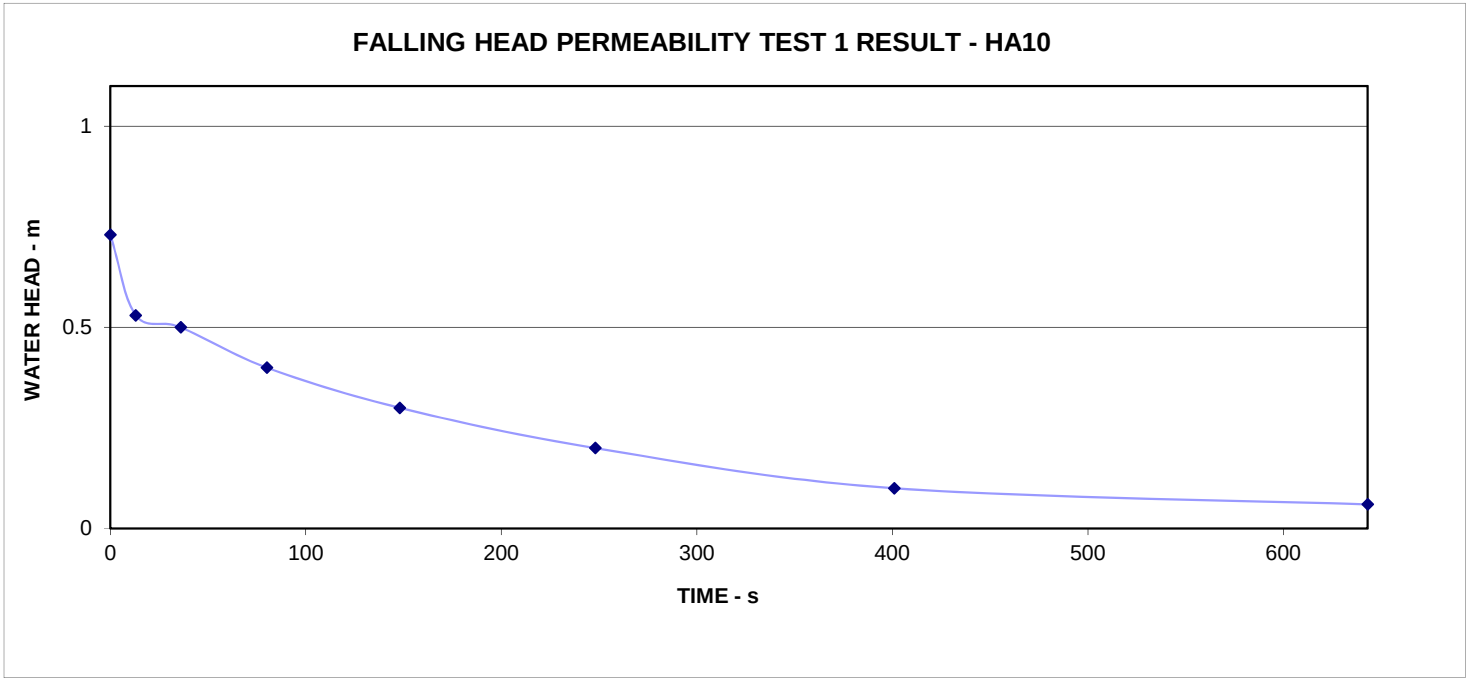
Project: Lot 502 Tamblyn Way (Project No.: 2015-0625)
Location: Wellard (Client: Ascari Developments)

Appendix C
In-situ Permeability Test Results

CLIENT: ASCARI DEVELOPMENTS
PROJECT: LOT 502 TAMBLYN PLACE
LOCATION: WELLARD, WA
JOB NUMBER: 2015-0625
TEST DATE: 7/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

FALLING HEAD PERMEABILITY TEST 1 RESULT - HA10



STRATIGRAPHIC LOG	
	TOPSOIL: SILTY SAND (0m - 0.3m)
	SAND (0.3m - 1.1m)
Bottom of soakage test hole= 1.1m	

Reference: Appendix 4, Control of Groundwater for Temporary Works (CIRIA Report No. 113)

Borehole diameter = 90 mm

Hydraulic conductivity $$k = \left(\frac{log\left(\frac{h_1}{h_2}\right) - log\left(\frac{\alpha h_1 + 1}{\alpha h_2 + 1}\right)}{(t_2 - t_1)} \right) \times I$$

where I = average piezometric head over chosen time interval

$$= \frac{(h_1 + h_2)}{2}$$

h_1 = piezometric head at start of chosen interval (m)

h_2 = piezometric head at end of chosen interval (m)

$t_2 - t_1$ = chosen time interval (seconds)

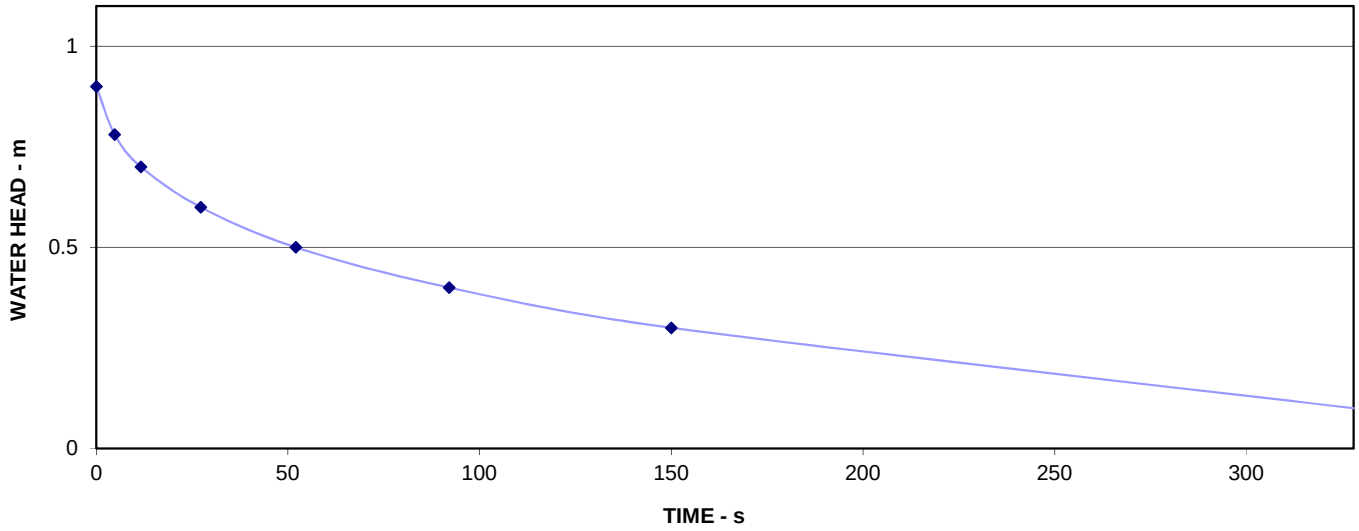
$$\alpha = \frac{\pi d}{\left(\frac{\pi d^2}{2}\right)} = 22.2$$

Elapsed Time (s)	t2 - t1 (secs)	Piezometric Head h (m)	*Avg head* *I* (m)	log (h_1/h_2)	Hydraulic Conductivity k (m/sec)	k (m/day)
0		0.73				
13	13	0.53	0.63	0.14	4.56E-04	39
36	23	0.5	0.52	0.03	4.56E-05	4
80	44	0.4	0.45	0.10	9.08E-05	8
148	68	0.3	0.35	0.12	7.41E-05	6
248	100	0.2	0.25	0.18	6.86E-05	6
401	153	0.1	0.15	0.30	7.18E-05	6
643	242	0.06	0.08	0.22	2.70E-05	2
				Average =	1.19E-04	10

CLIENT: ASCARI DEVELOPMENTS
PROJECT: LOT 502 TAMBLYN PLACE
LOCATION: WELLARD, WA
JOB NUMBER: 2015-0625
TEST DATE: 7/07/2015

CMW Geosciences Pty Ltd
Chapman Morton Woodward

FALLING HEAD PERMEABILITY TEST 2 RESULT - HA14



STRATIGRAPHIC LOG	
	TOPSOIL: SILTY SAND (0m - 0.25m)
	SAND (0.3m - 1.1m)
Bottom of soakage test hole= 1.1m	

Reference: Appendix 4, Control of Groundwater for Temporary Works (CIRIA Report No. 113)

Borehole diameter = 90 mm

Hydraulic conductivity $$k = \left(\frac{log\left(\frac{h_1}{h_2}\right) - log\left(\frac{\alpha h_1 + 1}{\alpha h_2 + 1}\right)}{(t_2 - t_1)} \right) \times I$$

where I = average piezometric head over chosen time interval

$$= \frac{(h_1 + h_2)}{2}$$

h_1 = piezometric head at start of chosen interval (m)

h_2 = piezometric head at end of chosen interval (m)

$t_2 - t_1$ = chosen time interval (seconds)

$$\alpha = \frac{\pi d}{\left(\frac{\pi d^2}{2}\right)} = 22.2$$

Elapsed Time (s)	t2 - t1 (secs)	Piezometric Head h (m)	*Avg head* *I* (m)	log (h_1/h_2)	Hydraulic Conductivity k (m/sec)	k (m/day)
0		0.9				
4.8	5	0.78	0.84	0.06	5.55E-04	48
11.65	7	0.7	0.74	0.05	2.92E-04	25
27.22	16	0.6	0.65	0.07	1.82E-04	16
52.05	25	0.5	0.55	0.08	1.33E-04	12
92.05	40	0.4	0.45	0.10	9.98E-05	9
150.01	58	0.3	0.35	0.12	8.69E-05	8
328.01	178	0.1	0.20	0.48	1.13E-04	10
				Average =	2.09E-04	18

Appendix D
Laboratory Test Results

Part of the Envirolab Group

16 - 18 Hayden Court, Myaree, Western Australia 6154
PO Box 4023 Myaree BC, Western Australia 6960
Tel: +61 8 9317 2505 / Fax: +61 8 9317 4163
email: laboratory@mpl.com.au
www.envirolabservices.com.au
Envirolab Services (WA) Pty Ltd ABN 53 140 099 207

CERTIFICATE OF ANALYSIS 168237

Client:
CMW Geosciences
Unit 19 Wembley Green Offices
127 Herdsman Parade
WA 6104

Attention: A Economo

Sample log in details:

Your Reference:	**Ascari Developments**
No. of samples:	11 Soil
Date samples received:	08/07/2015
Date completed instructions received:	08/07/2015
Location:	Lot 502 Tamblyn Place Wellard

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:	15/07/15
Date of Preliminary Report:	Not Issued
Issue Date:	15/07/15

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

Pamela Adams
Assistant Operations Manager

Miscellaneous Inorg - soil						
Our Reference:	UNITS	168237-1	168237-2	168237-3	168237-4	168237-5
Your Reference	----------	HA01	HA02	HA03	HA04	HA05
Depth	----------	0.05-0.2	0.05-0.2	0.05-0.15	0.05-0.2	0.05-0.2
Type of sample		Topsoil	Topsoil	Topsoil	Topsoil	Topsoil
Date prepared	-	13/07/2015	13/07/2015	13/07/2015	13/07/2015	13/07/2015
Date analysed	-	13/07/2015	13/07/2015	13/07/2015	13/07/2015	13/07/2015
Loss on Ignition	%	1.1	7.0	3.4	19	15

Miscellaneous Inorg - soil						
Our Reference:	UNITS	168237-6	168237-7	168237-8	168237-9	168237-10
Your Reference	----------	HA06	HA07	HA09	HA11	HA15
Depth	----------	0.05-0.2	0.05-0.2	0.05-0.2	0.05-0.15	0.05-0.3
Type of sample		Topsoil	Topsoil	Topsoil	Topsoil	Topsoil
Date prepared	-	13/07/2015	13/07/2015	13/07/2015	13/07/2015	13/07/2015
Date analysed	-	13/07/2015	13/07/2015	13/07/2015	13/07/2015	13/07/2015
Loss on Ignition	%	27	8.7	20	1.4	9.8

Miscellaneous Inorg - soil		
Our Reference:	UNITS	168237-11
Your Reference	----------	HA08
Depth	----------	0.05-020
Type of sample		Topsoil
Date prepared	-	13/07/2015
Date analysed	-	13/07/2015
Loss on Ignition	%	3.7

Method ID	Methodology Summary
INORG-092	LOI - Sample is dried, then ignited in a furnace.

Report Comments:

Asbestos Signatories:

Asbestos was analysed by Approved Identifier: Not applicable for this job
Airborne fibres were analysed by Approved Counter: Not applicable for this job

Definitions:

NT: Not tested NA: Test not required INS: Insufficient sample for this test PQL: Practical Quantitation Limit
<: Less than >: Greater than RPD: Relative Percent Difference LCS: Laboratory Control Sample
NS: Not Specified NEPM: National Environmental Protection Measure

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

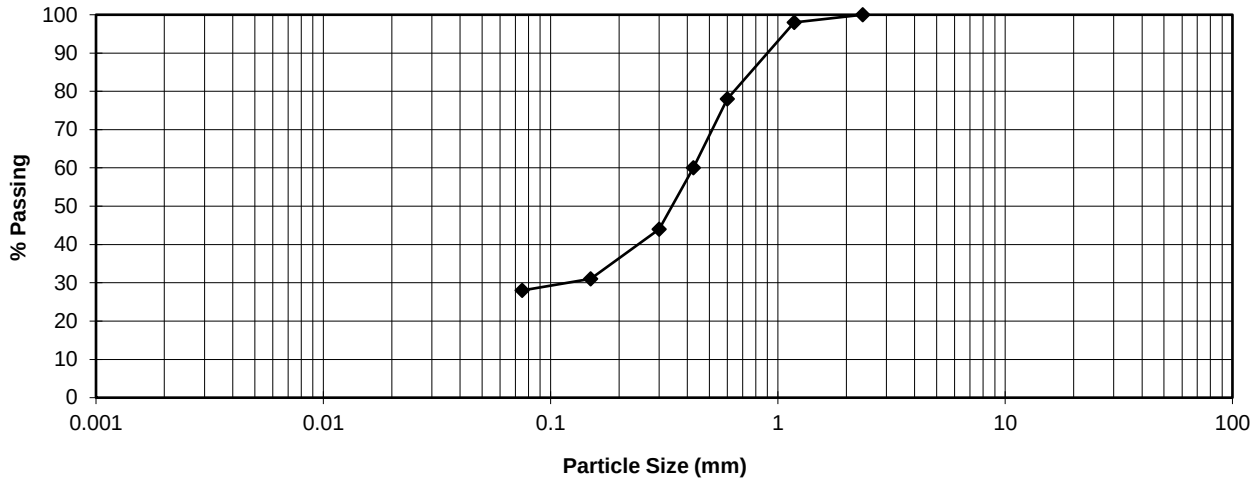
Particle Size Distribution and Plasticity Index tests

Mining & Civil
Geotest Pty Ltd
unit1/1 Pusey Road, Jandakot, WA 6164
Ph (08) 9414 8022 Fax (08) 9414 8011
Email: matt@mcgeotest.com.au

Job No:	60138
Report No:	60138-P15/4615
Sample No:	P15/4615
Issue Date:	21 July 2015

Client: CMW Geosciences
Project: Lot 502 Tamblyn Place
Location: Wellard

Sample ID: HA03
Sample Depth(m): 0.15 - 0.30



SIEVE ANALYSIS AS 1289.3.6.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	98
0.600	78
0.425	60
0.300	44
0.150	31
0.075	28

Plasticity index tests
AS 1289

Liquid limit 3.1.1	65	%
Plastic limit 3.2.1	52	%
Plasticity index 3.3.1	13	%
Linear shrinkage 3.4.1	5.5	%

Cracked ☐

Curled ☐

Client Address: 127 Herdsman Parade, Wembley WA 6014

Sampling Procedure: Tested as received

NATA WORLD RECOGNISED ACCREDITATION

Approved signature

Matthew van Herk
AS PSDPI May 2009

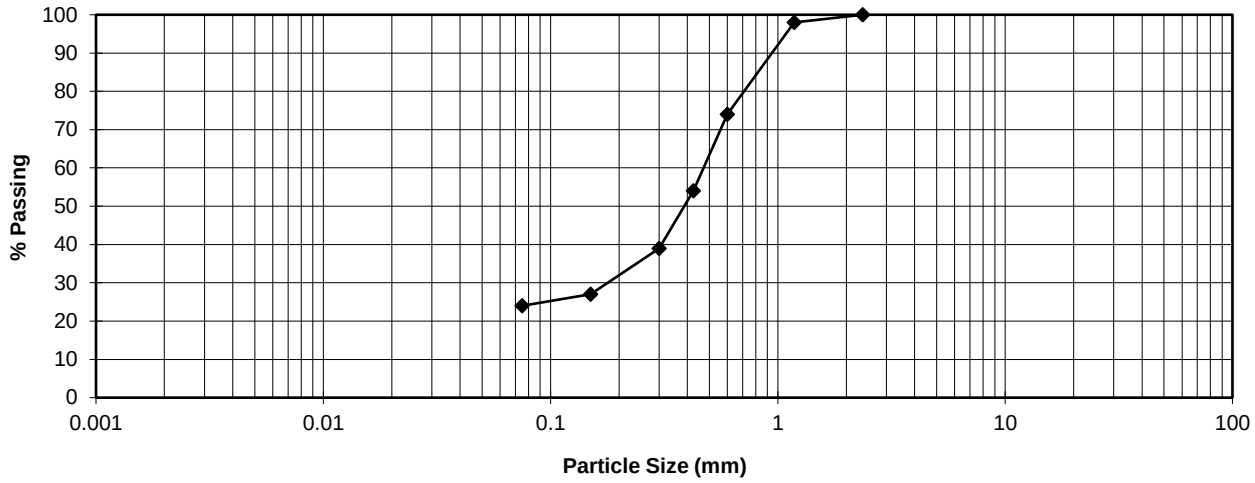
Particle Size Distribution and Plasticity Index tests

Mining & Civil
Geotest Pty Ltd
unit1/1 Pusey Road, Jandakot, WA 6164
Ph (08) 9414 8022 Fax (08) 9414 8011
Email: matt@mcgeotest.com.au

Job No:	60138
Report No:	60138-P15/4616
Sample No:	P15/4616
Issue Date:	21 July 2015

Client: CMW Geosciences
Project: Lot 502 Tamblyn Place
Location: Wellard

Sample ID: HA04
Sample Depth(m): 0.2 - 0.3



SIEVE ANALYSIS AS 1289.3.6.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	98
0.600	74
0.425	54
0.300	39
0.150	27
0.075	24

Plasticity index tests
AS 1289

Liquid limit 3.1.1	73	%
Plastic limit 3.2.1	61	%
Plasticity index 3.3.1	12	%
Linear shrinkage 3.4.1	5.5	%

Cracked ☐

Curled ☑

Client Address: 127 Herdsman Parade, Wembley WA 6014

Sampling Procedure: Tested as received

NATA WORLD RECOGNISED ACCREDITATION

Approved signature

Matthew van Herk
AS PSDPI May 2009

Particle Size Distribution and Plasticity Index tests

Mining & Civil
Geotest Pty Ltd
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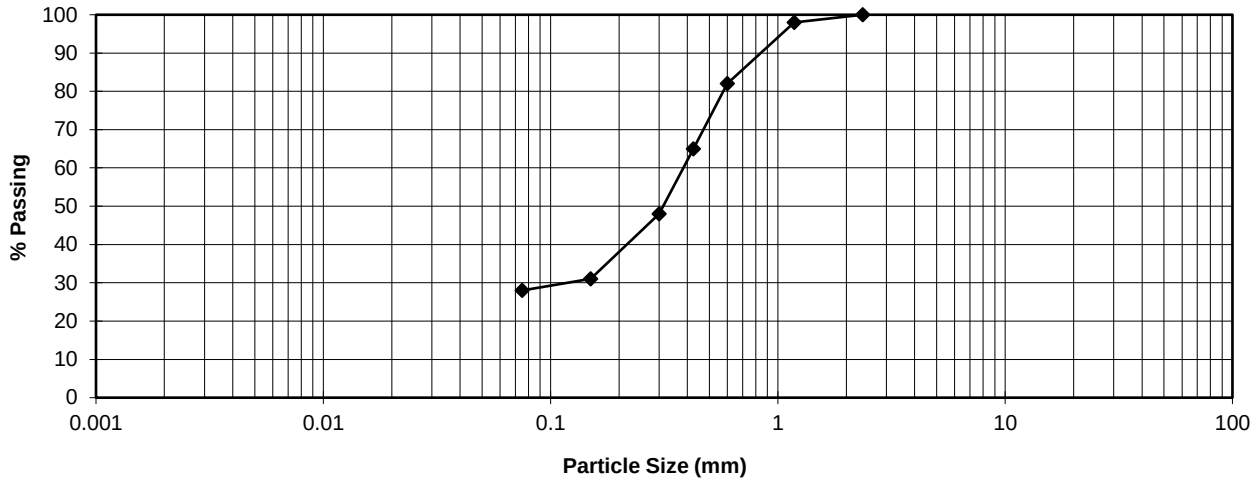
Email: matt@mcgeotest.com.au

Job No:	60138
Report No:	60138-P15/4617
Sample No:	P15/4617
Issue Date:	21 July 2015

Client: CMW Geosciences
Project: Lot 502 Tamblyn Place
Location: Wellard

Sample ID: HA06
Sample Depth(m): 0.2 - 0.4



SIEVE ANALYSIS AS 1289.3.6.1

Sieve Size (mm)	% Passing
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	98
0.600	82
0.425	65
0.300	48
0.150	31
0.075	28

Plasticity index tests
AS 1289

Liquid limit 3.1.1	48	%
Plastic limit 3.2.1	37	%
Plasticity index 3.3.1	11	%
Linear shrinkage 3.4.1	5.0	%

Cracked ☐

Curled ☐

Client Address: 127 Herdsman Parade, Wembley WA 6014

Sampling Procedure: Tested as received

Approved signature

Matthew van Herk
AS PSDPI May 2009

Appendix

C

Ground Water Monitoring Data

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Table C1 Groundwater Monitoring Date from Lot 502

Date	Bore ID	Time:	Water Level Below TOC (m)	Bore Depth (m)	Confirm Bore Depth	Stick Up Height (m)	Top Of Casing (mAHD)	Ground Level (mAHD)	Depth to Water (mBGL)	Water Level (mAHD)
	W1									
24/08/2015		10:30	2.72	5.92		0.71	9.45	8.74	2.01	6.74
17/09/2015		8:30	2.63	5.89		0.71	9.45	8.74	1.92	6.82
26/10/2015		10:15	2.95	6.00	6.01	0.71	9.45	8.74	2.24	6.50
	W2									
30/07/2015		15:30	1.19	5.00	5.65	0.68	6.75	6.07	0.52	5.56
24/08/2015		11:00	1.08	5.62	5.65	0.68	6.75	6.07	0.41	5.67
17/09/2015		9:00	1.08	5.61	5.65	0.68	6.75	6.07	0.41	5.67
26/10/2015		10:35	1.45	6.00	5.75	0.68	6.75	6.07	0.77	5.30
	W3									
30/07/2015		15:00	0.66	5.00	5.65	0.64	5.62	4.99	0.02	4.96
24/08/2015		11:30	0.63	5.64	5.65	0.64	5.62	4.99	-0.01	4.99
17/09/2015		9:30	0.64	5.64	5.65	0.64	5.62	4.99	0.00	4.99
26/10/2015		10:50	0.86	6.00	5.78	0.64	5.62	4.99	0.23	4.76

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Table C2 – Groundwater Quality Data from Lot 502

Date	Bore ID	Time:	Level	Temperature °C	DO mg/L	EC field µS/cm	TDS mg/L	pH fiel pH	Redox mV
	W1								
24/08/2015		10:30		19.5	1.13	336	206	6.51	100
17/09/2015		8:30		19.2	0.71	299	187	6.17	103
26/10/2015		10:20		19.3	0.12	332.2	207.35	6.1	100.2
				19.33	**0.65**	**322.40**	**200.12**	**6.26**	**101.07**
	W2								
30/07/2015		15:30		15.5	0.16	249.5	171.6	5.57	71.6
24/08/2015		11:00		15.4	0.3	307	207	5.69	40
17/09/2015		9:00		15.2	0.17	361	250	6.05	-74
26/10/2015		10:40		16.4	0.09	291.6	195.8	5.56	-34.1
				15.63	**0.18**	**302.28**	**206.10**	**5.72**	**0.87**
	W3								
30/07/2015		15:00		16.8	0.16	261.4	173.8	5.71	31.7
24/08/2015		11:30		16.5	0.3	261	172	5.4	82
17/09/2015		9:30		16.2	0.14	231	156	5.78	15
26/10/2015		10:55		16.5	0.09	252.9	169.4	5.35	27.1
				16.50	**0.17**	**251.58**	**167.80**	**5.56**	**38.95**

Source PDC

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Table C3 – Groundwater Monitoring Data from Lots 503, 504, 505, and Lot 1

Date	MW1-E	MW2-E	MW3-E	MW4-E	MW5-E	MW6-E OLD	MW6-E NEW
1/07/2010	6.29	3.55	Dry	3.78	3.69	4.11	4.07
8/07/2010	6.28	3.57	Dry	3.75	3.68	4.11	4.04
5/08/2010	6.44	4.06	Dry	3.98	3.91	4.46	4.34
8/09/2010	6.42	4.2	Dry	4.14	3.96	4.59	4.61
28/10/2010	6.22	3.9	Dry	3.88	3.95	4.55	4.22
11/11/2010	6.2	3.78	Dry	3.78	3.92	4.84	4.18
9/12/2010	6.09	3.4	Dry	3.33	3.29	3.56	4.6
20/01/2011	5.94	2.71	Dry	2.85	2.77	3.19	3.56
3/02/2011	5.91	2.62	Dry	2.77	2.7	3.13	3.49
8/03/2011	5.79	2.31	Dry	2.55	2.37	3	3.27
12/04/2011	5.6	2.23	Dry	2.53	2.48	3.17	3.13
10/05/2011	Dry	2.38	Dry	2.66	2.6	3.18	3.17
26/07/2011	6.19	3.38	Dry	3.79	3.68	4.01	3.84
7/09/2011	6.58	3.21	Dry	4.05	3.98	4.54	4.64
6/10/2011	6.59	4.02	Dry	4.08	4.045	4.286	4.206

Source: ENV

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Table C4 – Groundwater Quality Data from Lots 503, 504, 505, and Lot 1

		pH	EC	Total P	FRP	Total N	NH3	TKN	Nox	Nitrate	Nitrite
Date	Bore ID		uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	MW1-E										
8/07/2010		7.3	810	1.3	0.25	3.8	0.02	3		0.72	0.039
28/10/2010		7.6	530	1.3	0.3	1.3	0.02	1.2	0.092		
20/01/2011		7.7	510	0.79	0.17	3.7	0.047	0.9	2.8		
1/12/2011		7.6	1200	0.67	0.12	4	0.1	3.9	0.09	0.04	0.04
	MW2-E										
8/07/2010		7.6	1200	0.58	<0.005	1.1	0.57	1.1		0.007	<0.05
28/10/2010		7.4	1000	0.12	<0.005	1.3	0.64	1.2	0.008		
20/01/2011		7.7	910	0.21	0.03	1.7	0.65	1.4	0.28		
10/05/2011		7.5	1200	0.17	0.02	5.6	0.13	5.6	<0.03		
14/06/2011		7.2	1100	0.86	0.05	1.9	0.41	1.9	<0.04		
6/10/2011		7.7	1300	0.46	0.02	1	0.43	1	<0.05	<0.02	<0.02

1/12/2011		7.7	1300	0.43	0.04	1.9	0.05	1.4	0.52	0.41	0.12
	MW4-E										
8/07/2010		7.8	1600	0.46	<0.005	2.3		2.1		0.14	0.023
28/10/2010		7.6	780	0.15	<0.005	1.7	0.53	1.6	0.033		
20/01/2011		7.6	670	0.12	0.03	7.2	0.75	6.9	0.26		
10/05/2011		8	800	0.32	0.02	7.3	0.55	7.3	<0.05		
14/06/2011		7.7	810	0.09	0.03	5.1	0.25	5	0.11		
6/10/2011		7.8	880	0.21	<0.01	1.6	0.35	1.1	0.53	0.04	0.48
1/12/2011		7.8	950	0.27	0.03	1.8	0.21	1.5	0.28	0.22	0.06
	MW5-E										
8/07/2010		7.5	1800	0.38	<0.005	1.7	0.37	1.6		0.068	0.036
28/10/2010		7.1	950	0.12	0.008	1.3	0.19	1.3	0.031		
20/01/2011		7.6	1200	0.3	0.03	7.2	1	6.9	0.31		
10/05/2011		7.6	1400	<0.05	0.03	13	0.72	13	<0.05		

14/06/2011		7.3	3400	0.3	0.04	5.8	0.15	5.8	<0.05		
6/10/2011		7.7	890	0.47	<0.01	1.5	0.41	1.4	0.1	0.1	<0.02
1/12/2011		7.6	1600	0.14	0.01	1.6	0.47	1.6	<0.05	<0.02	0.07
	MW6-E										
8/07/2010		7.1	3000	0.88	<0.005	13	1.1	10		1.5	1.5
28/10/2010		6.5	2100	0.07	<0.005	3.3	0.56	3.1	0.18		
20/01/2011		7.3	1900	0.08	0.03	7.1	0.26	6.7	0.4		
10/05/2011		7.4	2500	0.09	0.02	5.6	0.32	5.4	0.19		
14/06/2011		7.3	680	0.79	0.04	13	0.02	6.5	6.2		
6/10/2011		6.8	2000	<0.05	<0.01	11	0.03	8.1	2.4	2.2	0.22
1/12/2011		6.4	2400	0.41	<0.01	3.9	0.31	3.7	0.23	0.2	0.03
	MW6										
8/07/2010		7.4	2200	0.38	<0.005	12	0.28	7.8		4	0.22
28/10/2010		6.9	2100	0.03	<0.005	2.7	0.36	2.4	0.36		

20/01/2011		7.5	1300	0.091	0.05	8.3	0.49	7.6	0.72		
10/05/2011		7.3	1700	0.46	0.04	5.7	0.31	5.5	0.18		
14/06/2011		7.1	1900	0.58	0.05	8.9	0.02	3.2	5.7		

ANZECC Lowland River	6.5-8		0.065	0.04	1.2			0.15		
SCCP Long Term Target			0.1		1					
SCCP Short Term Target			0.2		2					

Source: ENV

Table C5 – Lot 900 Groundwater Quality Data

Parameter (all units mg/L except where stated)	Aquatic Ecosystems **A**	Irrigation Water **B**	ASS **C**	T1	T2	T3	T4	T5
pH (field)	6.5 - 8	6.5 - 8	6	6.2	6.5	8.8	6.7	7.7
pH (lab)	6.5 - 8	6.5 - 8	6	6.4	6.5	6.8	6.2	7
Temp (field) (C̊)	ng	ng	ng	20.4	21.4	20.4	20.9	19
Conductivity (field) (mS/cm)	0.12-0.3	1.3	ng	0.34	0.33	0.41	0.37	0.43
Total Dissolved Solids	ng	ng	ng	280	340	410	230	360
Total Acidity (CaCO3)	ng	ng	40	6	<5	8	<5	<5
Total Alkalinity (CaCO3)	ng	ng	ng	26	23	65	27	95
Sulphate (SO4)	ng	ng	ng	30	27	42	24	41
Acidity:Alkalinity Ratio	ng	ng	1	0.32	<0.22	0.12	<0.19	<0.05
Alkalinity:Sulphate Ratio	ng	ng	5	0.87	0.85	1.55	1.13	2.32
Total Nitrogen	1.2	5	ng	7.4	7.5	5.8	3.6	4.6
Total Kjeldahl Nitrogen	ng	ng	ng	<0.2	<0.2	<0.2	<0.2	<0.2
Nitrate + Nitrite	0.15	ng	ng	7.4	7.5	5.8	3.5	4.6
Total Filterable Phosphorus	0.065	ng	ng	0.61	0.83	0.31	0.12	0.56

Filterable Reactive Phosphorus	0.04	ng	ng	<0.01	<0.01	<0.01	<0.01	0.04
Aluminium	0.055	5	1	<0.1	0.1	<0.1	<0.1	<0.1
Arsenic	0.013	0.1	ng	<0.001	0.002	<0.001	<0.001	0.003
Cadmium	0.0002	0.01	ng	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (VI)	0.013	0.1	ng	<0.002	<0.002	<0.002	<0.002	<0.002
Copper			ng	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	ng	0.2	ng	0.06	1.3	0.04	0.05	0.43
Lead			ng	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury			ng	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Zinc	0.008	2	ng	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:

ng denotes " no guideline ".

A.ANZECC (2000) Aquatic Ecosystem trigger values for nutrients and pH in lowland rivers.

B. ANZECC (2000) Irrigation trigger values (long term irrigation upto 100 years

C. Standing Advice from DoE LWQB on dewatering trigger values taken from ASS Guideline Series (2004)

D. Guidelines for Al applies only to waters with pH > 6.5

Values in **BOLD** indicate Breach of relevant criterion

Source: Bayley Environmental Services

Appendix

D

GHD Flood Modelling Summary (GHD 2010)

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Memorandum

25 November 2010

To	Darren Evans, Greg Rowe & Associates		
Copy to			
From	Helen Brookes	Tel	61 8 6222 8702
Subject	Development of Bollard Bullrush Swamp	Job no.	61/25042/01

Please note that this memorandum supersedes all previous communications on this matter and that it should not be released or reproduced by any party until the Department of Water have given formal approval for the modelling.

Introduction

It is proposed to develop land immediately surrounding the Bollard Bullrush Swamp environmental protection policy lake boundary. The development proposes to amend the environmental protection policy boundary in the north east and extend development further into the floodway. In order that development may occur areas of the floodway will have to be filled and so it is necessary to determine the up and downstream impacts of this effective reduction in the flood capacity of the swamp.

GHD have been engaged to undertake preliminary investigations into the impact of the proposed fill for the purposes of a rezoning application. The results of this preliminary modelling are not intended for publication at this time and may not be published until they have been reviewed and approved by the Department of Water and the Water Corporation.

Methodology

The dimensions of the Bollard Bullrush Swamp as modelled for the Jandakot Drainage and Water Management Plan were amended to reflect the proposed filling of the proposed development areas to the south and north east of the swamp as seen in Figure 1. Modelling assumed that the environmental protection policy boundary and buffer are successfully moved so that the full extent of development can go ahead.

In addition, because of the proposed change in land use within the development areas, the percentage of impermeable area (and hence generated runoff) was increased according the local structure plan shown in Figure 1. This will give a worst case indication of the likely impact, since it does not take into consideration that the development will provide additional compensation and promote additional infiltration through the use of water sensitive urban design and therefore is likely to retain or reduce predevelopment runoff characteristics.

A second scenario has also been modelled which incorporates detention capacity within the development to maintain the pre-development discharge peak flow rates into the Main Drain.

The modelling parameters used adapted from those established within the Jandakot DWMP and are presented in Tables 1 and 2 below.

Table 1 Land use impervious areas

Land use	Area (m^2)	Percent impervious	Impervious area (m^2)
School	77797	72%	56014
Grouped Dwellings	7682	28%	2151
Aged Persons	10020	35%	3507
Low Density	481644	28%	134860
Existing Residential	223430	28%	62560
Roads	381155	80%	304924
Medium Density	209403	28%	58633
POS	144472	0%	0
Drainage	935238	0%	0
Total	**2,470,841**		**622,649**

Table 2 Runoff surface characteristics

Runoff surface ID	Description	Surface type	Surface roughness (Manning's n)	Initial loss (mm)	Fixed runoff coefficient
61	URBAN (Perv') 2yr	Pervious	0.025	0	0.1
62	URBAN (Perv') 10yr	Pervious	0.025	0	0.15
63	URBAN (Perv') 100yr	Pervious	0.025	0	0.2
7	URBAN (IMP)	Impervious	0.015	15	1

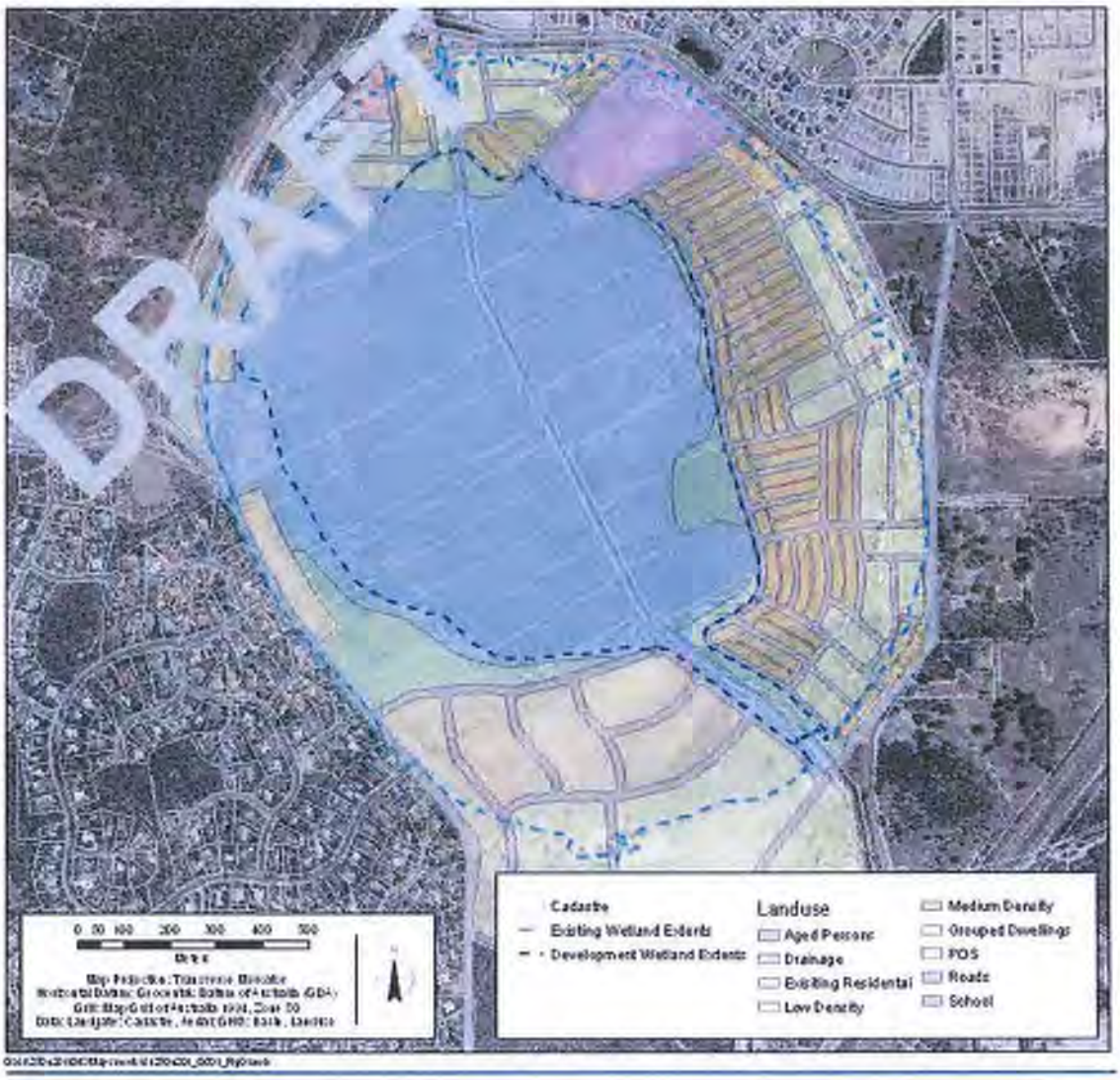


Figure 1 Exiting and Ultimate Wetland Extents with Proposed Landuse

Notes to figure 1:

1. Wetland extents indicated by the hatched lines are the areas available within the pre- and post-development models to accept overflow from the Peel Main Drain.
2. The land use type 'drainage' is used to define runoff parameters only and does not reflect the flooded area predicted by the model.

Results

Table 3 below presents top water levels and peak flow rates from modelling undertaken in support of the Jandakot Drainage and Water Management Plan at critical locations. Tables 4 and 5, also below, present a summary of the results of modelling for the two scenarios described above. Table 6 presents the discharge peak flow rates and required detention capacities within the development.

Table 3 Jandakot Drainage and Water Management Plan modelling results

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Road	7.90	8.20	3.25	3.82
Bollard Bullrush Swamp	4.82	5.61	3.38	4.00
Peel main Drain at Millar Road	4.70	5.59	4.38	5.06

Table 4 Modelling of full extent of proposed development

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Rd	7.90 *(no change)*	8.20 *(no change)*	3.25 *(no change)*	3.82 *(no change)*
Bollard Bullrush Swamp	4.85 *(+ 30 mm)*	5.65 *(+ 40 mm)*	3.38 *(no change)*	4.00 *(no change)*
Peel main Drain at Millar Road	4.72 *(+20 mm)*	5.62 *(+ 30 mm)*	4.73 *(+ 350 L/s)*	5.77 *(+ 710 L/s)*

Table 5 Modelling of proposed development including provision of on-site detention

Location	Top Water Level (mAHD)		Peak Flow (m^3/s)	
	10 year ARI	100 year ARI	10 year ARI	100 year ARI
Peel Main Drain at Bertram Rd	7.90 *(no change)*	8.20 *(no change)*	3.25 *(no change)*	3.82 *(no change)*
Bollard Bullrush Swamp	4.82 *(no change)*	5.62 *(no change)*	3.38 *(no change)*	4.00 *(no change)*
Peel main Drain at Millar Road	4.70 *(no change)*	5.59 *(no change)*	4.39 *(+ 10 L/s)*	5.14 *(+ 80 L/s)*

Table 6 Discharge peak flows and required detention volumes for the proposed development

ARI storm event	Basin outflow (m^3/s)	Storage volume required (m^3)
10 Year	0.2	30,000
100 Year	0.35	39,000

Conclusions

The modelling summarised above indicates that in scenario 1, which is the worst case scenario given no detention capacity within the development area, the top water level within the Bollard Bullrush Swamp changes by less than 100 mm for the 100 year ARI event and that levels both up and downstream also remain relatively unchanged.

The scenario 2 results indicated that by providing a total detention capacity of approximately 39,000 m^3 for a 100 year ARI event (30,000 m^3 for a 10 year ARI event) within the development area the change in top water level will be zero.

Suitable fill levels for development must be determined by detailed site investigations in conjunction with drainage and earthworks design for the site. This modelling indicates that a minimum habitable floor level of 6.12 m AHD will be required to ensure that 500 mm of clearance is provided from the 100 year ARI event flood level in Bollard Bullrush Swamp.

Peak flows upstream of and within the swamp also remain unchanged, however there is an increase of up to 710 L/s on the downstream peak flow rate in the 100 year ARI event. This increase in flow rate is related to the increased impervious area and it will be a requirement of development that sufficient detention capacity is provided within the drainage system and public open space areas to ensure that this does not occur.

In scenario 2 the increase in downstream peak flow rate is managed through the provision of 39,000 m^3 total detention capacity within the development area. This results in a downstream peak flow rate in the 100 year ARI event of 5,140 L/s which is within 80 L/s of the predevelopment downstream peak flow rate.

The indicated detention capacity of 39,000 m^3 for the 100 year ARI event which is required in order to maintain the peak discharge peak flow rates for the development will need to reviewed during the development of drainage designs. It is likely that the drainage design process will be able to reduce this detention capacity through water sensitive urban design practices, providing capacity for minor events throughout the development on lots and in road reserves as well as provision of flood detention areas within the normal public open space provision.

Recommendations:

1. Rezoning submissions should indicate that the change in top water level is predicted to be zero in the 10 and 100 year ARI events as a result of the proposed development.
2. Rezoning submissions should also indicate that there is less than 100 L/s predicted increase in peak downstream flow rates in the 10 and 100 year ARI events as a result of the proposed development, and that this is not likely to cause any downstream impacts.
3. The design of the proposed development should provide sufficient detention capacity within lots, road reserves and/or public open space to ensure that predevelopment peak discharge flow rates are not exceeded (indicatively 30,000 m^3 and 39,000 m^3 respectively for the 10 and 100 year ARI events).
4. The design of the proposed development should incorporate a minimum habitable floor level of 6.12 m AHD.

Helen Brookes
Manager, Waterways

Appendix

E

Water Supply Consumption Tool

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

Introduction

Welcome to the Water Corporation's Water Supply Consumption Tool. This tool is designed to assist in profiling anticipated water use for your development. It can be used to characterise water use in Residential developments, Schools, Commercial and Industrial areas.

Simply enter information about your development into the yellow boxes in each data sheet, and the model calculates the water consumption per annum based on the figures in the Parameters & Assumptions data sheet.

To ensure that you capture all of your land, the model will check the information you enter in each sheet against the total development area you have specified, for example the total area of Residential development, and the model adds up the block sizes specified and checks if that matches the total. A warning message is displayed if it does not, however this won't stop the model from working.

Below are some notes to assist you as you work through each of the data sheets in the model. To get started select the Water Summary data sheet and then work through each of the pages.

Water Summary

This page shows the Water Supply and Water Use summaries including the kL/person/year (both Total and Scheme) and the total kL/year metrics. It also asks for information such as the total area of the development (yellow boxes), this is then checked against each of the area totals for each subsection (which is taken from the respective page). All other information is taken from the other sheets you complete.

1. Residential

The household types, number of lots and lot sizes are entered here. The total area of the Residential component is entered at the top of the page. The model allows for up to 20 different household type/lot size combinations. For example, Traditional houses with lot sizes 400 and 450 m^2 can be entered on different lines. The Irrigation area is set as a default of 25% of the lot size but this can be overwritten.

Your Alternative Water Supply Source is specified at the bottom of the page. Note that if a check box is not ticked then the model will ignore this source, even if a value is entered in one of the boxes.

2. Schools

The type of School and numbers of students are entered here. The total area of the School should be entered at the top of the page. Up to five schools can be entered into the model. The model requires the total number of students per school and the total area, including Irrigation area. The Irrigation area is set as a default of 40% of the school but this can be overwritten.

Your Alternative Water Supply Source is specified at the bottom of the page. Note that if a check box is not ticked then the model will ignore this source, even if a value is entered in one of the boxes.

3. Commercial & Industrial

Commercial & Industrial types are entered here. The total area of the Commercial & Industrial component should be entered at the top of the page. Up to 15 types of Industry can be specified in the model. Depending on the type of industry, different information is required. In all cases the total land area of the industry type is required.

Your Alternative Water Supply Sourceis specified at the bottom of the page. Note that if a check box is not ticked then the model will ignore this source, even if a value is entered in one of the boxes.

4. POS, Roads & Verges

The total area of the POS, Roads & Verges component should be entered at the top of the page. The areas of POS are required including Bushland – which is assumed to have a zero water requirement. For Active POS, you are also asked to estimate the Water Use of Amenities associated – such as drinking water fountains, shower blocks, etc – as this is out of scope for the model.

Your Alternative Water Supply Source is specified at the bottom of the page. Note that if a check box is not ticked then the model will ignore this source, even if a value is entered in one of the boxes.

5. Other

The total area of the Other component should be entered at the top of the page. This data sheet is designed to capture any small areas that have not been covered and also Infrastructure Corridors. The areas specified should not be substantive (with the possible exception of Infrastructure Corridors) and should only be used as a means to ensure the total area of the development tallies.

This data sheet requires that the subsection totals have been entered otherwise the area entered here will be ignored.

Your Alternative Water Supply Source is not specified here as it is assumed the alternatives specified in the respective pages are used.

Water Use Summary

The Water Use tool is primarily aimed at residential developments but can handle mixed developments.

Developer:	Ascari Developments
Development Name:	Lot 502 Tamblyn Place Wellard
Date Of Entry:	1/09/2015
Total Area of Development (m^2):	44,792

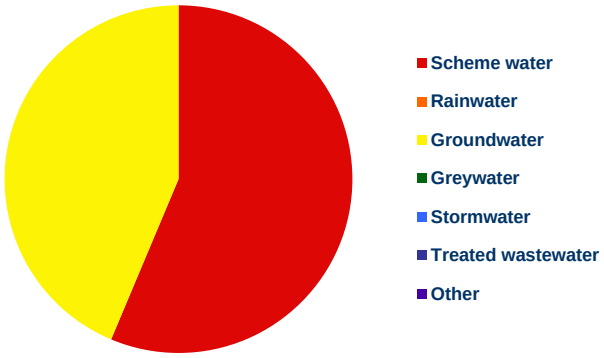
Area Totals Match

Help/Notes (Click)

Water Supply

Water supply by source type in kL/year.

Scheme water[1]	11,105
Rainwater	0
Groundwater	8,607
Greywater	0
Stormwater	0
Treated wastewater	0
Other	0



Water Use

Water use for total development and by sub-section.

	Total Water (kL/person/year)	Scheme Water (kL/person/year)	Development Consumption (kL/year)
Consumption Indicators	62	62	19,712

Development Summary

Click on subsection to go to page.

		Area (m^2)	Irrigation (kL/year)	Drinking[1] (kL/year)	Non-Drinking (kL/year)
1.	Residential	25,216	46	6,167	4,891
2.	Schools				
3.	Commercial & Industrial				
4.	Public Open Spaces, Roads, Footpaths & Verges	19,576	8,607		
5.	Other				
	TOTAL	44,792	8,653	6,167	4,891

[1] All drinking water needs are met by Scheme water.

1. Residential

Please Enter Total Residential Area

Total Area (m^2): 25,216

Area Running Total (m^2): 25,216 **Area Totals Match**

Total Residential Water Use

Summary Page (Click)

Summary

kL/Person/Year (Total)	62
kL/Person/Year (Scheme)	62
kL/Year (Total)	11,105
kL/Year (Irrigation)	46
kL/Year (Drinking)	6,167
kL/Year (Non-Drinking)	4,891

Residential Information

Summary Page (Click)

Multiple residency types are possible.

Help/Notes (Click)

Household Type	Lots	Households (per Lot)	Area (m^2/Lot)	Irrigation Area (m^2/Lot)
Traditional	64	1	394	1

Water Sources

Summary Page (Click)

Select possible water sources and their contribution to Irrigation or Non-Drinking water use.

Model only uses water source when check box is ticked.

Source	Select Source(s)	Source Contribution (%) Irrigation	Non-Drinking
Scheme water		100	100
Rainwater*		0	0
Groundwater			
Greywater			
Stormwater			
Treated wastewater			
Other	☐		
TOTAL ALTERNATE		0	0

Apply Rainwater to:
Irrigation
Non-drinking

* Rainwater proportion calculated automatically and split between Irrigation and Non-drinking

2. Schools

Please Enter Total School Area

Total Area (m^2):

Area Running Total (m^2):

Total Schools Water Use

Summary Page (Click)

Summary

kL/Year (Total)	0
kL/Year (Irrigation)	0
kL/Year (Drinking)	0
kL/Year (Non-Drinking)	0

School Information

Summary Page (Click)

Multiple school sizes are possible.

Help/Notes (Click)

School Type	Students	Area (m^2/School)	Irrigation Area (m^2/School)

Water Sources

Summary Page (Click)

Select possible water sources and their contribution to Irrigation or Non-Drinking water use.

Model only uses water source when check box is ticked.

Source	Select Source(s)	Source Contribution (%) Irrigation	Non-Drinking
Scheme water		0	100
Rainwater*	☐	0	0
Groundwater	☑	100	0
Greywater	☐		
Stormwater	☐		
Treated wastewater	☐		
Other	☐		
TOTAL ALTERNATE		100	0

Apply Rainwater to:
- ☐ Irrigation
- ☐ Non-drinking

* Rainwater proportion calculated automatically and split between Irrigation and Non-drinking

3. Commercial & Industrial

Please Enter Total Commercial & Industrial Area

Total Area (m^2):

Area Running Total (m^2):

Total Commercial & Industrial Water Use

Summary Page (Click)

Summary

kL/Year (Total)	0
kL/Year (Irrigation)	0
kL/Year (Drinking)	0
kL/Year (Non-Drinking)	0

Commercial & Industrial Information

Summary Page (Click)

Multiple types of Hotel, Nursing Home and Hospital are possible.

Help/Notes (Click)

Use the check boxes at the end of each line to indicate the use of alternative water sources.

Commercial Type	Gross Area (m^2)	Gross Lettable Area[1] (m^2)	Number of Units[2]	Unit Type	
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐
					☐

[1] For Commercial/Office spaces, Retail Centres and Light Industrial/General Purpose only.

[2] For Aquatic Centres, Other Sporting Facilities and Commercial Laundries only.

Water Sources

Summary Page (Click)

Select possible water sources and their contribution to Irrigation or Non-Drinking water use.

Model only uses water source when check box is ticked.

Source	Select Source(s)	Source Contribution (%) Irrigation	Non-Drinking
Scheme water		100	100
Rainwater*			
Groundwater	☐		
Greywater	☐		
Stormwater	☐		
Treated wastewater	☐		
Other	☐		
TOTAL ALTERNATE		0	0

* Rainwater not an alternative source for Commercial & Industrial

4. POS, Roads & Verges

Please Enter Total POS, Roads & Verges Area

Total Area (m^2): 19,576

Area Running Total (m^2): 19,576 Area Totals Match

Total POS, Roads & Verges Water Use

Summary Page (Click)

Summary

kL/Year (Total)	8,607
kL/Year (Irrigation)	8,607
kL/Year (Drinking)	0
kL/Year (Non-Drinking)	0

POS, Roads & Verges Information

Summary Page (Click)
Help/Notes (Click)

For Active POS, please estimate the total water use by amenities.
E.g. water fountains and shower cubicles.

Public Open Space	Area (m^2)	Amenities (kL/Year)
Active	3,031	
Passive	7,387	
Bushland		
Roads & Paths	9,158	
Verges		
Street Scaping	0	

Water Sources

Summary Page (Click)

Select possible water sources and their contribution to Irrigation or Non-Drinking water use.
Model only uses water source when check box is ticked.

Source	Select Source(s)	Source Contribution (%) Irrigation	Non-Drinking[1]
Scheme water		0	100
Rainwater[2]			
Groundwater	☑	100	0
Greywater	☐		
Stormwater	☐		
Treated wastewater	☐		
Other	☐		
TOTAL ALTERNATE		100	0

[1] Non-Drinking water use for POS amenities.
[2] Rainwater not an alternative source for POS, Roads & Verges

5. Other

Please Enter Total Other Area

Total Area (m^2):

Area Running Total (m^2):

Total Other Water Use

Summary Page (Click)

Summary

kL/Year (Total)	0
kL/Year (Irrigation)	0
kL/Year (Drinking)	0
kL/Year (Non-Drinking)	0

Other Information

Summary Page (Click)

Total Areas on each subsection must have been completed for this to function.

Help/Notes (Click)

At least one Total Area has not been completed. The component will be ignored until they have.

Area Type	Area (m^2)
Residential	
Schools	
Commercial & Industrial	
POS, Roads & Verges	
Infrastructure Corridor	

WATER USAGE

1. Residential

1.1 Household Use	Estimate	Units	Source	Water Use	Notes
Garden Irrigation	0.002	kL/m^2/day	Water Corporation	Irrigation	10mm*9apps*8months/365.25days
Shower	0.050	kL/person/day	Diversity Australia	Drinking Water	
Kitchen sink	0.008	kL/person/day	Diversity Australia	Drinking Water	
Bathroom basin	0.006	kL/person/day	Diversity Australia	Drinking Water	
Dishwasher	0.003	kL/person/day	Diversity Australia	Drinking Water	
Bath	0.001	kL/person/day	Diversity Australia	Drinking Water	
Laundry trough	0.004	kL/person/day	Diversity Australia	Drinking Water	
Leaks	0.029	kL/household/day	Diversity Australia	Drinking Water	
Pool	0.020	kL/household/day	Diversity Australia	Drinking Water	
Spa	0.002	kL/household/day	Diversity Australia	Drinking Water	
Car washing	0.002	kL/household/day	Diversity Australia	Drinking Water	
Evaporative cooling	0.006	kL/household/day	Diversity Australia	Drinking Water	
Other	0.004	kL/household/day	Diversity Australia	Drinking Water	
Toilet	0.033	kL/person/day	Diversity Australia	Non-Drinking Water	
Washing machine	0.042	kL/person/day	Diversity Australia	Non-Drinking Water	

1.2 Household Type	Estimate	Units	Source	Notes
Traditional	2.790	Average # of Residents	2001 ABS Census	
Terraced	1.730	Average # of Residents	2001 ABS Census	
Cottage	1.810	Average # of Residents	2001 ABS Census	
Apartment	1.480	Average # of Residents	2001 ABS Census	
Lifestyle	2.790	Average # of Residents	2001 ABS Census	

2. Schools

2.1 School Size	Estimate	Units	Source	Notes
<100 Students	31.070	kL/Student/year	Water Corporation	
100 to 500 Students	8.710	kL/Student/year	Water Corporation	
501 to 1000 Students	7.060	kL/Student/year	Water Corporation	
>1000 Students	10.140	kL/Student/year	Water Corporation	
Irrigation	0.960	kL/m2/year		This is the midpoint between Active and Passive POS irrigation requirements.

2.2 School Non-Irrigation Water Usage Percentage

Parameter	Estimate	Units	Source	Notes
Drinking	60	%	Diversity Australia	Specify Drinking proportion and non-drinking is automatically calculated
Non-Drinking	40	%	Diversity Australia	
Scheme Water Supply/Total Water Supply For Schools	100	%	Estimate	

3. Commercial and Industrial

3.1 Entity Type	Constraint	Estimate	Units	Source	Notes
Shopping Centre	N/A	1.080	kL/m^2 GLA/year	Water Corporation	
Office Building	N/A	0.800	kL/m^2 GLA/year	Water Corporation	
Light Industrial	N/A	0.940	kL/m^2 GLA/year	Estimate	Mid point between Shopping Centres and Office Buildings
Hospital	≤300 Beds	185.820	kL/bed/year	Water Corporation	
Hospital	>300 Beds	269.350	kL/bed/year	Water Corporation	
Nursing Home	≤60 Beds	144.490	kL/bed/year	Water Corporation	
Nursing Home	>60 Beds	109.390	kL/bed/year	Water Corporation	
Hotel	≤250 Rooms	104.530	kL/room/year	Water Corporation	
Hotel	>250 Rooms	192.010	kL/room/year	Water Corporation	
Commercial Laundry	N/A	44834.400	kL/entity/year	Water Corporation	
Aquatic Centre	N/A	14600.000	kL/entity/year	Water Corporation	
Other Sporting Facility	N/A	14600.000	kL/entity/year	Water Corporation	

3.2 Commercial Laundries	
Assumed kgs/week for Commercial Laundries	60,000
L/kg/week	14

3.3 Aquatic Centres	
Assumed visitors/day	500
L/visitor/day	80

3.4 Water Usage Percentage Entity Type	Irrigation	Drinking Water	Non-Drinking Water
Shopping Centre	5%	60%	35%
Office Building	5%	60%	35%
Light Industrial	5%	60%	35%
Hospital	5%	60%	35%
Nursing Home	5%	60%	35%
Hotel	5%	60%	40%
Commercial Laundry	0%	5%	95%
Aquatic Centre	5%	80%	15%
Other Sporting Facility	5%	80%	15%

3.5 Scheme Water Supply/Total Water Supply for Entity Type Entity Type	Percentage
Shopping Centre	100%
Office Building	100%
Light Industrial	100%
Hospital	100%
Nursing Home	100%
Hotel	100%
Commercial Laundry	100%
Aquatic Centre	100%
Other Sporting Facility	100%

4. Public Open Spaces

4.1 Public Open Space	Estimate	Units	Source	Water Use
Public Open Space - Active	1.280	kL/m^2/year	Water Corporation	Irrigation
Public Open Space - Passive	0.640	kL/m^2/year	Water Corporation	Irrigation
Public Open Space - Amenity Drinking/Non-drinking ratio	0.50	%	Estimate	Drinking

4.2 Verges and Street Scaping	Estimate	Units	Source	Water Use
Verges	0.640	kL/m^2/year	Water Corporation	Irrigation
Street Scaping	0.640	kL/m^2/year	Water Corporation	Irrigation

WATER SUPPLY

1. Rainwater

1.1 Rainfall Collection	Estimate	Units	Source	Notes
Average Annual Rainfall	700	mm/m2/year	Estimate	Metro area only
Rain correction	24	mm/m2/year	http://enhealth.nphp.gov.au	For evaporation, roof wetting, etc
Efficiency factor	80%	%	Estimate	Conversion of rainfall to rain capture

1.2 Storage capacity	Estimate	Units	Source	Notes
Traditional	2.000	kL/household	Estimate	Total capacity per household
Terraced	2.000	kL/household	Estimate	Total capacity per household
Cottage	2.000	kL/household	Estimate	Total capacity per household
Apartment	5.000	kL/lot	Estimate	Total capacity per lot
Lifestyle	10.000	kL/household	Estimate	Total capacity per household
Schools	10.000	kL/household	Estimate	Total capacity per school
Proportion used for Irrigation (Residential)	0.50	%	Estimate	The remainder is then allocated to Non-drinking water use
Proportion used for Irrigation (Schools)	0.50	%	Estimate	The remainder is then allocated to Non-drinking water use

1.3 Percentage of lot that is roofing	Estimate	Units	Source	Notes
Traditional	50	%	Estimate	
Terraced	50	%	Estimate	
Cottage	50	%	Estimate	
Apartment	50	%	Estimate	
Lifestyle	25	%	Estimate	
Schools	10	%	Estimate	

Appendix

F

Landscaping Concept Plan

Combined LWMS and UWMP
Lot 502 Tamblyn Place - Wellard

MAINTENANCE ACCESS TO POS (HARDSTAND)

SITE BOUNDARY

BIOFILTRATION AREA : ROADSIDE GARDENS (RAIN GARDENS) AS PER PREPARED LWMS AND UWMP. LOW PLANTING SO AS NOT TO OBSTRUCT SIGHTLINES WITH UPPER STOREY TREE CANOPY.

OPEN LAWN AREA (IRRIGATED TURF) FOR PASSIVE RECREATION. NATIVE SHADE TREES TO ENHANCE VIEWS TO WETLAND.

CONCRETE SHARED-USE PATH PROVIDES ACCESS INTO POS AND A HARD EDGE DEFINING IRRIGATED TURF AREA FROM NUTRIENT INTERCEPTION BUFFER.

DOG-PROOF FENCE ALONG 50.0 METRE BUFFER BOUNDARY

TURF

WETLAND BUFFER

50.0 METRE WETLAND BUFFER

BIOFILTRATION AREA : ROADSIDE GARDENS (RAIN GARDENS) AS PER PREPARED LWMS AND UWMP.

NUTRIENT INTERCEPTION BUFFER PLANTED WITH LOCAL NATIVE SPECIES, AND FIRE RETARDANT PLANTS.

EXISTING DENSE VEGETATION (TREES) RETAINED WHERE POSSIBLE

THE WETLAND BUFFER WILL CONSIST OF NON-IRRIGATED DRYLAND TUBESTOCK PLANTING TO ASSIST IN PROVIDING A STABLE PLANTED SURFACE THAT ACCOMMODATES SOME ENVIRONMENTAL IMPROVEMENT WHILE MAINTAINING ALL FIRE SETBACK AND PLANTING DENSITY REQUIREMENTS. PLANT SPECIES WILL COMPLY WITH THE REQUIREMENTS FOR LOW THREAT VEGETATION LISTED IN AS3959-2009 AND CROSS-REFERENCED WITH COUNCIL'S PREFERRED ENVIRONMENTAL PLANTING SUGGESTIONS. CLEAR VIEWS TO THE EXISTING WETLAND TREES WILL BE MAINTAINED.

BOLLARD BULRUSH SWAMP

REVEGETATION OF WETLAND BUFFER TO BE IN ACCORDANCE WITH THE WETLAND MANAGEMENT PLAN.

SITE BOUNDARY

DOG-PROOF FENCE TO WETLAND BUFFER BOUNDARY TO RESTRICT ACCESS & PROTECT WETLAND.

LOT 502 TAMBLYN PLACE, WELLARD

PUBLIC OPEN SPACE - LANDSCAPE CONCEPT PLAN

NORTH

SCALE 1:500@A3

OCTOBER 2015

Appendix E – Bushfire Hazard Assessment – Fire Plan WA

FirePlan WA

Bill Harris
10 Bracken Rd
Thornlie WA 6108

Phone 08 9493 1692
Fax 08 9493 0330
Mobile 0418 941540
Email
firepla@bigpond.net.au

ABN 44 116 937 762

18th August 2014

Rowe Group
Level 3, 369 Newcastle Street
NORTHBRIDGE WA 6003
Attention: Darren Evans

Dear Darren,

RE: WELLARD LANDOWNERS GROUP CONCEPT STRUCTURE PLAN

On the 9th August 2014 FirePlan WA carried out a Bush Fire Hazard Assessment of the Wellard Concept Structure Plan (Attachment 1), as a result the following Bush Fire Strategies are to be incorporated into the Structure Plan.

1.0 Vegetation Types and Bush Fire Hazard Assessment

The vegetation within the site is cleared grassland with scattered trees generally in the eastern portion of the Site which is to be developed as urban residential.

The wetland has Open Forest Class A generally around the outside with Paper Bark and Scrub (Class D) in the wetter parts.

Grassland with Scattered trees


Open Forest On the edges of the wetland and grassland areas to be developed


Paper Bark wetland and grassland in the foreground to be developed

2.0 Slope Analysis

The site slopes to the west towards the wetland area at 0°-5° however the wetland itself is general Flat.

To calculate the BAL ratings for the Site a Flat slope (i.e. the wetland) will be used as a factor in that calculation.

3.0 Access

At present Johnson Road, Tamblyn Place and Bertram Road provide access to the existing Lots.

It is proposed to have a road reserve separating the wetland/ wetland buffer and multiple access/egress points onto Johnson Road, Tamblyn Place and Bertram Road will be provided. Complies with Acceptable Solution A2.1. Public Roads as a minimum will comply with Acceptable Solution A2.2 (*Planning for Bush Fire Protection* Edition 2 (2010)).

4.0 Water Supply for Fire Fighting

Reticulated water will be provided to each Lot and Fire Hydrants will be provided by the Developer that will meet the Water Corporations *No. 63 Water Reticulation Standard*. Complies with Acceptable Solution A3.1

5.0 Public Open Space and Wetland Buffer Peel Main Drain

Public Open Space

It is proposed to have some areas of Public Open Space (POS) between the Wetland Buffer and the road reserve along the western edge of the residential Lots. This POS along with the road reserve will form part of the 30m setback from the wetland buffer to the lot boundaries and will be managed to the Building Protection Zone standards initially by the Developer then by the City of Kwinana in perpetuity.

Wetland Buffer

In the south west and northwest corners of the Concept Structure Plan there is no Public Open Space adjoining the Wetland buffer (currently the wetland buffer is cleared grassland). In these areas it is proposed to reduce the setback to 22 metres which will be made up of front setback, within the lot, road reserve and a portion of the buffer to be landscaped. This may only be a 4 metre wide duel use pathway/firebreak along the eastern (SW corner) and northern (NW corner) edge of the wetland buffers.

Peel Main Drain

The Peel Main Drain is located adjoining the residential Lots in the northwest corner and southwest corner of the Concept Plan. In these areas if the width of the Peel Main Drain Reserve is less than 20 metres wide and it is separated from the wetland/wetland buffer by a low fuel area (compliant with Building Protection Zone standard and 20 metres wide) it does not increase the fire risk to houses in the adjacent Lots.

To achieve this in the northwest corner of the Site (Marked 1 on the Concept Structure Plan) a road reserve is proposed to link into a future residential area to the west. This road reserve with dual use pathway is to be 20 metres wide and managed to the Building Protection Zone Standard.

In the south west corner a gated Fire Service Access Way/Dual use pathway and landscaped area to a total of not less than 20 metres wide is proposed. This will provide for recreation connectivity to both

sides of the Peel Main Drain could provide for dual use Pathway/Firebreak around the whole of the Bollard Bullrush Swamp.

6.0 Building Construction Standard

Due to the Wetland and Shrubland type of vegetation being located adjoining the Site and Bush Fire Hazard Assessment for the vegetation is "Moderate" the "Site" is considered to be a *Bush Fire Prone Area and as such AS 3959* Construction of Buildings within a Bush Fire Prone area will apply to all habitable building within 100 metres of retained vegetation (Wetland and Wetland buffer).

Under AS 3959 as the distance from vegetation is reduced the construction standard must be increased. Table 2.4.3 AS 3959 sets out this relationship and Section 2 of AS 3959 details the methodology of determining the BAL Level.

Vegetation Class	**Setback from Vegetation (Metres)**	**Slope**	**BAL**	**Construction Standard AS 3959**	**BPZ width**
Open Forest A	21-31	Flat	29	S 3 &7	21-31
Open Forest A	31-42	Flat	19	S 3 &6	42
Open Forest A	42-100	Flat	12.5	S 3 &5	100

The setback distances and BAL ratings detailed in the above Table can be achieved with the POS and Road Reserve and front setback within Lots being managed to the Building Protection Zone Standard.

With the above fire strategies incorporated into the Structure Plan a Fire Management Plan can be prepared that will be compliant the current "Planning for Bush Fire Protection" guidelines and the Draft SPP 3.7 "Planning for Bushfire Risk Management" and "Planning for Bushfire Risk Management Guidelines and Appendices".

B.W. Harris

B.W. Harris

Attachment 1: Concept Structure Plan

Attachment 2: Bush Fire Hazard Assessment

Attachment 1: Concept Structure Plan

CONCEPT STRUCTURE PLAN

WELLARD

1. Movement network and key intersections to reflect existing and proposed development.
2. Bollard Bulrush CCW and associated buffer as defined through EPA environmental assessment process.
3. Road reserves provided in key location to allow for storage, treatment and conveyance of stormwater.
4. Multi-purpose open space 'nodes', providing both active and passive recreation opportunities.
5. Minimum 30m bush fire separate zone from edge of wetland buffer vegetation to dwelling frontage.
6. Public open space link to retain key stands of vegetation on site.
7. Residential density within proximity to the proposed Emerald Park Neighbourhood Centre.

LEGEND

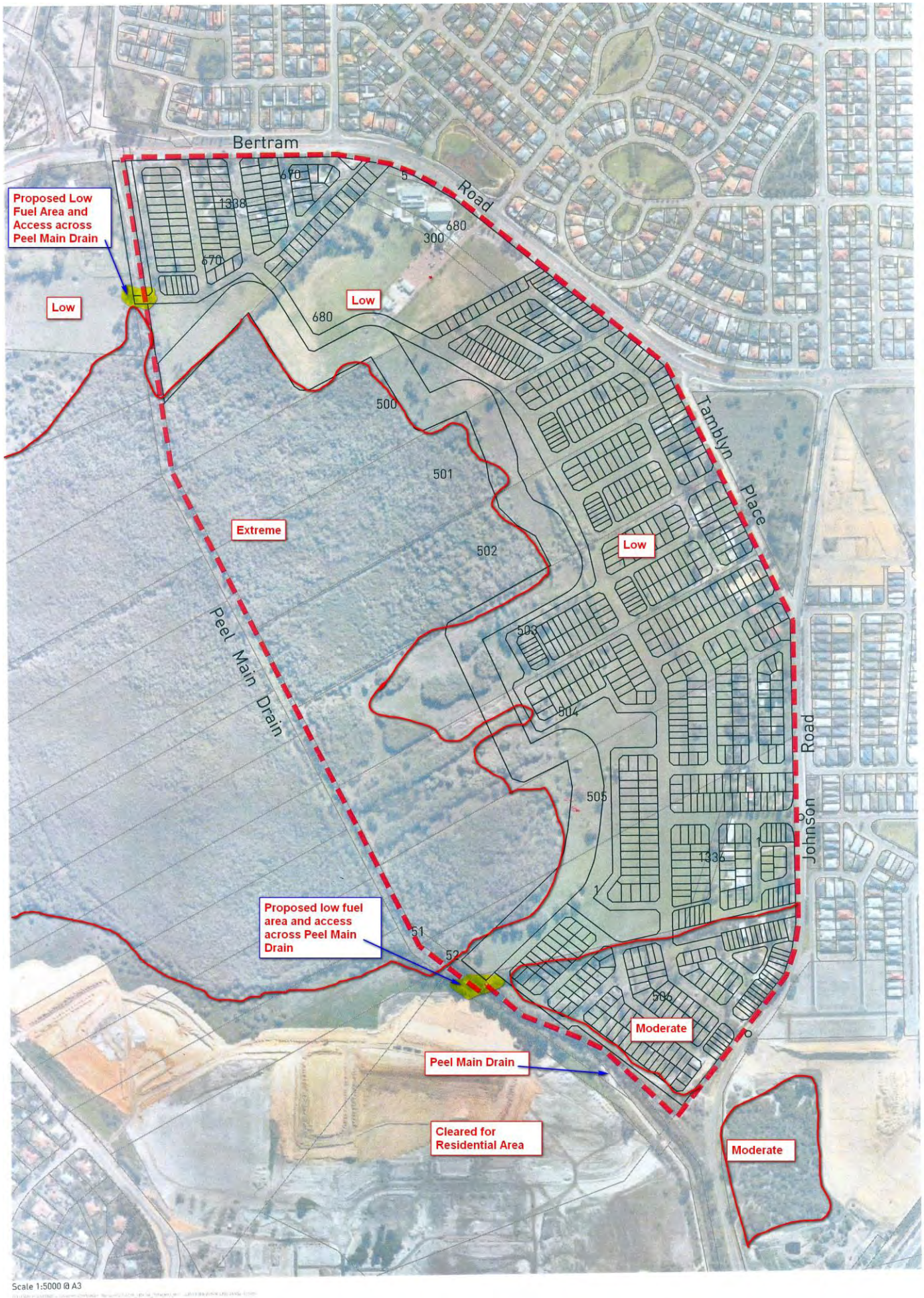
- Public Open Space
- Wetlands
- Wetlands Buffer

CONCEPT RESIDENTIAL DENSITIES

- R25
- R30
- R40
- R60

ROWEGROUP
PLANNING DESIGN DELIVERY

LM366_CON07C_20140804_Wellard (Concept Plan A2)



Attachment 2: Bush Fire Hazard Assessment.

Appendix F – Engineering Servicing Report – PDC

pdc
Engineering Evolved

Servicing Report

Lot 502 Tamblyn Place - Wellard

Prepared by PDC for:
Ascari Developments

Reporter:
Patrick Hayes

Report Number:
5009-REP-002_RevA

Job Number:
5009

Report Date:
10/09/2015

Servicing Report
Lot 502 Tamblyn Place - Wellard 502 Tamblyn Place - Wellard

Authority to Release

This document is authorised for release only when the following signatures have been obtained.

Authored

Signed — Patrick Hayes, Civil Engineer — Date: 15/09/2015

Approved *(Quality)*

Signed — Andrew Barry, Senior Civil Engineer — Date: 15/9/15

Authorised *(Management)*

Signed — Marino Evangelisti, General Manager – Property and Infrastructure — Date: 15.9.2015

Revision Description	Revision	Date	Prepared	Approved	Authorised
Original Servicing Report	A		PH	AB	ME

This document was based on the PDC Template Servicing Report Design Report Template - Long Template Revision 1.

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1 Introduction

PDC Design was engaged by Ascari Developments to produce an engineering servicing report for the Development on Lot 502 Tamblyn Place, Wellard WA. This report provides a preliminary assessment of the engineering aspects required for servicing the proposed development on Lot 502 Tamblyn Place, Wellard.

The subject site is bound by Tamblyn place to the east, Lot 503 to the South, Lot 501 to the north and parts of a conservation wetland to the west, as shown in Appendix A. The subject site is approximately 10.7 ha and is located within the City of Kwinana. The eastern end of the Lot is cleared and the western portion consists of dense vegetation and a wetland buffer. The site is currently utilised as a rural Lot with one dwelling and a number of buildings related to the housing of livestock. These buildings will require demolishing in order to construct the proposed development.

Although originally zoned rural, the subject land was allocated for short-term residential development in the Jandakot Structure Plan (August 2007) and following a Metropolitan Region Scheme Amendment was rezoned to urban-deferred. An urban deferred lifting request has recently been approved, granting the site to urban status.

It should be noted that as Lot 502 Tamblyn Place is at preliminary design stage, the servicing requirements presented here are based on current information available. This servicing report has been developed to incorporate responses from the City of Kwinana, Water Corporation, Western Power and ATCO Gas.

2 Roadworks & Footpaths

2.1 Existing Infrastructure

The subject land is served by existing roads which include Johnson Road, Tamblyn Place and Bertram Road.

Tamblyn Place is an un-sealed road, with a sealed intersection to the north (constructed during the upgrade of Bertram Road). The intersection to the south has been upgraded as part of the works on Johnson Road.

There is an existing footpath on Bertram Road, North of the development.

2.2 Required Infrastructure

Tamblyn Place will require upgrading to accommodate the development along with the review of the intersection of Tamblyn Place and Johnson Road. Based on current information, the works are being designed and installed by LWP as part of their adjacent development. It is likely that a contribution will be sought by LWP as part of cost sharing for this infrastructure.

The footpath on Bertram Road will need to be extended to service the proposed development.

3 Sewer Reticulation

3.1 Sewer Infrastructure Headworks

The development of Lot 502 will be dependent on the construction of a future Wastewater Pump Station "M". A pump station is currently pre-funded and forms part of Water Corporation five year capital works programmed to be constructed in 2018. This Pump Station is currently planned to be constructed on Lot 503.

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3.2 Internal Sewer Infrastructure

The sewer delivery will be completed as part of the standard Water Corporation detailed design process. Infrastructure will be designed in accordance with the Water Corporation Design Standard "DS50 – Design and Construction Requirements for Gravity Sewers DN 150 to DN 600". The developer shall be responsible for the provision of sewer servicing to Lots. Refer Table 3.1 below for sewer design flow.

Catchment	Area (ha)	R-Code	Expected Occupation	Wet Ground Gravity Sewer Design Flow (L/s)
A	2.52	25	August 2016	0.81

Table 3.1 Sewer Design Flow
Source: DS50- Table 4.1 Wastewater Design Flows from Residential Areas South of Latitude 26 South

4 Water Reticulation

4.1 Water Infrastructure Headworks

The Perth Residential Water Use Study (Water Corporation, 2008/2009) carried out by the Water Corporation was used as the basis for assumptions to calculate the water requirements per household.

The annual average daily usage has been determined as per Table 4.1 below:

Water Usage	kL/person/year
Ex-house Usage	46
In-house Usage	56
Leaks	4
Total	106

Table 4.1 Annual Average Daily Usage
Source: Perth Residential Water Use Study (Water Corporation, 2008/2009) Table 1.

This is an annual average water demand per person per year and for Lots zoned R25 we have assumed an occupancy rate of 3.5 people per household based on WSA 02-2002.2.3 Table A1. Water supply infrastructure is sized to meet peak instantaneous demands in summer. Therefore a peaking factor of 2.28 is applied to determine the peak monthly (Dec, Jan) demand rate of 2317.48 L/house/day and a peaking factor of 1.9 is applied to estimate peak simultaneous demands (peak day 7:00 pm) of 0.05 L/house/sec (DWUS, Figure 3.3).

Assuming a 64 Lot development at Lot 502 Tamblyn Place, a **peaking water demand estimate** of 3.26 L/sec is used, and a contingency of 30% is applied which results in a requirement of **4.24 L/sec**.

Water Corporation advised that the development area is located with the current boundary for the Water Supply Scheme and overall planning has made allowance for residential development within the area.

The development would likely require the extension of a main off the existing DN300 on Johnson Road. The cost to construct this would form part of the headworks agreement signed between the developer and Water

Corporation. It is likely that these headworks will be installed by LWP in order to provide their development with an appropriate water service.

However, it may be practical and efficient for the developer to construct headworks assets on behalf of the Water Corporation through a Developer Constructed Headworks Asset Process. A prerequisite for entering this process is that the project required must be within the current 5 year Water Corporation Capital Investment Program (CIP). The developer will be asked to "prefund" the assets design and construction, with the Water Corporation recouping the funds in accordance with the scheduled funding in the CIP.

If funding is scheduled in the CIP for the year of construction desired by the developer then the project may be funded under a "Direct funding" arrangement where the works are funded in full at the completion of the project.

4.2 Internal Water Infrastructure

Water supply reticulation within the proposed development area will be in accordance with standard Water Corporation design requirements, with connection to the new main on Tamblyn Place.

The water reticulation design will be completed during the detailed design phase of the redevelopment, and will be designed in accordance with the Water Corporation Design Standard "DS 63 – Water Reticulation Pipes DN 250 and Smaller". The developer will be responsible for servicing of Lots with water reticulation.

5 Power Infrastructure

5.1 Existing Infrastructure

There is a pole mounted transformer (TX) on the opposite side of Tamblyn Place which currently supplies a small section of overhead line (Tamblyn Place). This TX is supplied by a high voltage (HV) cable from Mortimer Rd.

5.2 Required Infrastructure

A new switchgear unit and 630kVA transformer (TX) will be required for the overall development (64 Lots).

Western Power may request that the existing pole mounted transformer be removed (and a section of overhead line) as part of the project which will require the new TX to backfeed the existing LV overhead line (existing properties south of this development). Due to volt drop limitations on the LV, the preferred location of the new HV substation will be along Tamblyn Rd within this development, not the POS/Drainage area to the south west.

An Earth Potential Rise hazard zone assessment is required for all new HV substations. This will require soil resistivity testing on-site as well as an EPR report prepared for Western Power.

No metallic infrastructure had been identified in the area and no major issues are foreseen for this development.

6 Drainage

6.1 General

The proposed stormwater drainage strategy for the site follows WSUD principles to promote infiltration of stormwater at source and to minimize the pit and pipe network. Roadside rain gardens have been proposed to fulfil the above requirements in addition to providing aesthetic amenity to the development.

6.2 Flows < 1 Year ARI Event

Runoff from events up to the 1 Yr 1 hour ARI will be conveyed through kerb breaks located at the upstream ends of the rain-garden and into the garden itself which serves to detain and infiltrate the first flush of stormwater though a layer of bio-media. Runoff from the road adjacent to the POS will be conveyed via sheet flow to a roadside bioremediation swale (using flush kerbing) running the length of the POS. These areas are designed to capture and infiltrate the 1Yr 1 hour ARI storm event and provide treatment/bio-infiltration to runoff.

6.3 Flows: 1Yr 1hour < 5Yr ARI

For events greater than the 1Yr 1 hour ARI the rain-gardens fill to the gutter level and stormwater is directed past the entrance of the rain-garden and into the bypass pit. In line with WSUD principles, slotted pipes have been used in lieu of traditional sealed drainage pipes to promote in-transit exfiltration of stormwater en-route to the outfall.

Upon exiting the drainage networks in the POS, stormwater will flow overland into the Bollard Bullrush swamp.

Rain gardens have been located at all low points and on the upstream side of intersections to limit the appropriate gutter flow spread rates to 1.5m (for a 2-way cross fall) in accordance IPWEA guidelines.

6.4 Flows: > 5 Year ARI Event

Flows in excess of the critical 5 Yr ARI event are conveyed via the subsoil drainage network and overland flow paths in the road reserve towards the Bollard Bullrush swamp. Gutter flow widths for flows in excess of the 5Yr ARI will exceed 1.5m.

6.5 Flows: >100 Year ARI Event

The roads have been graded to convey flows from the 100Yr ARI towards the Bollard Bullrush swamp. Lot levels have been provided a 500mm freeboard to the 100Yr ARI top water level.

7 Gas

ATCO Gas provided the following advice on 1st September 2015 as per correspondence shown in appendix E of this report. The calculations for gas demand were based on the 2015 model in severe winter conditions with metersets at 60% capacity.

Meterset AL8 (m^3/hr)	8
Appliances per dwelling	2
Diversity Factor	1.2
No. Dwellings	64
Total (SCMH)	91

Table 7.1 Peak Gas Demand Volumes
Source: ATCO Gas Advice 01/09/2015

To service the development a 340m x 110PE medium pressure main extension will be required to be constructed in Tamblyn Place. The main extension will connect to the existing medium pressure network on Johnson Road. The medium pressure network has sufficient capacity to service the 64 Lots proposed.

It is envisaged that the mains extension will be delivered by LWP as part of the Tamblyn Place upgrade.

8 Telecommunications

The NBN Co. rollout map was accessed on the 27th of August 2015 which informed that the NBN is not planned for the development area in the next 12 months. Therefore Telstra are considered the "infrastructure Provider of Last Resort" (IPOLR).

8.1 NBN

The developer can enter into a commercial agreement with NBN Co. A feasibility study can be requested to be undertaken through NBN Co. to obtain an indicative cost for servicing the development ($600 per Single Dwelling Unit Lot plus any applicable network extension costs).

8.2 Telstra

A dial before you dig enquiry revealed that there is currently no optical fibre cable adjacent to the site. However, there is a Telstra owned optical fibre cable on Mortimer Road. The developer may wish to enter an agreement with Telstra Smart Communities to provide the development with Fibre Optic Broadband. This would likely be a costly alternative to the NBN extension.

The developer shall provide fibre ready pit and pipe infrastructure for new developments and will be required to contribute costs of other infrastructure such as cable, headworks and backhaul infrastructure. Telstra would then acquire the installed network as part of a commercial agreement.

An Application for Reticulation (AFR) should be lodged at least 6 months prior to the expected project completion date should the developer provide the pit and pit infrastructure. If the developer chooses to install their own fibre-ready pit and pipe, Telstra would expect to acquire the installed network as part of a commercial agreement.

Alternatively, Telstra may include the pit and pipe quote for consideration as part of a commercial offer to provide infrastructure for the development. There is no obligation for the developer to engage Telstra to install the pit and pipe.

Should the developer seek Telstra to consider quoting on pit and pipe installation, an AFR for each stage of the development will need to be lodged at least 3 months prior to the commencement of any subdivision road works or building civil works associated with the development.

9 Conclusion

On the basis of the current information available, informal discussions with service providers and preliminary assumptions, it is considered feasible and achievable to provide all of the required servicing infrastructure to the proposed residential development Lot 502 Tamblyn Place, Wellard, as follows:

- The site requires the upgrade of Tamblyn Place for the proposed development. Along with a review of the suitability of the Tamblyn Place/Johnson Road intersection.

- Sewerage reticulation will be provided by a gravity sewer reticulation network that flows to a wastewater pump station in Lot 503. The pump station is pre-funded and forms part of Water Corporations planning strategy.
- Water supply requires the extension of a watermain from the existing DN300 main on Johnson Road.
- Water reticulation for the servicing for of Lots will be the responsibility of the developer. The water reticulation design will be completed during the detailed design phase of the redevelopment, and will be designed in accordance with the Water Corporation Design Standard "DS 63 – Water Reticulation Pipes DN 250 and Smaller".
- Stormwater drainage network shall be designed in line with the LWMS/UWMP.
- The extension of the existing medium pressure network on Johnson Road is required with a 310m 110PE main on Tamblyn Place
- Telecommunication services are not currently available through NBN however a feasibility study should be sought from NBN Co. to service the development with fibre optic cable. An agreement with NBN would be preferential to Telstra on a cost basis.

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10 References

PDC, 2015, *"Lot 502 Wellard, Combine LWMS and UWMP"* for Ascari Developments, unpublished

Perth Residential Water Use Study 2008/2009, Water Corporation.

Loh, M. & Coghlan, P., Mar 2003, "*Domestic Water Use Study, In Perth, Western Australia, 1998 - 2001*", Water Corporation

Water Corporation, Design Standard No. DS 50 *"Design and construction requirements for gravity sewers – Sewers DN 150 to DN 600"*

11 Appendices

Appendix A: Subdivision Concept Plan

Appendix B: Service Plans

Appendix C: ATCO Gas Advice

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Appendix A

Subdivision Concept Plan

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Legend

- Subject Site Area (10.7428ha)
- Amalgamated Land from Road Closure (434m²)
- 50m Wetland Buffer
- Existing Vegetation
- Existing Buildings

Lot Summary

LOT TYPE	NO. LOTS
SQUAT	
12.5m x 25m (312.5m2)	11
15m x 25m (375m2)	12
TRADITIONAL	
12.5m x 30m (375m2)	18
15m x 30m (450m2)	23
TOTAL LOTS	**64**

Total Area Lots	2.5237ha
Average Lot Size	394m²
Area Roads	0.9158ha
Total POS Area	1.0418ha
POS Unrestricted Area	0.3031ha
Wetland Buffer Area	0.7387ha
Urban Zoned Area	4.4378ha

Subdivision Concept Plan

Lot 502 Tamblyn Place, WELLARD

NORTH

Scale 1:1500 @ A3

0 10 20 30 40 50m

DATE:	03/08/2015	**REVISED:**	
GRID:	PCG94 ZONE 50	**DATUM:**	AHD
DRAWING:			MONWEL001

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Appendix
B

Service Plans

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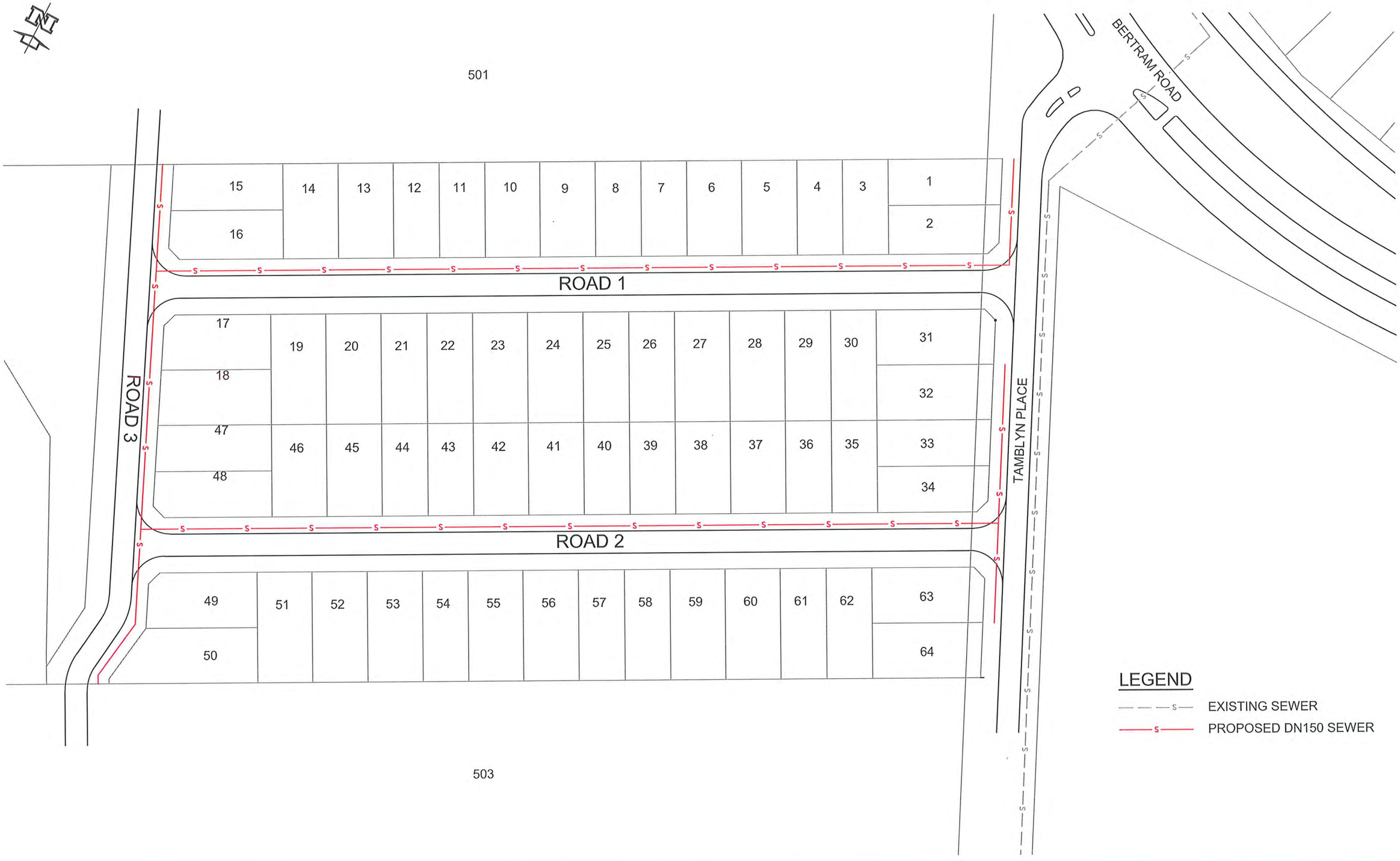

CLIENT	ASCARI
DATE	07/09/2015
DRAWN	N.RENAUD
CHECKED	P.HAYES

0 10 20 30
Full Size 1:1000
SCALE (m)

LOT 502 TAMBLYN PLACE WELLARD

ROAD & SEWER PLAN

FIGURE 5.3
REVISION A

pdc Engineering Evolved

48 Kishorn Rd, Applecross Western Australia 6153 +61 8 9315 6600 +61 8 9364 7860 PDCGROUP.COM

Cad File: T:\5009\900 Working Documents\901 Engineering\00\5009-00-503.dwg
Plotted By: renaud Plot Date: 15/09/15 - 10:50

CLIENT	ASCARI
DATE	07/09/2015
DRAWN	N.RENAUD
CHECKED	P.HAYES

0 10 20 30
Full Size 1:1000
SCALE (m)

LOT 502 TAMBLYN PLACE WELLARD
WATER & GAS PLAN
FIGURE 5.4
REVISION A

pdc Engineering Evolved

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Cad File: T:\5009\900 Working Documents\901 Engineering\00\5009-00-504.dwg
Plotted By: renaud Plot Date: 15/09/15 - 10:51

501

BERTRAM ROAD

ROAD 1

ROAD 2

ROAD 3

TAMBLYN PLACE

15 14 13 12 11 10 9 8 7 6 5 4 3 1
16 2

17 19 20 21 22 23 24 25 26 27 28 29 30 31
18 32
47 46 45 44 43 42 41 40 39 38 37 36 35 33
48 34

49 51 52 53 54 55 56 57 58 59 60 61 62 63
50 64

503

LEGEND

- O/H — EXISTING OVERHEAD POWER
- T — EXISTING TELECOMMUNICATION
- U/G — PROPOSED UNDERGROUND POWER
- T — PROPOSED TELECOMMUNICATION

CLIENT	ASCARI
DATE	07/09/2015
DRAWN	N.RENAUD
CHECKED	P.HAYES

0 10 20 30
Full Size 1:1000
SCALE (m)

LOT 502 TAMBLYN PLACE WELLARD

POWER & TELECOMMUNICATION PLAN

FIGURE 5.5
REVISION A

pdc Engineering Evolved

48 Kishorn Rd, Applecross Western Australia 6153 +61 8 9315 6600 +61 8 9364 7860 PDCGROUP.COM

Cad File: T:\5009\900 Working Documents\901 Engineering\00\5009-00-505.dwg
Plotted By: renaud Plot Date: 15/09/15 - 10:50

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Appendix
C

ATCO Gas Advice

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Patrick Hayes

To: Hassija, Manish
Subject: RE: LOT 502, Tamblyn Place Wellard-ES201508176

From: Hassija, Manish [mailto:Manish.Hassija@atcogas.com.au]
Sent: Tuesday, 1 September 2015 11:58 AM
To: Patrick Hayes
Subject: RE: LOT 502, Tamblyn Place Wellard-ES201508176

Hi Patrick

This is based on 2015 model in severe winter conditions with metersets in vicinity are at 60% of its capacity.

Gas load calculations assumptions:
Assuming AL8 for each dwelling.
Assuming 2 appliances per dwelling.
Using diversity factor of 0.19

An approx. 340 m X 110PE, MP main extension up in Tamblyn Place is required to supply the lot (Map attached).
Modelling shows that the MP Parmelia network can supply 91 SCMH to the proposed 64 dwellings.

Regards

Manish Hassija
Project Coordinator

ATCO Gas AUSTRALIA | Connecting WA to natural gas

www.atcogas.com.au

81 Prinsep Road, Jandakot, Western Australia, 6164
Telephone: (08) 6163 5150 | Mobile: 0475 809 960

From: Patrick Hayes
Sent: Friday, 28 August 2015 7:59 AM
To: 'Hassija, Manish'
Subject: RE: LOT 502, Tamblyn Place Wellard-ES201508176

Hi Manish,

We've got 64 dwellings on 64 lots.

I don't know what gas demand is for this development. I was hoping you could tell me.

Kind Regards,

Patrick Hayes
Civil Engineer

pdc
Engineering Evolved

T +61 8 9315 6600
D +61 8 9315 7278
E Patrick.Hayes@pdcgroup.com
W pdcgroup.com

From: Hassija, Manish [mailto:Manish.Hassija@atcogas.com.au]
Sent: Friday, 28 August 2015 7:47 AM
To: Patrick Hayes
Subject: FW: LOT 502, Tamblyn Place Wellard-ES201508176

Hi Patrick

How many Lots are we looking at and what will be the overall capacity required

Regards

Manish Hassija
Project Coordinator

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www.atcogas.com.au

81 Prinsep Road, Jandakot, Western Australia, 6164
Telephone: (08) 6163 5150 | Mobile: 0475 809 960

From: Patrick Hayes [mailto:Patrick.Hayes@pdcgroup.com]
Sent: Thursday, 27 August 2015 10:54 AM
To: Enquiries
Subject: LOT 502, Tamblyn Place Wellard

Sir/Madam,

Can you please advise if the existing gas network can supply the proposed development?

And if not can you please advise what infrastructure upgrades will be required and at what cost?

16 Reports – Civic Leadership

16.1 Council Policy Review – Elected Members Allowances, Expenses and Gifts

SUMMARY:

A review of the Council Policy – Elected Members Allowances, Expenses and Gifts was undertaken and is recommended for Council endorsement.

OFFICER RECOMMENDATION:

That Council adopt the amended Policy – Elected Members Allowances, Expenses and Gifts contained within Attachment A.

DISCUSSION:

A copy of the Policy as recommended for amendment is detailed in Attachment A with the current Policy as well as the tracked changes contained within Attachment B. A summary of changes recommended to the Policy is included below.

Policy recommended for amendment

Elected Members Allowances, Expenses and Gifts

The recommended changes include:

- Minor changes to grammar in line with the City's style guide.
- Amended option for iPad to be compatible with 3G and include maximum value for printer purchase.
- Rewording of clause regarding other Council business related expenses to remove provision of a sunhat each year.
- Removal of attached forms, consistent with the review of all Council Policies.

LEGAL/POLICY IMPLICATIONS:

Local Government Act 1995

Role of council

(1) The council —
(a) governs the local government's affairs; and
(b) is responsible for the performance of the local government's functions.

(2) Without limiting subsection (1), the council is to —
(a) oversee the allocation of the local government's finances and resources; and
(b) determine the local government's policies.

FINANCIAL/BUDGET IMPLICATIONS:

There are no direct financial implications for this report. Individual Policies may have financial implications and if so, budgetary considerations are included on an annual basis.

ASSET MANAGEMENT IMPLICATIONS:

There are no direct asset management implications related to this report.

ENVIRONMENTAL IMPLICATIONS:

There are no direct environmental implications related to this report.

STRATEGIC/SOCIAL IMPLICATIONS:

The role of Council is to ensure that the Council's Policies are aligned with the key goals and aspirations as set out in our Plan for the Future.

RISK IMPLICATIONS:

Setting Policy positions that guide the operations of the City will play a valuable role in reducing risk to levels acceptable to Council.

COUNCIL DECISION

122

MOVED CR S MILLS **SECONDED CR B THOMPSON**

That Council adopt the amended Policy – Elected Members Allowances, Expenses and Gifts contained within Attachment A.

CARRIED
7/0

ATTACHMENT A

ELECTED MEMBERS ALLOWANCES, EXPENSES AND GIFTS

To outline the support that is to be provided to elected members through the payment of allowances, reimbursement of expenses incurred, insurance cover and supplies provided in accordance with the Local Government Act 1995 while performing the official duties of office.

Adopted:	**11/07/2012 #163**
Last reviewed:	11/12/2013 #055 **12/11/2014 #304**
Legal Authority	Local Government Act 1995 Sections 2.7, 2.8, 2.10, 5.98, 5.98A, 5.99, 5.99A, and 5.100 Local Government (Administration) Regulations 1996 Part 8 Salaries and Allowances Act 1975 Part 7B

POLICY:

Elected members should take care to differentiate between expenditure incurred in their private capacity and expenditure necessary to fulfil their role as an elected member. Reimbursement is to be made for expenses outlined in the Policy.

1. ALLOWANCES:

1.1 Mayoral allowance

The Mayor is to receive the maximum annual local government allowance allowed under the *Salaries and Allowances Act 1975*.

1.2 Deputy Mayoral allowance

The Deputy Mayor is to receive the maximum annual local government allowance allowed under the *Salaries and Allowances Act 1975*.

1.3 Annual meeting attendance fees

The Mayor and councillors (elected members) are to receive the maximum annual local government meeting attendance fee allowed under the *Salaries and Allowances Act 1975*. This annual fee is provided on the principle that each councillor regularly attends meetings of Council and committees to which they are appointed and carry out other responsibilities of the office.

1.4 ICT allowance

The elected members are to receive the maximum annual local government information and communications technology allowance. As a minimum, elected members are to provide:

- at least one telephone access point for City and community access, and a mobile phone, inclusive of voice message recording capacity.
- a fully functioning internet connection which allows them to access emails, perform any necessary research and keep abreast of current and contentious issues in regard to their role as an elected member.
- consumables for computer equipment and internet, fax, phone, and mobile usage (such as printing cartridges, paper).

This allowance is designed to meet all Council related call costs and all other relevant telecommunication costs, including relevant hardware to use a telephone, mobile phone, and the internet.

1.5 Payments

The amount of an elected members entitlement to an annual attendance fee or annual allowance specified in this policy shall be apportioned on a pro rata basis according to the portion of a year that the person holds office as an elected member and is eligible for the relevant annual attendance fee or annual allowance. All payments will be in arrears and paid monthly.

2. INFORMATION AND COMMUNICATION EQUIPMENT

2.1 ICT equipment and office supplies

a) The City is to make available to all elected members, for use during their term of office, a suitably equipped laptop for the conduct of Council related business, which is in line with the standard IT product the City uses within the organisation at the date of request.

b) As well as a laptop, the City is to make available to all elected members , for use during their term of office, an Ipad and/or printer. The equipment must be in line with the standard product that the City uses within the organisation at the date of request and the elected member can choose for the Ipad to have 3G capabilities. The elected member can request a printer up to the value of $300. This type of hardware does not relate to hardware required to meet their communication needs, such as modems, internet sticks, and handsets, as outlined in section 1.4 of this policy. A request to purchase hardware will be submitted to the Chief Executive Officer, and the purchase must be made by the City. No reimbursement to elected members will be made for this hardware. All equipment must be for Council business only.

c) If the standard equipment provided by the City does not suit the elected member requirements, the elected member must, at their own expense, purchase the preferred equipment, and maintain the equipment that will best suit their requirements. No reimbursement can be claimed.

Notes:

Electronic equipment that is provided by the City remains the property of the local government and is to be returned by the elected member if no longer required, their term has expired and they are not re-elected, or it requires replacement.

It is expected that elected members are to make every effort to utilise their electronic equipment, in lieu of paper documents for attendance at meetings etc.

Personal computers and associated equipment that is provided by the City is to be offered to the elected member for purchase at the depreciated value of the equipment at the expiry of their term of office, or at other times as approved by the Chief Executive Officer. No Council property is to be disposed of without prior approval of the Chief Executive Officer.

2.2 Maintenance of equipment

a) At all times during an elected member's term, the City is to provide and make provision for the ongoing maintenance of the supplied equipment referred to in clause 2.1 of this policy with all maintenance costs being met by the City. The City will not provide ongoing maintenance to equipment that has been purchased by the elected member.

b) In the event of a malfunction of the equipment the elected member is to contact, during business hours, a Governance staff member or designated service provider, who is to coordinate the attendance of maintenance personnel.

c) Under no circumstances should elected members undertake repairs or maintenance to City equipment without the express permission of the Chief Executive Officer.

3. REIMBURSABLE EXPENSES

3.1 Travelling expenses

Elected members are to be reimbursed for travelling expenses incurred while using their own private motor vehicle in the performance of the official duties of their office, subject to:

3.1.1 Claims being related to travel to a destination from their normal place of residence or work and return in respect to the following:

(a) Council meetings, civic functions, citizenship ceremonies or briefings called by either Council, the Mayor and/or the Chief Executive Officer;

(b) Committees to which the elected member is appointed a delegate or in the circumstance an elected member deputising for the delegate who is unable to attend, by Council.

(c) Meetings, training and functions scheduled by the Chief Executive Officer or Directors.

(d) Conferences, community organisations, industry groups and local government associations to which the elected member has been appointed by Council as its delegate or a deputy to the delegate.

(e) Functions and presentations attended in the role as an elected member or whilst deputising for the Mayor, that are supported by a copy of the relevant invitation or request for attendance.

(f) Gatherings or events (i.e. funerals, local business or community events), approved by the Chief Executive Officer for attendance by the Mayor or the Mayor's nominated deputy as a representative of the City.

(g) Any other occasion in the performance of an act under the express authority of Council.

(h) Site inspections in connection with matters listed on any Council agenda (members to state the item number listed on any Council agenda along with the date and time of the visit on the claim form).

(i) In response to a request to meet with a ratepayer/elector, but excluding contact with any relevant to the biennial elections (members to state the time and purpose of the visit and the name and address of the ratepayer/elector on the claim form).

3.1.2 Elected members are to be reimbursed travelling expenses incurred while using their own private motor vehicle in the performance of the official duties of Council. The extent to which an elected member of a local government can be reimbursed for travel costs referred to in regulation 31(1)(b) of the *Local Government (Administration) Regulations 1996* is –

(a) if the person lives or works in the local government district or an adjoining local government district, the actual cost for the person to travel from the person's place of residence or work to the meeting and back; or

(b) if the person does not live or work in the local government district or an adjoining local government district, the actual cost, in relation to a journey from the person's place of residence or work and back —

(i) for the person to travel from the person's place of residence or work to the meeting and back; or

(ii) if the distance travelled referred to in subparagraph (i) is more than 100 kilometres, for the person to travel from the outer boundary of an adjoining local government district to the meeting and back to that boundary.

3.1.3 All claims for reimbursement being lodged with the Governance Team on the appropriate claim form, on a monthly basis. In submitting claims for reimbursement, elected members are to detail the date of the claim, particulars of travel and nature of business, distance travelled, vehicle displacement and the total travelled in kilometres and certify the accuracy of information. This should be accompanied by supporting documentation where applicable.

3.1.4 –Travel costs incurred while driving a privately owned or leased vehicle (rather than a commercially hired vehicle) are to be calculated at the same rate applicable to the reimbursement of travel costs in the same or similar circumstances under the *Public Service Award 1992* issued by the Western Australian Industrial Relations Commission as at the date of this determination.

3.1.5 Public transport

In the event that an elected member does not have access to a private vehicle, for travel referred to above, or has a preference for public transport, the elected member may use the services of the bus and rail public transport system, expenditure for which is to be reimbursed upon completion of a travel claim form and lodgement of receipts. A taxi service is also acceptable where this is considered necessary.

3.1.6 Parking fees

Parking fees incurred as a result of travel to any occasion referred to in clause 3.1.1 of this policy are to be reimbursed upon lodgement of receipts accompanying the associated travel claim form.

- The cost of 'valet' parking is not to be reimbursed (unless authorised by the Chief Executive Officer).

3.2 Child care costs

Elected members are to receive reimbursement of the lesser of the actual cost incurred or the maximum amount allowed under the *Salaries and Allowances Act 1975* for care of children, of which they are a parent or legal guardian, whilst attending a Council meeting or a meeting of a committee of which they are a member.

4. OTHER SUPPORT/SUPPLIES/GIFTS

4.1 The City is to supply the following items to be used only in fulfilling the role of the office of elected member :

(a) Briefcase or similar

A briefcase or similar (i.e. laptop carrying bag) is to be supplied to each elected member following their inaugural election to office.

(b) Corporate jacket

A corporate jacket is to be supplied to each elected member following their inaugural election to office.

Note: Corporate jackets and brief cases or similar are to be replaced where they are damaged to an extent to be unserviceable through reasonable wear and usage, approved by the Chief Executive Officer. The briefcase or similar and corporate jacket, may be retained by the Councillor at the expiry of the elected member's term of office.

(c) Annual diary (upon request)

A diary can be supplied to each elected member following their inaugural election to office and a new annual calendar diary can be supplied at the commencement of each calendar year.

Note: Elected members should note that any diary used by an elected member to record the scheduling or occurrence of activities related to the fulfilment of the office of elected members is subject to the requirements of the *State Records Act 2000*.

(d) Letterhead

Reasonable quantities of personalised elected member letterhead is to be supplied and replaced on request.

Elected members are not permitted to use City of Kwinana letterhead due to legal implications associated with the use of official City stationery.

(e) Business cards

The City is to provide each elected member with a quantity of 500 colour printed business cards for relevant City business use within each term of office.

The elected member business card format is to include; photograph, name, bestowed titles and contact information.

Note: Letterheads and business cards and are to be used strictly for official Council business and are not to be used for election purposes under any circumstances.

(f) Name badges

i. Formal (gold tone) elected member name badge.

ii. Formal (gold tone) elected member partner name badge.

iii. Plastic informal elected member name badge.

Note: The City is to within reason, replace on request any name badge which is lost or irreparably damaged.

(g) Filing cabinet

Upon request, a four drawer filing cabinet may be supplied to each elected member following their inaugural election to office.

(h) Other Council business related expenses

Other reimbursements for Council related expenses include reimbursement of clothing, footwear, apparel, dry cleaning, and personal presentation, to a maximum cost to the City of $1000 per elected member and $2000 for the Mayor per financial year, to fulfil their role as an elected member for attending official functions where they are formally representing the City. Where an elected member is due for election the maximum amount will be based on a pro rata amount.

4.2 Insurance

The City is to insure or provide insurance cover for elected members for:

4.2.1 Personal accident whilst engaged in the performance of the official duties of their office, however, the cover does not include ordinary medical expenses.

Spouses/partners of elected members are to receive the same level of cover when attending meetings, conferences or functions with the express approval of Council.

4.2.2 Professional indemnity for matters arising out of the performance of the official duties of their office provided the performance or exercise of the official duty is in the opinion of Council, not illegal, dishonest, against the interests of the City or otherwise in bad faith.

4.2.3 Public liability for matters arising out of the performance of the official duties of their office but subject to any limitations set out in the policy of insurance.

4.2.4 Motor vehicle at the particular time owned or driven by the elected member or driven by another person on behalf of the elected member whilst the elected member is proceeding as a member to and from any occasion while performing the functions of an elected member or as a result of an act under the express authority of Council.

4.3 Medical expenses

Elected members are to receive reimbursement of medical expenses not covered by their medical insurance fund, incurred while in the performance of the official duties of their office, upon submission of relevant receipts and medical documentation to the Chief Executive Officer and subject to such reimbursement being limited to the sum of $500 without the prior approval of Council. This can include damage to or loss of spectacles, flu vaccine, and other aids.

4.4 Gifts from the local government

In accordance with Clause 5.100A of the *Local Government Act 1995* and *Local Government (Administration) Regulations 1996* clause 34AC gifts may only be given to elected members upon the occasion of their retirement, following the completion of at least one full four year term of office.

On the retirement of an elected member and in recognition of their years of service the following will be presented:

i. Framed photograph;

ii. Plaque

iii. a gift up to the value of $100 per year of service to a maximum of $1000 (provided that at least one full 4 year term of office has been served).

4.5 Accompanying person on official City business

Where an elected member attends an event, for example receiving an award on behalf of the City, attending stakeholder annual dinners, in an official capacity representing the City, the payment of one accompanying person will be made, and must be approved by the Chief Executive Officer. The City will pay for up to four events per financial year for an accompanying person to attend with an elected member.

ATTACHMENT B

ELECTED MEMBERS ALLOWANCES, EXPENSES AND GIFTS

To outline the support that is to be provided to ~~E~~elected ~~M~~members through the payment of allowances, reimbursement of expenses incurred, insurance cover and supplies provided in accordance with the *Local Government Act 1995* while performing the official duties of office.

Adopted:	**11/07/2012 #163**
Last reviewed:	11/12/2013 #055 **12/11/2014 #304**
Legal Authority	Local Government Act 1995 Sections 2.7, 2.8, 2.10, 5.98, 5.98A, 5.99, 5.99A, and 5.100 Local Government (Administration) Regulations 1996 Part 8 Salaries and Allowances Act 1975 Part 7B

POLICY:

Elected ~~M~~members should take care to differentiate between expenditure incurred in their private capacity and expenditure necessary to fulfil their role as an ~~E~~elected ~~M~~member. Reimbursement is to be made for expenses outlined in the Policy.

1. ALLOWANCES:

1.1 Mayoral ~~A~~allowance

The Mayor is to receive the maximum annual local government allowance allowed under the *Salaries and Allowances Act 1975*.

1.2 Deputy Mayoral ~~A~~allowance

The Deputy Mayor is to receive the maximum annual local government allowance allowed under the *Salaries and Allowances Act 1975*.

1.3 Annual ~~M~~meeting ~~A~~attendance ~~F~~fees

The Mayor and ~~C~~councillors (~~E~~elected ~~M~~members) are to receive the maximum annual local government meeting attendance fee allowed under the *Salaries and Allowances Act 1975*. This annual fee is provided on the principle that each ~~C~~councillor regularly attends meetings of Council and ~~C~~committees to which they are appointed and carry out other responsibilities of the office.

1.4 ICT ~~A~~allowance

The ~~E~~elected ~~M~~members are to receive the maximum annual local government information and communications technology allowance. As a minimum, ~~E~~elected ~~M~~members are to provide:

- at least one telephone access point for City and community access, and a mobile phone, inclusive of voice message recording capacity.
- a fully functioning internet connection which allows them to access emails, perform any necessary research and keep abreast of current and contentious issues in regard to their role as an ~~E~~elected ~~M~~member.
- consumables for computer equipment and internet, fax, phone, and mobile usage (such as printing cartridges, paper).

This allowance is designed to meet all Council related call costs and all other relevant telecommunication costs, including relevant hardware to use a telephone, mobile phone, and the internet.

1.5 Payments

The amount of an ~~E~~elected ~~M~~members entitlement to an annual attendance fee or annual allowance specified in this policy shall be apportioned on a pro rata basis according to the portion of a year that the person holds office as an ~~E~~elected ~~M~~member and is eligible for the relevant annual attendance fee or annual allowance. All payments will be in arrears and paid monthly.

2. INFORMATION AND COMMUNICATION EQUIPMENT

2.1 ICT ~~E~~equipment and ~~O~~office ~~S~~supplies

a) The City is to make available to all ~~E~~elected ~~M~~members, for use during their term of office, a suitably equipped laptop for the conduct of Council related business, which is in line with the standard IT product the City uses within the organisation at the date of request.

b) As well as a laptop, the City is to make available to all ~~E~~elected ~~M~~members , for use during their term of office, an Ipad and/or printer. The equipment must be in line with the standard product that the City uses within the organisation at the date of request and the elected member can choose for the Ipad to have 3G capabilities. The elected member can request a printer up to the value of $300. This type of hardware does not relate to hardware required to meet their communication needs, such as modems, internet sticks, and handsets, as outlined in section 1.4 of this policy. A request to purchase hardware will be submitted to the Chief Executive Officer, and the purchase must be made by the City. No reimbursement to ~~E~~elected ~~M~~members will be made for this hardware. All equipment must be for Council business only.

c) If the standard equipment provided by the City does not suit the ~~E~~elected ~~M~~member requirements, the ~~E~~elected ~~M~~member must, at their own expense, purchase the preferred equipment, and maintain the equipment that will best suit their requirements. No reimbursement can be claimed.

Notes:

Electronic equipment that is provided by the City remains the property of the local government and is to be returned by the ~~E~~elected ~~M~~member if no longer required, their term has expired and they are not re-elected, or it requires replacement.

It is expected that ~~E~~elected ~~M~~members are to make every effort to utilise their electronic equipment, in lieu of paper documents for attendance at meetings etc.

Personal computers and associated equipment that is provided by the City is to be offered to the ~~E~~elected ~~M~~member for purchase at the depreciated value of the equipment at the expiry of their term of office, or at other times as approved by the Chief Executive Officer. No Council property is to be disposed of without prior approval of the Chief Executive Officer.

2.2 Maintenance of ~~E~~equipment

a) At all times during an ~~E~~elected ~~M~~member's term, the City is to provide and make provision for the ongoing maintenance of the supplied equipment referred to in clause 2.1 of this policy with all maintenance costs being met by the City. The City will not provide ongoing maintenance to equipment that has been purchased by the ~~E~~elected ~~M~~member.

b) In the event of a malfunction of the equipment the ~~E~~elected ~~M~~member is to contact, during business hours, a Governance staff member or designated service provider, who is to coordinate the attendance of maintenance personnel.

c) Under no circumstances should ~~E~~elected ~~M~~members undertake repairs or maintenance to City equipment without the express permission of the Chief Executive Officer.

3. REIMBURSABLE EXPENSES

3.1 Travelling ~~E~~expenses

Elected ~~M~~members are to be reimbursed for travelling expenses incurred while using their own private motor vehicle in the performance of the official duties of their office, subject to:

3.1.1 Claims being related to travel to a destination from their normal place of residence or work and return in respect to the following:

(a) Council ~~M~~meetings, ~~C~~civic ~~F~~functions, ~~C~~citizenship ~~C~~ceremonies or briefings called by either Council, the Mayor and/or the Chief Executive Officer;

(b) Committees to which the ~~E~~elected ~~M~~member is appointed a delegate or in the circumstance an elected member ~~Councillor~~ deputising for the delegate who is unable to attend, by Council.

(c) Meetings, training and functions scheduled by the Chief Executive Officer or Directors.

(d) Conferences, community organisations, industry groups and local government associations to which the ~~E~~elected ~~M~~member has been appointed by Council as its delegate or a deputy to the delegate.

(e) Functions and presentations attended in the role as an ~~E~~elected ~~M~~member or whilst deputising for the Mayor, that are supported by a copy of the relevant invitation or request for attendance.

(f) Gatherings or events (i.e. funerals, local business or community events), approved by the Chief Executive Officer for attendance by the Mayor or the Mayor's nominated deputy as a representative of the City.

(g) Any other occasion in the performance of an act under the express authority of Council.

(h) Site inspections in connection with matters listed on any Council ~~A~~agenda (~~M~~members to state the item number listed on any Council ~~A~~agenda along with the date and time of the visit on the claim form).

(i) In response to a request to meet with a ratepayer/elector, but excluding contact with any relevant to the biennial elections (~~M~~members to state the time and purpose of the visit and the name and address of the ratepayer/elector on the claim form).

3.1.2 Elected ~~M~~members are to be reimbursed travelling expenses incurred while using their own private motor vehicle in the performance of the official duties of Council. The extent to which an ~~E~~elected member of a local government can be reimbursed for travel costs referred to in regulation 31(1)(b) of the ~~LG~~ *Local Government (Administration) Regulations 1996* is –

(a) if the person lives or works in the local government district or an adjoining local government district, the actual cost for the person to travel from the person's place of residence or work to the meeting and back; or

(b) if the person does not live or work in the local government district or an adjoining local government district, the actual cost, in relation to a journey from the person's place of residence or work and back —

(i) for the person to travel from the person's place of residence or work to the meeting and back; or

(ii) if the distance travelled referred to in subparagraph (i) is more than 100 kilometres, for the person to travel from the outer boundary of an adjoining local government district to the meeting and back to that boundary.

3.1.3 All claims for reimbursement being lodged with the Governance Team on the appropriate claim form, on a monthly basis. In submitting claims for reimbursement, ~~E~~elected ~~M~~members are to detail the date of the claim, particulars of travel and nature of business, distance travelled, vehicle displacement and the total travelled in kilometres and certify the accuracy of information. This should be accompanied by supporting documentation where applicable.

3.1.4 ~~–~~Travel costs incurred while driving a privately owned or leased vehicle (rather than a commercially hired vehicle) are to be calculated at the same rate applicable to the reimbursement of travel costs in the same or similar circumstances under the *Public Service Award 1992* issued by the Western Australian Industrial Relations Commission as at the date of this determination.

3.1.5 Public ~~T~~transport

In the event that an ~~E~~elected ~~M~~member does not have access to a private vehicle, for travel referred to above, or has a preference for public transport, the ~~–E~~elected ~~M~~member may use the services of the bus and rail public transport system, expenditure for which is to be reimbursed upon completion of a travel claim form and lodgement of receipts. A taxi service is also acceptable where this is considered necessary.

3.1.6 Parking ~~F~~fees

Parking fees incurred as a result of travel to any occasion referred to in clause 3.1.1 of this policy ~~is~~ are to be reimbursed upon lodgement of receipts accompanying the associated travel claim form.

- The cost of 'valet' parking is not to be reimbursed (unless authorised by the Chief Executive Officer).

3.2 Child ~~C~~care ~~C~~costs

Elected ~~–M~~members are to receive reimbursement of the lesser of the actual cost incurred or the maximum amount allowed under the *Salaries and Allowances Act 1975* for care of children, of which they are a parent or legal guardian, whilst attending a Council meeting or a meeting of a committee of which they are a member.

4. OTHER SUPPORT/SUPPLIES/GIFTS

4.1 The City is to supply the following items to be used only in fulfilling the role of the office of ~~E~~elected ~~M~~member :

(a) Briefcase or similar

A briefcase or similar (i.e. laptop carrying bag) is to be supplied to each ~~E~~elected ~~M~~member following their inaugural election to office.

(b) Corporate ~~J~~jacket

A corporate jacket is to be supplied to each ~~E~~elected ~~M~~member following their inaugural election to office.

Note: Corporate jackets and brief cases or similar are to be replaced where they are damaged to an extent to be unserviceable through reasonable wear and usage, approved by the Chief Executive Officer. The briefcase or similar and corporate jacket, may be retained by the Councillor at the expiry of the ~~E~~elected ~~M~~member's term of office.

(c) Annual ~~D~~diary (upon request)

A diary can be supplied to each ~~E~~elected ~~M~~member following their inaugural election to office and a new annual calendar diary can be supplied at the commencement of each calendar year.

Note: Elected ~~M~~members should note that any diary used by an ~~E~~elected ~~M~~member to record the scheduling or occurrence of activities related to the fulfilment of the office of ~~E~~elected ~~M~~members ~~are~~ is subject to the requirements of the *State Records Act 2000*.

(d) Letterhead

Reasonable quantities of personalised ~~E~~elected ~~M~~member letterhead is to be supplied ~~to~~ and replaced on request.

Elected ~~M~~members are not permitted to use City of Kwinana letterhead due to legal implications associated with the use of official City stationery.

(e) Business ~~C~~cards

The City is to provide each ~~E~~elected ~~M~~member with a quantity of 500 colour printed business cards for relevant City business use within each term of office.

The ~~E~~elected ~~M~~member business card format is to include; photograph, name, bestowed titles and contact information.

Note: Letterheads and ~~B~~business ~~C~~cards and are to be used strictly for official Council business and are not to be used for election purposes under any circumstances.

(f) Name ~~B~~badges

i. Formal (gold tone) ~~E~~elected ~~M~~member name badge.

ii. Formal (gold tone) ~~E~~elected ~~M~~member partner name badge.

iii. Plastic informal ~~E~~elected ~~M~~member name badge.

Note: The City is to within reason, replace on request any name badge which is lost or irreparably damaged.

(g) Filing ~~C~~cabinet

Upon request, a~~A~~ four drawer ~~F~~filing ~~C~~cabinet may be supplied to each ~~E~~elected ~~M~~member following their inaugural election to office ~~at the request of the Elected Member~~.

(h) Other Council ~~B~~business ~~R~~related ~~E~~expenses

Other ~~R~~reimbursements for Council related expenses include~~:~~ reimbursement of clothing, footwear, apparel, dry cleaning, and personal presentation, to a maximum cost to the City of $1000 per elected member and $2000 for the Mayor per financial year, to fulfil their role as an elected member for attending official functions where they are formally representing the City. Where an elected member is due for election the maximum amount will be based on a pro rata amount.

~~i) Reimbursement of up to $100 per financial year for the purchase of a sun hat to comply with the City's sun safe policy.~~

~~ii) Reimbursement of clothing, footwear, apparel, dry cleaning, and personal presentation, to a maximum cost to the City of $1000 per Councillor and $2000 for the Mayor per financial year, to fulfil their role as an Elected Member for attending official functions where they are formally representing the City. Where an Elected Member is due for election the maximum amount will be based on a pro rata amount.~~

4.2 Insurance

The City is to insure or provide insurance cover for ~~E~~elected ~~M~~members for:

4.2.1 Personal accident whilst engaged in the performance of the official duties of their office, however, the cover does not include ordinary medical expenses.

Spouses/partners of ~~E~~elected ~~M~~members are to receive the same level of cover when attending meetings, conferences or functions with the express approval of Council.

4.2.2 Professional indemnity for matters arising out of the performance of the official duties of their office provided the performance or exercise of the official duty is in the opinion of Council, not illegal, dishonest, against the interests of the City or otherwise in bad faith.

4.2.3 Public liability for matters arising out of the performance of the official duties of their office but subject to any limitations set out in the policy of insurance.

4.2.4 Motor vehicle at the particular time owned or driven by the ~~E~~elected ~~M~~member or driven by another person on behalf of the ~~E~~elected ~~M~~member whilst the elected member ~~Councillor~~ is proceeding as a member to and from any occasion while performing the functions of an ~~E~~elected ~~M~~member or as a result of an act under the express authority of Council.

4.3 Medical ~~E~~expenses

Elected ~~M~~members are to receive reimbursement of medical expenses not covered by their medical insurance fund, incurred while in the performance of the official duties of their office, upon submission of relevant receipts and medical documentation to the Chief Executive Officer and subject to such reimbursement being limited to the sum of $500 without the prior approval of Council. This can include damage to or loss of spectacles, flu vaccine, and other aids.

4.4 Gifts from the ~~L~~local ~~G~~government

In accordance with Clause 5.100A of the *Local Government Act 1995* and *Local*

Government (Administration) Regulations 1996 clause 34AC gifts may only be given to elected members ~~Councillors~~ upon the occasion of their retirement, following the completion of at least one full four year term of office.

On the retirement of an ~~E~~elected ~~M~~member and in recognition of their years of service the following will be presented:

i. Framed photograph;

ii. Plaque

iii. a gift up to the value of $100 per year of service to a maximum of $1000 (provided that at least one full 4 year term of office has been served).

4.5 Accompanying ~~P~~person on ~~O~~official City ~~B~~business

Where an ~~E~~elected ~~M~~member attends an event, for example receiving an award on behalf of the City, attending stakeholder annual dinners, in an official capacity representing the City, the payment of one accompanying person will be made, and must be approved by the Chief Executive Officer. The City will pay for up to four events per financial year for an accompanying person to attend with an ~~E~~elected ~~M~~member.

ELECTED MEMBER EXPENSES CLAIM FORM

Elected Member's Name:	Month:	Year:

I claim reimbursement for the expenses listed below incurred by me in accordance with Policy - Elected Members Allowances, Expenses and Gifts.

TRAVELLING EXPENSES INCURRED				
Date	Purpose	Location (exact address) To	From	Distance
			TOTAL	

VEHICLE TYPE			
Make	***Model***	***Engine Size***	***Reg. No.***

REIMBURSEMENT OF OTHER EXPENSES		
Date	***Details of Expense***	***Amount Claimed***
	***** Please attach copies of receipts***	$

CHILD CARE EXPENSES INCURRED		
Date	***Meeting***	***Amount Claimed***
	***** Please attach copies of receipts***	$

I certify that the expenses claimed herein were actually incurred by me in attending meetings of the Council of the City of Kwinana or as a result of an activity authorised by the Council or reasonable expenses incurred in carrying out my duties as an Elected Member in accordance with Section 5.98 of the *Local Government Act 1995* and *Local Government (Administration) Regulations 1996 Clauses 31 and 32* and excludes items of a personal nature.

…… ***Elected Member Signature:*** Date:	**APPROVED FOR PAYMENT** …… **Director Corporate and Engineering Services** Date:	**AMOUNT DUE TO MEMBER** $……

Elected Member Request Form

Elected Member _____ Date _____

Request/Complaint Received From _____

Address _____

Details of Request/Complaint:

Other Comments:

SIGNED (by Elected Member): _____

16.2 Accounts for Payment up to 31 January 2016

SUMMARY:

This is a List of Accounts paid by the City of Kwinana.

OFFICER RECOMMENDATION:

That the List of Accounts paid for the period ended 31 January 2016 be noted.

DISCUSSION:

The following list of accounts summarises all cheques and electronic funds transfer (EFT) drawn for the period to 31 January 2016. It is in agreement with the attached List of Accounts.

FUND	**CHEQUE NO**	**AMOUNT**	**TOTAL**
MUNICIPAL A/C	Cheque # 1048 to 18115 EFT # 3196 to 3220		
	Creditors Cheques and EFT	$ 4,335,685.66	
	Non Creditors Cheques	$ 11,183.70	
	Cancelled Cheques/EFT	$ 1,173.57	
	Payroll 20/01/16, 06/01/16, Payroll interim	$ 1,136,253.01	
TRUST A/C	**EFT NO**	$	
TOTAL			$5,484,295.94

LEGAL/POLICY IMPLICATIONS:

In accordance with Local Government (Financial Management) Regulations 1996, Regulation 13 where the power has been delegated to the Chief Executive Officer (CEO), a list of accounts paid by the CEO is to be prepared and presented to Council each month. The list is to show each payment, payee's name, payment amount and date of payment and sufficient information to identify the transaction.

FINANCIAL/BUDGET IMPLICATIONS:

Various, but understood to be consistent with budget/budget review position and allowable variations therein

16.2 ACCOUNTS FOR PAYMENT UP TO 31 JANUARY 2016

ASSET MANAGEMENT IMPLICATIONS:

No asset management implications have been identified as a result of this report or recommendation.

ENVIRONMENTAL IMPLICATIONS:

No environmental implications have been identified as a result of this report or recommendation.

STRATEGIC/SOCIAL IMPLICATIONS:

No strategic implications have been identified as a result of this report or recommendation.

RISK IMPLICATIONS:

No risk implications have been identified as a result of this report or recommendation.

COUNCIL DECISION

123

MOVED CR R ALEXANDER **SECONDED CR D WOOD**

That the List of Accounts paid for the period ended 31 January 2016 be noted.

CARRIED
7/0

Warrant Listing

Warrants between

1/01/2016 to 31/01/2016

Program - ci_ap001 1/02/2016 10:07:22AM

Minimum Amount: **$0.00**

Cancelled

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
00018057	06/01/2016	3531	Estate of Silvia Knight	********** C A N C E L L E D ******	$173.57
00018075	06/01/2016		Marie Farrell	********** C A N C E L L E D ******	$1,000.00

Total:	Cancelled		2	$1,173.57

Program - ci_ap001 1/02/2016 10:07:40AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor Payee	Description	Amount
00018048	06/01/2016	69Alinta Gas	Usage to 221215 207U BPClub	$126.00
00018049	06/01/2016	7705APG Homes Pty Ltd	Refund sec dep-L106 Lambeth Circle	$2,912.00
00018050	06/01/2016	6375Ashmy Pty Ltd	Refund sec dep-L154 Rockport Ridge	$1,456.00
00018051	06/01/2016	203Big Brews Liquor	Civic Recognition Dinner Drinks	$949.76
00018052	06/01/2016	5109Building Commission (Department of	Building Services levy for December 2015	$38,871.29
00018053	06/01/2016	3032Celebration Nominees Pty Ltd	Refund sec dep-L89 Ditton Corner	$13,104.00
00018054	06/01/2016	1767Construction Training Fund	CTF fund for December 2015	$44,522.90
00018055	06/01/2016	7315Foxtel Cable Television Pty Ltd	Foxtel annual fees 16/12/15 to 16/12/16	$3,060.00
00018056	06/01/2016	6418Home Group WA Pty Ltd	Refund sec dep-L433 Leda Blvd	$1,456.00
00018058	06/01/2016	3390SSB Pty Ltd	Refund sec dep-L154 Sapphire Chase	$2,912.00
00018059	06/01/2016	1490Town Of Kwinana - Pay Cash	Petty cash recoup to 21/12/2015-Recquati	$1,417.85
00018061	06/01/2016	1592Water Corporation	Usage to 171215 66KL Kwinana Senior Citi	$7,809.64
00018077	06/01/2016	3037Colonial First State Investments Li	Superannuation-November 2015--18	$4,204.00
00018078	06/01/2016	4101IOOF Global One Retirement Solution	Superannuation-Dec2015-29	$236.79
00018079	06/01/2016	3442One Path - formerly ING Life Limite	Superannuation-Dec2015-24	$2,586.02
00018080	13/01/2016	69Alinta Gas	Usage to 22/12/15 9995U - Library & D/W	$1,136.75
00018081	13/01/2016	6375Ashmy Pty Ltd	Refund sec dep-L200 Brampton Road	$2,912.00
00018082	13/01/2016	4861Big W	Care Packages for Homeless Community	$165.00
00018083	13/01/2016	3032Celebration Nominees Pty Ltd	Refund sec dep-L2040 Needlewood Loop	$11,648.00
00018084	13/01/2016	3390SSB Pty Ltd	Refund sec dep-L900 Cascade Road	$1,456.00
00018085	13/01/2016	1490Town Of Kwinana - Pay Cash	Petty cash recoup to 13/1/2015-Admin	$323.55
00018086	13/01/2016	1984Vital Packaging	Bags for lolly run	$181.50
00018087	13/01/2016	1592Water Corporation	Charges to 29 FEb 2016 - Tafe Office	$261.60
00018092	20/01/2016	69Alinta Gas	Usage to 221215 96731U Recquatic	$5,790.05
00018093	20/01/2016	140Australian Communications and Media	Apparatus Licence Renewal fees - Depot	$988.00
00018094	20/01/2016	3360Blueprint Homes (WA) Pty Ltd	Refund of verge materials fee- VP #118	$1,385.44
00018095	20/01/2016	6437Simsai Constructions Group Pty Ltd	Refund permit fees-VP 92 35 Coleford Roa	$184.63
00018096	20/01/2016	3390SSB Pty Ltd	Ref Sec Dep - Lot 599 Sapphire Chase	$1,456.00
00018097	20/01/2016	1490Town Of Kwinana - Pay Cash	Petty Cash Recoup to 150116 - Vacation C	$907.90
00018099	20/01/2016	1592Water Corporation	Usage to 080116 54KL Sloans Cottage	$4,419.56
00018103	27/01/2016	203Big Brews Liquor	Local Orgs Chrismtas Function - Bar Drin	$1,615.64
00018104	27/01/2016	4861Big W	Toys and plastic boxes for Toy library	$2,645.77
00018105	27/01/2016	329City of Canning	Lost library item-The Secret of Self-Re	$28.60
00018106	27/01/2016	2071Compleat Angler & Camping World -	Community Engagement Officers - Thermos	$159.98
00018107	27/01/2016	480Department of Transport	Vehicle Registration Search Fees - Novem	$6.70
00018108	27/01/2016	3608Foreshore Rehabilitation & Landscap	Firebreaks	$1,529.00
00018109	27/01/2016	5256Lord Mayor's Distress Relief Fund	Donation to Waroona & Districts fire app	$2,000.00
00018110	27/01/2016	980Midway Drycleaners	Darius Wells Drycleaning tablecloths	$72.00
00018111	27/01/2016	1490Town Of Kwinana - Pay Cash	Petty cash recoup to 27/1/2016	$708.85
00018112	27/01/2016	1984Vital Packaging	Gift bags for seniors christmas party	$89.70
00018114	27/01/2016	1592Water Corporation	Usage to 120116 24KL Rhodes Cres Reserve	$17,406.98
3196.727-01	04/01/2016	727Ii Net Technologies Pty Ltd	Mthly Internet Bertram Community Centre	$59.95
3197.1079-01	06/01/2016	1079Parmelia Delivery Round	The West Australian newspaper - 26/12/20	$44.50
3197.1249-01	06/01/2016	1249Royal Life Saving Society	Pool Lifeguard Requalification - 11/10/	$1,905.00
3197.1393-01	06/01/2016	1393Sunny Sign Company Pty Ltd	Street sign	$72.50
3197.1423-01	06/01/2016	1423Telstra	Usage to 27/12/15 - Kwinana South mobile	$468.19
3197.1485-01	06/01/2016	1485T-Quip	Clevis Adjustment, Nuts	$85.60
3197.1520-01	06/01/2016	1520Truck & Car Panel & Paint	SANDBLAST - TRAILER - COMPLETE PRIM	$1,980.00
3197.1649-01	06/01/2016	1649Dennis Cleve Wood	ICT Allowance	$2,866.67
3197.1689-01	06/01/2016	1689Sandra Elizabeth Lee	Meeting Fee	$2,866.67
3197.1726-01	06/01/2016	1726Kyocera Document Solutions Australi	Taskalfa 4551CI to 30/11/15 - Recquatic	$1,091.98
3197.21-01	06/01/2016	21Accidental First Aid Supplies	Zone Youth Space-First Aid Supplies rep	$294.53
3197.2115-01	06/01/2016	2115Asbestos Masters WA	Asbestos pick up	$550.00
3197.2125-01	06/01/2016	2125Synergy	Usage to 8/12/15 1214U - Street Lights	$34,347.35
3197.218-01	06/01/2016	218Bob Jane T-Mart	Wheel alignment - 1EHB946	$526.00
3197.248-01	06/01/2016	248Bunnings Building Supplies	Recquatic sheets plywood	$359.90
3197.270-01	06/01/2016	270Caltex Australia Petroleum Pty Ltd	Caltex Fuel Card - Dec 2015	$992.87
3197.2931-01	06/01/2016	2931Ruth Elizabeth Alexander	Meeting Fees	$2,866.67
3197.2981-01	06/01/2016	2981Peter Edward Feasey	Meeting Fees	$4,690.63
3197.30-01	06/01/2016	30Carol Elizabeth Adams	Mayoral Allowance	$11,450.00
3197.3031-01	06/01/2016	3031Specialised Security Shredding	GC Bin Exchange x 1	$40.48
3197.3155-01	06/01/2016	3155PFD Food Services Pty Ltd	Frozen Chips and Oil for Cafe Splash	$804.45
3197.3243-01	06/01/2016	3243Grant Thornton Australia Ltd	Final fee-audit to Roads of Recovery Pro	$24,860.00
3197.3357-01	06/01/2016	3357BGC Residential Pty Ltd	Refund sec dep-L348 Corbridge Road	$4,368.00
3197.3360-01	06/01/2016	3360Blueprint Homes (WA) Pty Ltd	Refund sec dep-L159 Rockport Ridge	$1,456.00
3197.3392-01	06/01/2016	3392Summit Homes Group	Refund sec dep-L288 Ipswich Street	$2,912.00
3197.3424-01	06/01/2016	3424Dale Alcock Homes Pty Ltd	Refund sec dep-L80 Sapphire Chase	$1,456.00
3197.3490-01	06/01/2016	3490Estate of Jozina Thomas	Banksia Park Refund 14/15	$265.51
3197.3607-01	06/01/2016	3607Hays Specialist Recruitment Pty Ltd	B Hill w/ending 20/12/15	$1,895.59

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3197.3877-01	06/01/2016	3877	Schweppes Australia Pty Ltd	Assorted drinks for Cafe Splash - 7 Dece	$159.19
3197.4664-01	06/01/2016	4664	AMPAC Debt Recovery (WA) Pty Ltd	Costs December 2015	$1,281.35
3197.5105-01	06/01/2016	5105	Tiffany Nicole Johanson	Reimb of items for lolly run and Fair Da	$261.47
3197.5131-01	06/01/2016	5131	Leonard Rudeberg	Freakfest - Wisdom2th performance - 5.12	$150.00
3197.5143-01	06/01/2016	5143	Wendy Gaye Cooper	Meeting Fees	$4,717.62
3197.5191-01	06/01/2016	5191	Sureguard Security Pty Ltd	Freakfest - Provide Security	$651.20
3197.5351-01	06/01/2016	5351	Koori Kids Pty Ltd	Koori Kids Naidoc School Initiative 2016	$450.00
3197.5529-01	06/01/2016	5529	Rhys Blake Heron	Reimb of Study fees-Bachelor of Commerce	$4,156.20
3197.5538-01	06/01/2016	5538	The Literature Centre	Celebrate Reading National Conference K	$520.00
3197.5678-01	06/01/2016	5678	Josephine's Edutainment	Rhyme/Story time - Mrs Claus show	$200.00
3197.583-01	06/01/2016	583	Flexi Staff Pty Ltd	Temp staff w/e 05/12/2015	$7,836.37
3197.5881-01	06/01/2016	5881	Guitar World	Acoustic strings	$45.00
3197.6223-01	06/01/2016	6223	Robert Thompson	ICT Allowance	$2,866.67
3197.6332-01	06/01/2016	6332	Drainflow Services Pty Ltd	Gully educting - Casserly Way	$3,168.00
3197.6707-01	06/01/2016	6707	Labourforce Impex Personnel Pty Ltd	Giorgios Paraskeva w/e 13/12/15	$1,875.15
3197.6749-01	06/01/2016	6749	Australia Post	Postage to period ending 30/11/2015	$6,340.41
3197.6854-01	06/01/2016	6854	Aspireon Homes	Refund sec dep-L23 Huntington Avenue	$2,912.00
3197.7557-01	06/01/2016	7557	Sheila Mills	ICT Allowance	$2,942.56
3197.7593-01	06/01/2016	7593	Ben Matthews	Darius Wells-Sunsets in the Square	$800.00
3197.7620-01	06/01/2016	7620	Perth Parkour Inc	Payment for parkour classes - Zone Youth	$1,200.00
3197.7694-01	06/01/2016	7694	Natasha Kirkwood	Facilitator for Face Painting workshop	$180.00
3197.7695-01	06/01/2016	7695	Rialto Distribution Pty Ltd	Licence to screen film "Hip-Hop Eration"	$137.50
3197.7697-01	06/01/2016	7697	Francoise Marie Windon	Refund -Working With Children Check	$82.00
3197.7698-01	06/01/2016	7698	Dane Wellman	Performance-Midnight Boulevard-Freakfest	$150.00
3197.7699-01	06/01/2016	7699	Kelly Moss	Reimb of ovepaid FDC levy	$23.86
3197.7700-01	06/01/2016	7700	Debra Lynn Petterlin	Refund sec dep-L890 Ryhill Crescent	$1,456.00
3197.7701-01	06/01/2016	7701	Jamie Choun-Yen Kho	Refund sec dep-L840 Ryhill Crescent	$1,456.00
3197.7702-01	06/01/2016	7702	Hermanus Johannes Ebersohn	Refund sec dep-L892 Ryhill Road	$4,368.00
3197.7703-01	06/01/2016	7703	Naomi Nina Nainan	Refund sec dep-L897 Ryhill Crescent	$1,456.00
3197.7704-01	06/01/2016	7704	Samuel Donald Walter Stock	Refund sec dep-L899 Ryhill Crescent	$1,456.00
3197.7706-01	06/01/2016	7706	Luke Leslie Hughes	Refund sec dep-L942 Lambeth Circle	$1,456.00
3197.7707-01	06/01/2016	7707	Clint David Pinero Ang	Refund sec dep-L838 Ryhill Crescent	$1,456.00
3197.7708-01	06/01/2016	7708	Keith Alexander Strachan	C/over subsidy rebate-L214 Crystal Tce,W	$360.00
3197.7709-01	06/01/2016	7709	Wilfred Victor Stanislaus	C/over subsidy rebate-L58 Dolomite Avenu	$540.00
3197.7710-01	06/01/2016	7710	Benjamin Hon Weng Seah	C/over subsidy rebate-L901901 Ryhill Cre	$360.00
3197.7711-01	06/01/2016	7711	Warren Troy Dowbysch	c/over subsidy rebate-L188 Fairhaven Blv	$360.00
3197.7712-01	06/01/2016	7712	Patrick James Miller	Refund sec dep-L293 Ipswich Street, WELL	$360.00
3197.7713-01	06/01/2016	7713	Peter James Wilkinson	C/over subsidy rebate-L446 Huntington Av	$360.00
3197.7714-01	06/01/2016	7714	Christopher Juanillo Dizon	C/over subsidy rebate-L76 Sapphire Chase	$360.00
3197.7715-01	06/01/2016	7715	Stephen Neil Fisher	C/over subsidy rebate-L375 Nursling Chas	$540.00
3197.843-01	06/01/2016	843	Kwinana Little Athletics Centre	Kidsport vouchers	$6,442.00
3198.1491-01	06/01/2016	1491	Works Social Club	Payroll Deduction	$250.00
3198.151-01	06/01/2016	151	Australian Services Union	Payroll Deduction	$792.48
3198.2853-01	06/01/2016	2853	Maxxia Pty Ltd	Payroll Deduction	$6,628.15
3198.3376-01	06/01/2016	3376	Health Insurance Fund of WA (HIF)	Payroll Deduction	$1,836.80
3198.3719-01	06/01/2016	3719	Town of Kwinana - Xmas fund	Payroll Deduction	$6,990.00
3198.487-01	06/01/2016	487	Child Support Agency	Payroll Deduction	$1,903.04
3198.892-01	06/01/2016	892	LGRCEU	Payroll Deduction	$929.43
3199.153-01	06/01/2016	153	Australian Taxation Office	Taxation	$184,426.00
3200.565-01	06/01/2016	565	Bright Futures Family Day Care - Pa	FDC payroll 21/12/15-03/01/16	$60,947.40
3200.568-01	06/01/2016	568	Bright Futures In Home Care - Payro	IHC payroll 21/12/15-03/01/16	$41,753.18
3201.568-01	07/01/2016	568	Bright Futures In Home Care - Payro	IHC Payroll to 03/01/2016 Interim Pay	$2,356.00
3202.7367-01	08/01/2016	7367	ClickSuper Pty Ltd	Superannuation-Dec2015-03	$221,326.45
3203.153-01	11/01/2016	153	Australian Taxation Office	Taxation	$173,614.00
3204.1033-01	13/01/2016	1033	Nilfisk Pty Ltd	Recquatic - Rental Contract for period S	$7,999.20
3204.1227-01	13/01/2016	1227	Rockingham Holden	Holden Commodore - 1EWO612	$68,121.21
3204.130-01	13/01/2016	130	Australasian Performing Rights	License fees - 1/10/15 to 31/12/15	$2,742.91
3204.134-01	13/01/2016	134	Australia Post	Commissionon on postage period ending 31	$811.48
3204.1423-01	13/01/2016	1423	Telstra	Usage to 13/12/15 - Darius	$248.45
3204.1520-01	13/01/2016	1520	Truck & Car Panel & Paint	Motor Vehicle Insurance Claim KWN005 P44	$500.00
3204.1589-01	13/01/2016	1589	Waste Stream Management Pty Ltd	Class 1 & concrete clean	$271.33
3204.1621-01	13/01/2016	1621	Western Australian Treasury Corpora	Guarantee fees due to 15 February 2016	$76,146.31
3204.1652-01	13/01/2016	1652	Woolworths Ltd	Depot morning tea	$1,196.71
3204.1916-01	13/01/2016	1916	Patricia Rear	Reimb Bunnings Gift cards for Volunteers	$100.00
3204.2024-01	13/01/2016	2024	Institute of Public Works Engineeri	Membership - David Boccuzzi	$286.00
3204.2125-01	13/01/2016	2125	Synergy	Usage to4/01/2016 4670U - Bertram Comm C	$104,533.45
3204.2224-01	13/01/2016	2224	Prestige Catering & Event Hire	Catering - Forum Dinner 21 December 2015	$539.50
3204.2410-01	13/01/2016	2410	ABCO Products	Handsoap	$779.60
3204.248-01	13/01/2016	248	Bunnings Building Supplies	Community Engagement Officer Outreach Eq	$183.26

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3204.3357-01	13/01/2016	3357	BGC Residential Pty Ltd	Refund sec dep-L760 Bindarri Grove	$2,912.00
3204.3358-01	13/01/2016	3358	Homebuyers Centre Pty Ltd	Refund sec dep-L2105 Cordata Approach	$8,736.00
3204.3392-01	13/01/2016	3392	Summit Homes Group	Refund sec dep-L2060 Tiliqua Cres	$2,912.00
3204.3424-01	13/01/2016	3424	Dale Alcock Homes Pty Ltd	Refund sec dep-L2120 Ironcap Grove	$2,912.00
3204.358-01	13/01/2016	358	Coastline Mower World	Parts	$521.45
3204.3589-01	13/01/2016	3589	Envirocare Systems Pty Ltd	Greenheart Waterless Urinal Service-Recq	$264.00
3204.3607-01	13/01/2016	3607	Hays Specialist Recruitment Pty Ltd	Temp staff w/e 27/12/2015 - Belinda Hill	$2,369.49
3204.3644-01	13/01/2016	3644	Structerre Consulting Group	Structual engineer certification group f	$715.00
3204.3755-01	13/01/2016	3755	Dowsing Concrete	Footpaths - Sulphur Rd PARMELIA	$29,869.97
3204.3859-01	13/01/2016	3859	Tina Kathryn Olsen	Reimb of expenses for Christmas Party	$37.81
3204.4018-01	13/01/2016	4018	The Smith Family	Refund Unspent Grant Funds 2014/2015	$1,839.20
3204.412-01	13/01/2016	412	Courier Australia	Courier charges 9/11/15 to 12/11/15	$287.36
3204.4263-01	13/01/2016	4263	Casey James Robertson	Reimb of White Card course	$39.00
3204.4430-01	13/01/2016	4430	Janni Benjamin Curtis	Reimb of Study fees - 3 x units	$3,288.00
3204.4664-01	13/01/2016	4664	AMPAC Debt Recovery (WA) Pty Ltd	Legal fees - December 2015 - Rates	$1,072.50
3204.504-01	13/01/2016	504	Domino's Pizza	Zone - YMCA support - Youth Christmas Pa	$100.00
3204.5062-01	13/01/2016	5062	Tony Aveling & Associates Pty Ltd	S & H refresher course 9-10/11/15 R Mill	$540.00
3204.533-01	13/01/2016	533	Eclipse Resources	Tipping required for green waste from Ev	$990.00
3204.56-01	13/01/2016	56	Aim	Applied Project Management A Nicholas 01	$10,540.00
3204.5764-01	13/01/2016	5764	Code Group Pty Ltd	Group fitness cross rig building conveyo	$495.00
3204.583-01	13/01/2016	583	Flexi Staff Pty Ltd	Temp staff w/e 19/12/015	$9,010.91
3204.6107-01	13/01/2016	6107	Vivid Promotions	100 x Presto Sports Bag (Black/Grey)	$652.30
3204.6370-01	13/01/2016	6370	Elexacom	Repair irrigation bore pump- Barney Cour	$1,987.53
3204.6383-01	13/01/2016	6383	Alicia Jane McKenzie	Reimb of Internet - Jan 2016	$79.90
3204.640-01	13/01/2016	640	Gilden Tree Farm	Tree watering on 21/12 & 28/12/201	$2,893.75
3204.6812-01	13/01/2016	6812	Australian Grown	Bright Futures Uniforms	$89.76
3204.6970-01	13/01/2016	6970	Helen & David Russell	Banksia Park Refund 14/15 S Knight	$173.57
3204.7042-01	13/01/2016	7042	Quantum Building Services	Steel Door Thomas Oval	$6,146.13
3204.7083-01	13/01/2016	7083	WOW Homes	Refund sec dep-L875 Geikie Glade	$1,456.00
3204.7236-01	13/01/2016	7236	Wheelers Book Club Ltd	DRM hosting fees for 12 ebook titles.	$26.40
3204.7601-01	13/01/2016	7601	Focus Networks	Deposit - External Audit of IT Systems +	$4,398.90
3204.7717-01	13/01/2016	7717	Dara Ayuningtyas	Refund for overpayment of Daycare fees	$390.42
3204.7718-01	13/01/2016	7718	Barry Joseph Anthony Cappeluti	Refund sec dep-L205 De Haer Road	$1,456.00
3204.7719-01	13/01/2016	7719	Ali Karaerik	Refund sec dep-4/4 Brownell Place	$1,456.00
3204.7720-01	13/01/2016	7720	David John Walker	Refund bond-Hall hire 29/12/2015	$1,000.00
3204.7721-01	13/01/2016	7721	Pillai Shivasankaran	C/over subsidy rebate-L200 Brampton Road	$540.00
3204.7722-01	13/01/2016	7722	Adrian Chee Yeong Liew	C/over subsidy rebate-L2037 Needlewood L	$540.00
3204.7723-01	13/01/2016	7723	Jessica May Ivicic	C/over subsidy rebate-L2012 Needlewood L	$540.00
3204.7724-01	13/01/2016	7724	Choong Keen Liew	C/over subsidy rebate-L2038 Needlewood L	$540.00
3204.7725-01	13/01/2016	7725	Grace Wai Sze Liew	C/over subsidy rebate-L2036 Needlewood L	$540.00
3204.7726-01	13/01/2016	7726	Jeong Rae Park	C/over subsidy rebate-L188 Brampton Road	$360.00
3204.7727-01	13/01/2016	7727	Victor David Pink	C/over subsidy rebate-L724 Towarri Way,	$540.00
3204.7728-01	13/01/2016	7728	Carlos Alexandre Queiros Martins	C/over subsidy rebate-L900 Cascade Road,	$540.00
3204.7729-01	13/01/2016	7729	Michael Brian Gooding	C/over subsidy rebate-L2014 Needlewood L	$540.00
3204.853-01	13/01/2016	853	Kwinana South Bush Fire Brigade	Hazard Reduction burns	$3,750.00
3204.934-01	13/01/2016	934	Mandogalup Volunteer Fire Brigade	Hazard Reduction Burn:	$847.00
3205.727-01	12/01/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Zone Training 12/1/15-1	$119.90
3206.727-01	14/01/2016	727	Ii Net Technologies Pty Ltd	Internet Charges 14/01-14/02/2016 Senior	$39.95
3207.1205-01	20/01/2016	1205	Ridleys Towing & Transport	Bus Service 17/11/15 - Senior Walkers	$240.00
3207.1227-01	20/01/2016	1227	Rockingham Holden	Holden Colorado - KWN2023	$40,096.21
3207.1343-01	20/01/2016	1343	Southern Metropolitan Regional Coun	MIxed Recyclables Gate Fees Dec15	$27,742.04
3207.1423-01	20/01/2016	1423	Telstra	Mobile phone usage-Whole organisation -	$6,227.16
3207.1629-01	20/01/2016	1629	Weston Road Systems	Temporary Spotting for Macedonia Street	$687.50
3207.1652-01	20/01/2016	1652	Woolworths Ltd	Team milestone/Team building Food	$1,080.85
3207.1856-01	20/01/2016	1856	Cornerstone Legal	Legal advice - Medina Revitalisation Pr	$8,250.00
3207.1916-01	20/01/2016	1916	Patricia Rear	Reimbursement of Expenses for FDC	$88.46
3207.1948-01	20/01/2016	1948	Alleasing Pty Ltd	Contract E6N0158899-Dell Computers Monit	$21,848.96
3207.1982-01	20/01/2016	1982	Hewlett-Packard Australia Pty Ltd	HP Trim Annual Maintenance - HP Order #2	$1,344.55
3207.2021-01	20/01/2016	2021	Subway Kwinana	Catering - Zone - School Holiday Program	$338.00
3207.2125-01	20/01/2016	2125	Synergy	Usage to 060116 104257U Recquatic	$84,763.65
3207.228-01	20/01/2016	228	Boya Equipment	Front skirt, cover LH & RH, head lamp	$618.21
3207.248-01	20/01/2016	248	Bunnings Building Supplies	Hardware Supplies - Gemstone Park/Maldon	$503.10
3207.264-01	20/01/2016	264	Cabcharge Australia Ltd	Cabcharge - 7/12/15 to 3/01/16	$6.00
3207.3155-01	20/01/2016	3155	PFD Food Services Pty Ltd	6 x cartons frozen chips (code 012749)	$223.60
3207.3357-01	20/01/2016	3357	BGC Residential Pty Ltd	Refund of permit fee - VP88 - 14 Wako La	$310.00
3207.3360-01	20/01/2016	3360	Blueprint Homes (WA) Pty Ltd	Refund O/Payment of ferge permit fees-VP	$226.00
3207.4026-01	20/01/2016	4026	Red Ink Homes Pty Ltd	Refund verge permit - VP87	$160.00
3207.4166-01	20/01/2016	4166	Alison Dymond	Reimbursement Telephone Exp 13/11/15 - 1	$100.00
3207.4245-01	20/01/2016	4245	ED Property Services	Regrouting shower, floors & walls-U39 Ca	$385.00

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3207.4412-01	20/01/2016	4412	JB Hi-Fi Rockingham	Zone - Games for PlayStation - X-Box One	$799.00
3207.4453-01	20/01/2016	4453	Carringtons WA	Traffic management 02/12/2015 - Sulphur	$1,596.14
3207.4490-01	20/01/2016	4490	Jungle Gym	Excursion 12/01/16 Jungle Gym	$588.00
3207.4528-01	20/01/2016	4528	Robert John Bond	Reimbursement Drivers Licence B Bond	$44.00
3207.4853-01	20/01/2016	4853	Ashley Thomas Harding	Reimbursement - Batteries and Key Box	$198.86
3207.5250-01	20/01/2016	5250	Sparkles Children's Entertainer	1 Hour entertaining with magic & baloons	$250.00
3207.583-01	20/01/2016	583	Flexi Staff Pty Ltd	Tony Mallet w/e 13/12/15 WALGA contract	$3,775.26
3207.5851-01	20/01/2016	5851	Homestead Ridge Progress Associatio	Community Development Fund Grant Paymer	$2,800.00
3207.6109-01	20/01/2016	6109	Enchanted Character Productions	Stiltwalking Slam Dunk Performers	$330.00
3207.6284-01	20/01/2016	6284	Kristy Vanessa Walley	Reimbursement MR-B Licence - K Walley	$41.80
3207.6376-01	20/01/2016	6376	Daniel Wakeford Turrell	Reimbursement HC Licence Payment 2 of 3	$44.00
3207.6749-01	20/01/2016	6749	Australia Post	Posage for period ending 31/12/015	$6,762.00
3207.7042-01	20/01/2016	7042	Quantum Building Services	Installation of reception doorway-Kwn Ci	$4,037.83
3207.7067-01	20/01/2016	7067	Dawn Mary Pianto	Financial Assistance Michael Pianto	$175.00
3207.7083-01	20/01/2016	7083	WOW Homes	Refund of verge permit fee - VP 78	$166.00
3207.7344-01	20/01/2016	7344	Katelyn Abbott	Lyrik Educational Scholorship 2015/2016	$800.00
3207.7589-01	20/01/2016	7589	360 Environmental Pty Ltd	Preparation and presentation-Indan Ocean	$726.00
3207.7609-01	20/01/2016	7609	Rockingham Roofing Pty Ltd	Re-roof Challenger Beach Toilets	$8,391.09
3207.7730-01	20/01/2016	7730	Nicole Louise Bosenbacker	Rates Refund	$1,075.88
3207.7736-01	20/01/2016	7736	Moorditj Koort Aboriginal Corporati	Community Development Fund	$2,000.00
3207.7739-01	20/01/2016	7739	The Kings College	Lyrok Educational Scholorship 2015/16 J	$300.00
3207.7740-01	20/01/2016	7740	Bhargav Sanatkumar Joshi	Lyrik Educational Scholarship 2015/16 A	$300.00
3207.7741-01	20/01/2016	7741	Gabrielle Cecelia Abbott	Lyrik Educational Scholarship 2015/16 N	$375.00
3207.7742-01	20/01/2016	7742	CLAN WA INC	Community Development Fund Grant Paymer	$4,000.00
3207.7743-01	20/01/2016	7743	Denise Walker	Financial Assistance Cody Walker	$175.00
3207.7744-01	20/01/2016	7744	Allsortz Netball Club	Kidsport Payment Miracle Tuipoloa	$200.00
3207.815-01	20/01/2016	815	Kwinana Early Years Services	Community Development Fund	$4,000.00
3207.905-01	20/01/2016	905	Local Government Managers Australia	2016 LGMA Finance Conference N French	$1,900.00
3207.936-01	20/01/2016	936	Noelene Mantellato	Ref Sec Dep Ken Jackman Hall 09/01/16	$2,000.00
3207.959-01	20/01/2016	959	McLeods Barristers & Solicitors	Licence Agreement-Reserve 48278-Anglican	$4,595.26
3208.565-01	20/01/2016	565	Bright Futures Family Day Care - Pa	FDC Payroll to 17/01/2016	$86,727.70
3208.568-01	20/01/2016	568	Bright Futures In Home Care - Payro	IHC Payroll to 17/01/2016	$44,101.53
3209.4805-01	19/01/2016	4805	TPG Internet Pty Ltd	Internet Connection to 25/02/2016 Mandog	$49.99
3210.2853-01	20/01/2016	2853	Maxxia Pty Ltd	Payroll Deduction	$8,358.71
3210.3376-01	20/01/2016	3376	Health Insurance Fund of WA (HIF)	Payroll Deduction	$1,836.80
3210.3719-01	20/01/2016	3719	Town of Kwinana - Xmas fund	Payroll Deduction	$7,020.00
3211.727-01	21/01/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Kwinana Village 20/1-20	$39.95
3212.568-01	22/01/2016	568	Bright Futures In Home Care - Payro	IHC Payroll to 17/01/2016 Interim file	$1,111.60
3213.1707-01	22/01/2016	1707	Public Transport Authority of Weste	Smartrider recharge to 16/12/15	$100.00
3213.229-01	22/01/2016	229	BP Australia Pty Ltd	Fleet fuel 01/12/15-31/12/15	$16,154.66
3214.179-01	04/01/2016	179	Bankwest Visa	Corporate credit card transaction 1/12/1	$11,575.19
3215.727-01	25/01/2016	727	Ii Net Technologies Pty Ltd	Internet Wellard Community Centre 25/1-2	$59.95
3216.1033-01	27/01/2016	1033	Nilfisk Pty Ltd	Recquatic - Rental Contract for period 0	$1,333.20
3216.1044-01	27/01/2016	1044	Oakford Agricultural & Garden Suppl	40 Medium Gripples	$99.60
3216.1072-01	27/01/2016	1072	Paint Industries	Exterior White Paint	$45.85
3216.1112-01	27/01/2016	1112	Phonographic Performance Company of	Health and fitness annual music licencin	$3,595.13
3216.1130-01	27/01/2016	1130	Port Printing Works	Purchase of Business Cards 081215	$1,460.80
3216.115-01	27/01/2016	115	Asphalt Surfaces Pty Ltd	Supply Asphalt 7mm 9499 1.02Tonne	$186.80
3216.1159-01	27/01/2016	1159	SoundPack Solutions Pty Ltd	DVD Cases and Storage Folder	$184.53
3216.1186-01	27/01/2016	1186	Red Dot	Christmas lollies, christmas paper and t	$43.92
3216.1187-01	27/01/2016	1187	Red Sand Supplies Pty Ltd	Dkt 2487 Tipping concrete light mesh	$16.50
3216.1205-01	27/01/2016	1205	Ridleys Towing & Transport	Supply Driver for Senior Walkers Rec	$215.00
3216.1206-01	27/01/2016	1206	Ritz Party Hire	Assorted Equipment Hire for Freakfest 5/	$5,845.00
3216.1227-01	27/01/2016	1227	Rockingham Holden	GM-94756469, LAMP TAIL, GM-94756468, L	$869.35
3216.1228-01	27/01/2016	1228	Rockingham Mower & Chainsaw Centre	E06 - EDGER HEAD COMPLETE D&F, E21 -	$620.20
3216.1260-01	27/01/2016	1260	Sadena Pty Ltd Trading As Kwinana	Dog MIcroship x 2	$522.00
3216.1276-01	27/01/2016	1276	Satellite Security Services	Installation of CCTV-Thomas Kelly Pav	$5,106.70
3216.1277-01	27/01/2016	1277	Savage Garden Services	Clean up illegal dumping on Durrant Rd P	$25,129.40
3216.1282-01	27/01/2016	1282	Sealanes (1985) Pty Ltd	Drinks for Mandogalup Fire Brigade	$427.66
3216.1290-01	27/01/2016	1290	Shane McMaster Surveys	Inglis Crt Medina Survey Pick-Up	$770.00
3216.1297-01	27/01/2016	1297	Shenton Enterprises Pty Ltd	669995550 - Bottom Lid Assembly - Atomat	$78.01
3216.1313-01	27/01/2016	1313	Daimler Trucks Perth	Cover Air cleaner	$831.62
3216.1314-01	27/01/2016	1314	Skipper Trucks Belmont	1 x Aircon condenser fan motor - KWN1779	$598.27
3216.1356-01	27/01/2016	1356	Sports Turf Technology	Gilmore Collage Senior Oval site analyis	$1,210.00
3216.1357-01	27/01/2016	1357	Sportsworld Of WA	Assorted children's goggles and accessor	$1,807.30
3216.1360-01	27/01/2016	1360	Saint John Ambulance Australia (WA)	First Aid Cover for Freakfest - 5.12.201	$268.40
3216.1370-01	27/01/2016	1370	State Library of Western Australia	Lost State Library items - November 2015	$408.10
3216.1373-01	27/01/2016	1373	Statewide Vehicle Hoist Service	Annual service to vehicle hoist Dec 2015	$110.00
3216.1393-01	27/01/2016	1393	Sunny Sign Company Pty Ltd	Street Sign - Hennessy Ave, Street Signs	$942.50

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3216.14-01	27/01/2016	14	Flick Anticimex Pty Ltd	Washroom Services December 2015	$2,183.21
3216.1423-01	27/01/2016	1423	Telstra	Usage to 281215 Internet & Data	$2,472.83
3216.1500-01	27/01/2016	1500	Toyotaways	Toyota Landcruiser fire truck 1CRB723 re	$3,796.64
3216.1523-01	27/01/2016	1523	Tudor House	Print and supply of one PVC banner for C	$210.50
3216.1524-01	27/01/2016	1524	Turfmaster Facility Management	Supply & Spread Fertiliser	$47,650.13
3216.1528-01	27/01/2016	1528	Twights Plumbing Pty Ltd	APU - unit 8, replace unserviceable gard	$10,391.60
3216.1566-01	27/01/2016	1566	WA Electoral Commission	Local Government Election 2015 Costs	$62,312.88
3216.1572-01	27/01/2016	1572	Western Australian Local Government	Short Course Booking J Vogel	$654.50
3216.1577-01	27/01/2016	1577	WA Rangers Assocation Inc	Advertising City Assist Officer x 4	$250.00
3216.1585-01	27/01/2016	1585	Wandi Progress Association Inc.	Grant - Open Day/Neighbour Day event	$5,000.00
3216.1595-01	27/01/2016	1595	Wattleup Tractors	O Ring	$576.45
3216.1609-01	27/01/2016	1609	West Australian Newspapers Limited	Advert - 02/12/2015	$390.00
3216.161-01	27/01/2016	161	DORMA Australia Pty Ltd	Bertram Community Cnt-Call out fee to re	$253.00
3216.1624-01	27/01/2016	1624	Western Power Corporation	Install St lights & U/G power-MP148161-A	$310,663.00
3216.1629-01	27/01/2016	1629	Weston Road Systems	Mandurah Rd Line Marking Reinstatement 6	$2,855.88
3216.1652-01	27/01/2016	1652	Woolworths Ltd	Gift Cards for YOLO program + plus other	$470.33
3216.1669-01	27/01/2016	1669	Zipform Pty Ltd	3rd Instalment Notice 2015-Program & Tes	$3,106.53
3216.1689-01	27/01/2016	1689	Sandra Elizabeth Lee	Remib of Travel Expenses - Nov/Dec 2015	$243.38
3216.1718-01	27/01/2016	1718	Qualcon Laboratories Pty Ltd	Pavement Testing and Traffic Control	$6,625.30
3216.1726-01	27/01/2016	1726	Kyocera Document Solutions Australi	Nov Photocopy Reading-Admin Planning	$4,412.26
3216.1760-01	27/01/2016	1760	Hanson Construction Materials Pty L	Serenity St, Wellard 0.4 M3 Concrete	$1,284.80
3216.1798-01	27/01/2016	1798	Griffin Valuation Advisory	Market rental valuations for Consultant	$3,960.00
3216.1814-01	27/01/2016	1814	P Rond & Co	Bertram Oval - Redevelop Bore and Chemic	$23,078.00
3216.1826-01	27/01/2016	1826	Arteil	Chair R Slaughter Records	$1,017.50
3216.188-01	27/01/2016	188	Beaurepaires Tyres Kwinana	TYRES FOR P289, KWN1779	$1,995.77
3216.19-01	27/01/2016	19	Absolute Painting Services	APU - unit 37, repair and repaint where	$550.00
3216.1980-01	27/01/2016	1980	Pember Wilson & Eftos	Valuation of Units 9-17, 11 Stidworthy C	$1,892.50
3216.2021-01	27/01/2016	2021	Subway Kwinana	Zone - School Holiday Program - January	$114.00
3216.2084-01	27/01/2016	2084	Snap Printing Rockingham	Daily Vehicle/Plant Inspection Checklist	$1,970.00
3216.2096-01	27/01/2016	2096	Orelia Primary School	KIC Environment Scholarship for 2016.	$330.00
3216.2097-01	27/01/2016	2097	Beaver Tree Services Aust Pty Ltd	Tender - 538KWN13 - Dead wooding of larg	$18,474.58
3216.21-01	27/01/2016	21	Accidental First Aid Supplies	1 x Code of Practice Portable First Aid	$145.97
3216.2115-01	27/01/2016	2115	Asbestos Masters WA	Remove asbestos from Gentle Road 23/12/1	$550.00
3216.2125-01	27/01/2016	2125	Synergy	Usage to 060116 30679.59U The Zone	$10,440.90
3216.2215-01	27/01/2016	2215	Mirco Bros Pty Ltd	Fertiliser Poly Spreader (KS-300P)	$855.00
3216.2224-01	27/01/2016	2224	Prestige Catering & Event Hire	Catering for Forum Dinner 18 January 201	$1,472.50
3216.2247-01	27/01/2016	2247	Rankine Mosquito Management	Mosquito monitoring-December 2015	$4,059.00
3216.228-01	27/01/2016	228	Boya Equipment	Rotor Assembly, chain guards, blade, bol	$844.18
3216.2321-01	27/01/2016	2321	Civic Legal	Professional costs-rates recovery fees	$2,460.15
3216.2339-01	27/01/2016	2339	Totally Confidential Records Manage	Monthly Storage/retrieval costs - Archiv	$446.85
3216.235-01	27/01/2016	235	Bristol Cleaning Services	BP - Clubhouse, window cleaning for Oct,	$370.00
3216.2410-01	27/01/2016	2410	ABCO Products	Council Buildings Toiletries Various 101	$9,210.70
3216.2460-01	27/01/2016	2460	Allcom Communications	Supply and Install 1x DM4400 radio plus	$1,586.40
3216.247-01	27/01/2016	247	Bullet Sign Shop	4 signs for the Alcoa Challenger Beach F	$257.40
3216.2474-01	27/01/2016	2474	Writing WA	Annual membership renewal year ending 2	$135.00
3216.2475-01	27/01/2016	2475	Xercise Pro	Annual license fees 2016 xercise pro pro	$2,555.00
3216.248-01	27/01/2016	248	Bunnings Building Supplies	6 x paint brush blend monarch	$1,446.59
3216.2507-01	27/01/2016	2507	Ixom Operations Pty Ltd	70kg Chlorine Gas Bottles	$1,877.92
3216.2546-01	27/01/2016	2546	Sigma Chemicals	Purchase of Chemicals-Chlorine	$951.36
3216.262-01	27/01/2016	262	WBHO Civil Pty Ltd	Contract 575KWN14 Anketell Road Realignm	$17,139.35
3216.2646-01	27/01/2016	2646	Neverfail Springwater	Zone - Water situated waiting area 21121	$240.10
3216.2652-01	27/01/2016	2652	Modern Teaching Aids Pty Ltd	10 x Green Toys Tugboats (Code GY014)	$467.26
3216.2660-01	27/01/2016	2660	PlayRight Australia Pty Ltd	Spice Top Complete & Green delivered to	$1,394.77
3216.2674-01	27/01/2016	2674	Fire & Safety WA	BR9W/BCVMFS-RD (RED) Pacific BR9 Helm	$1,002.47
3216.2675-01	27/01/2016	2675	Serco Australia Pty Ltd	Smart riders Community Engagement office	$255.00
3216.2698-01	27/01/2016	2698	Wilson Security Pty Ltd	Emergency Call out - 15/12/15 - BP 23 -	$1,593.66
3216.2703-01	27/01/2016	2703	Tree Watering Services	Watering of Coastcare plants at Alcoa Ch	$650.00
3216.2852-01	27/01/2016	2852	Downer EDI Works Pty Ltd	Road surfacing-Mandurah Rd Part 1 06/12/	$168,743.36
3216.2903-01	27/01/2016	2903	Insight Call Centre Services	After Hours Call Monitoring - November 2	$566.61
3216.2960-01	27/01/2016	2960	Australian Plant Wholesalers	Various native plants 130mm for Orelia O	$633.60
3216.302-01	27/01/2016	302	Chadson Engineering	Handles - Balance tank lids x 3	$330.00
3216.3031-01	27/01/2016	3031	Specialised Security Shredding	GC Bin Exchange	$30.36
3216.3084-01	27/01/2016	3084	Outsource Business Support Solution	Onsite consulting-Rates & Finance	$1,232.00
3216.3105-01	27/01/2016	3105	Poly Pipe Traders	100m 9 wire multicore	$3,711.22
3216.3106-01	27/01/2016	3106	Lochness Pty Ltd	Contract Mowing for December 2015	$24,711.48
3216.311-01	27/01/2016	311	ChemCentre	Water sample analysis 52 Braddock Road	$209.00
3216.3152-01	27/01/2016	3152	Charles Service Company	Cleaning services for December 2015	$58,082.55
3216.3212-01	27/01/2016	3212	Marketforce Pty Ltd	Public Notice - Wekend Courier - 11 Dece	$711.27
3216.3224-01	27/01/2016	3224	Retech Rubber	Millbrook Park - 32m2 @ repair vandalise	$907.50

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor Payee	Description	Amount
3216.3243-01	27/01/2016	3243Grant Thornton Australia Ltd	Interim fee - Annual DCA audit (DCA1-15)	$3,850.00
3216.3265-01	27/01/2016	3265Duress Systems Pty Ltd	BP Monitoring for Medical Alarms in all	$7,779.20
3216.3280-01	27/01/2016	3280Cut Price Imports	Australia Day - Merchandise	$540.74
3216.3312-01	27/01/2016	3312Daniels Printing Craftsmen	Print and delivery of the LyriK photoboo	$440.00
3216.3320-01	27/01/2016	3320Arbor Logic	Arboricultural Assessments (x3)	$885.50
3216.335-01	27/01/2016	335City of Rockingham	Lost Inter-library Loan	$84,191.30
3216.3355-01	27/01/2016	3355Gholam Reza Najafzadeh Abriz	IPWEA Membership 2016/17 Reimbursement	$286.00
3216.3450-01	27/01/2016	3450West Coast Shade	Installation of 37 x shade sails for Sum	$6,039.00
3216.3452-01	27/01/2016	3452WA Recycling Service	Greenwaste Collection from 041215	$1,151.04
3216.346-01	27/01/2016	346Clean Sweep	Road sweeping 04/12/15 - Medina various	$2,246.75
3216.347-01	27/01/2016	347Transpacific Cleanaway Limited	Waste Collection December 2015	$159,097.62
3216.357-01	27/01/2016	357BullAnt Security Pty	Koorliny - replace damaged deadbolt	$1,868.58
3216.3580-01	27/01/2016	3580HECS Fire	Wellard Community Centre-Attend to call	$7,797.90
3216.358-01	27/01/2016	358Coastline Mower World	Chainsaw Repair	$708.70
3216.3584-01	27/01/2016	3584CPG Research & Advisory Pty Ltd	CPG Advice Fees quarter ended December 2	$3,300.00
3216.359-01	27/01/2016	359Coates Hire Operations Pty Ltd	Hire of 12 mobile Lighting Towers Mandur	$3,848.13
3216.3607-01	27/01/2016	3607Hays Specialist Recruitment Pty Ltd	Hours Worked-Belinda HIII WE 10/01/16	$6,548.38
3216.3642-01	27/01/2016	3642Hodge Collard Preston Pty Ltd	Contract 563KWN13 Detailed Design Kwina	$2,145.00
3216.3679-01	27/01/2016	3679Antonino Scidone	IPWEA Membership 2016 Reimbursement	$286.00
3216.3700-01	27/01/2016	3700Tutoring Australasia	Yourtutor License Renewal (1st February	$7,271.00
3216.3755-01	27/01/2016	3755Dowsing Concrete	Supply & lay footpaths Sulphur Rd	$42,445.17
3216.3935-01	27/01/2016	3935Saferoads Pty Ltd	Supply and Install Speed Cushion at Burl	$5,444.97
3216.3977-01	27/01/2016	3977MRP Osborne Park-General Pest/Termi	General Pest/Termite Division 4307	$536.03
3216.4003-01	27/01/2016	4003Infiniti Group	B17R400PP Toilet Roll (6001), B18BR Ecos	$677.44
3216.407-01	27/01/2016	407Staples Australia	Stationery, Toilet rolls, hand towels -	$3,612.55
3216.4077-01	27/01/2016	4077Commarine	Hino Truck - VIN: JHDGT8JHMXXX10081 - R	$521.00
3216.4112-01	27/01/2016	4112Cleverpatch Pty Ltd	Craft items for holiday activities	$162.91
3216.412-01	27/01/2016	412Courier Australia	Courier Charges to 111215	$78.79
3216.4125-01	27/01/2016	4125LD Total	December-Landscape Maintenance Works W	$70,606.31
3216.413-01	27/01/2016	413Covs Parts Pty Ltd	Air Filter	$1,318.68
3216.4176-01	27/01/2016	4176Banyan Creative	Darius Movie Night Operation and Popcorn	$1,694.00
3216.4179-01	27/01/2016	4179Australian Office Leading Brands	Reply Paid envelopes 140068 (4 x 250) 10	$474.14
3216.4184-01	27/01/2016	4184Salvatore Sorgiovanni	IPWEA Membership 2016 Reimbursement	$286.00
3216.4190-01	27/01/2016	4190AC Cooling Services	BP - Clubhouse, Service Air-conditioner	$341.00
3216.4233-01	27/01/2016	4233Wavesound Pty Ltd	Purchase of CD's	$1,128.60
3216.4245-01	27/01/2016	4245ED Property Services	BP - villa 27, Repair to ceiling vent an	$77.00
3216.4256-01	27/01/2016	4256Rockingham Skylights	APU - unit 22, replace ducting to 3 skyl	$600.00
3216.4364-01	27/01/2016	4364Trenchbusters Pty Ltd	Mulch Spreading at Anketell Road	$13,376.00
3216.4382-01	27/01/2016	4382Stonehenge Ceramics	BP - villa 6, replace loose tiles in kit	$752.50
3216.4412-01	27/01/2016	4412JB Hi-Fi Rockingham	Purchase DVDs to the value of $500.00	$499.50
3216.4422-01	27/01/2016	4422Octagon - BKG Lifts	Repairs lift Fiona Harris Pavilion	$924.00
3216.4453-01	27/01/2016	4453Carringtons WA	Traffic Management-Gilmore Ave	$28,251.42
3216.4477-01	27/01/2016	4477Trophy Express	Trophies Tuesday night mixed netball gra	$326.00
3216.4550-01	27/01/2016	4550Bitumen Surfacing	Bituminous Sprayed Sealing Works Mandura	$22,865.92
3216.4692-01	27/01/2016	4692Elliotts Irrigation Pty Ltd	Iron Filter Service x 4-Wellard	$2,317.70
3216.4719-01	27/01/2016	4719Complete Office Supplies Pty Ltd	William Bertram December Stationary Orde	$1,545.79
3216.4743-01	27/01/2016	4743Artcom Fabrication	Vehicle magnets x2 600x500mm gloss lamin	$249.70
3216.4800-01	27/01/2016	4800Web In A Box	Package Starter-Toy Trak FDC	$810.00
3216.4804-01	27/01/2016	4804G L Clotworthy	Supply of Sound Equipment & Operation -	$770.00
3216.483-01	27/01/2016	483Landgate	GRV chargeables,Sch No.G2015/26,5-18/12/	$4,427.45
3216.4918-01	27/01/2016	4918Fairfax Digital Australia & NZ Pty	597KWN15 - Tenderlink upload of document	$192.50
3216.4952-01	27/01/2016	4952Lasi Controls	Attendance of BMS breakdowns in the hyd	$418.00
3216.5015-01	27/01/2016	5015Ellenby Tree Farm Pty Ltd	12 x Agonis flexuosa 100Lt for KIA tree	$2,376.00
3216.5033-01	27/01/2016	5033Baileys Fertilisers	Wellard Oval - Soil analysis testing and	$875.60
3216.5035-01	27/01/2016	5035Quell Cleen	APU - unit 63, carpet cleaning and gener	$320.00
3216.5071-01	27/01/2016	5071JB HiFi Commercial Division	Purchase music CDs to the value of $250.	$249.86
3216.510-01	27/01/2016	510Downer EDI Engineering Electrical P	Electrical Test & Tagging for Freakfest	$511.50
3216.5128-01	27/01/2016	5128M P Rogers & Associates Pty Ltd	Specification for Demolition of Kwn Beac	$3,641.72
3216.5147-01	27/01/2016	5147Perth Audiovisual	Local orgs Christmas Function Lighting	$231.00
3216.5191-01	27/01/2016	5191Sureguard Security Pty Ltd	Static Guard to maintain crowd control a	$1,016.40
3216.522-01	27/01/2016	522Dymocks Book Sellers	Purchase Titles Various	$140.34
3216.5223-01	27/01/2016	5223Go Go On-Hold Pty Ltd	On-hold messages Jan 16 to Jun 16	$414.00
3216.5375-01	27/01/2016	5375Radical Fitness WA	Radical license fees January 2016	$298.00
3216.5387-01	27/01/2016	5387Woodlands Distributors & Agencies	Supply 11 x 5.4m Rightwood secret fix de	$1,187.45
3216.544-01	27/01/2016	544Environmental Industries Pty Ltd	Works Completed to date Kwn Adventure P/	$492,185.40
3216.5520-01	27/01/2016	5520Master Lock Service	Call to U17 Callistermon Crt & Repair Ga	$1,286.00
3216.5537-01	27/01/2016	5537Girl Guides WA Inc	Kidsport Payment Isla Spencer	$200.00
3216.5546-01	27/01/2016	55464 Signs Pty Ltd	Partial bus wrap - custom design - artwo	$6,732.00
3216.560-01	27/01/2016	560Goodchild Enterprises	RTX14-BS battery	$72.05

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3216.5627-01	27/01/2016	5627	Tyrecycle Pty Ltd	Tyre collection December 2015	$368.58
3216.5679-01	27/01/2016	5679	Kwinana District Diamond Sports Ass	Kidsport Payments J Jones, J Jarvis, K L	$380.00
3216.5743-01	27/01/2016	5743	Programmed Maintenance Services Ltd	Garden & Turf maintenance BP Village-Dec	$9,245.61
3216.5750-01	27/01/2016	5750	Kev's Wheelie Kleen	Darius Wells Library/Resource Centre Bin	$260.00
3216.5751-01	27/01/2016	5751	David Roberts Graphics	Bluebeam Revu Standard Annual Maintenanc	$715.00
3216.5823-01	27/01/2016	5823	Accord Security Pty Ltd	Freakfest - Security Static overnight to	$508.20
3216.5830-01	27/01/2016	5830	CPD Group Pty Ltd	Emergency lighting, Fire Det-Koorliny Ar	$59,584.09
3216.5851-01	27/01/2016	5851	Homestead Ridge Progress Associatio	Grant - Neighbour Day	$2,000.00
3216.5958-01	27/01/2016	5958	West Coast Profilers	Profile 50mm of Road Surface Mandurah Rd	$23,958.79
3216.5995-01	27/01/2016	5995	Zenien Pty Ltd T/as ATFT Astuta Tru	Phase 2 CCTV Project Kwinana City Centre	$22,965.36
3216.6000-01	27/01/2016	6000	Scott Printers Pty Ltd	IOG extended documentation. Brochure of	$418.00
3216.60-01	27/01/2016	60	Air Liquide	cylinder fee invoice no. sw2864	$75.07
3216.6018-01	27/01/2016	6018	ALSCO Pty Ltd	Hire of Tea towels & Tablecloths	$245.00
3216.6075-01	27/01/2016	6075	Ricardo Natalio Espinoza	IPWEA Membership 2016 Reimbursement	$286.00
3216.6091-01	27/01/2016	6091	Kilo Holdings Pty Ltd	Darius Wells Plant Hire December 2015	$110.00
3216.6158-01	27/01/2016	6158	Defib Your Club For Life Limited	Darius Wells replacement defib	$2,900.00
3216.6182-01	27/01/2016	6182	Hospitality Accessories	Loc Orgs Xmas Functions 041215	$559.90
3216.6261-01	27/01/2016	6261	Rebecca J Flanagan	Children's Christmas performance - The C	$350.00
3216.6289-01	27/01/2016	6289	Clockwork Print	Print and delivery of roster signs x2 61	$209.00
3216.6316-01	27/01/2016	6316	KPMG	Feasibility & property strategy report f	$16,500.00
3216.6319-01	27/01/2016	6319	Meagan Sandra Hodgson	Reimb items for School Holiday Program	$44.55
3216.6370-01	27/01/2016	6370	Elexacom	Casuarina Hall - - RCD bush button test	$6,370.77
3216.6371-01	27/01/2016	6371	KDAire Mechanical Services Pty Ltd	Replace water pump at Fiona Harris Pav	$25,834.55
3216.6380-01	27/01/2016	6380	Anne Yardley	Oral interview with Gary Stidworthy (inc	$556.00
3216.640-01	27/01/2016	640	Gilden Tree Farm	January - tree watering on 4/1, 11/1	$2,893.75
3216.6566-01	27/01/2016	6566	Isentia Pty Limited	Media monitoring-coverage and alerts for	$2,402.06
3216.6567-01	27/01/2016	6567	Poolegrave Signs	Illegal dumping signs Supply and deliver	$435.60
3216.662-01	27/01/2016	662	Green Skills Inc / Ecojobs	Hire of personnel 17 & 20 Nov 2015	$1,703.35
3216.664-01	27/01/2016	664	Greenway Enterprises	C636974 Leaf Rake, RH450GF Premium Fan	$1,842.56
3216.6660-01	27/01/2016	6660	Preplan Pty Ltd	Consultancy Services	$1,076.63
3216.6700-01	27/01/2016	6700	Sprayking WA Pty Ltd	December - Chemical weed control of Hard	$15,319.13
3216.6703-01	27/01/2016	6703	Lucor Pty Ltd	Years of Service x2 at Depot 11 December	$670.00
3216.6732-01	27/01/2016	6732	Elizabeth Midgley	Storytime and book launch	$350.00
3216.6743-01	27/01/2016	6743	Josh Byrne & Associates	Work completed to date on Calista Advent	$8,890.13
3216.6745-01	27/01/2016	6745	Shelford Constructions Pty Ltd	Contract 572KWN14 - Wandi Community Cer	$14,495.15
3216.6834-01	27/01/2016	6834	S & L Engineering	ANNUAL INSPECTION, DEPOT WORKSHOI	$309.35
3216.684-01	27/01/2016	684	Hart Sport	assorted sizes of netball gloves	$11.50
3216.6876-01	27/01/2016	6876	Flora Plant	Local orgs Christmas function Poinsettia	$616.00
3216.6972-01	27/01/2016	6972	Go Doors Pty Ltd	Parmelia house - New door closer to fron	$904.96
3216.7-01	27/01/2016	7	AAA Windscreens & Tinting	Supply & Fit new windscreen - Fire Suppo	$897.00
3216.7062-01	27/01/2016	7062	UES International	Telescopic Support Stays/Brackets	$362.45
3216.7168-01	27/01/2016	7168	Exit Waste	Thomas Kelly Pavilion -Clean greasetrap	$1,954.70
3216.720-01	27/01/2016	720	Hydramet Pty Ltd	HSA1020V3 - Hydra Sentinel - Cylinder Yo	$429.11
3216.7366-01	27/01/2016	7366	REDiMED Pty Ltd	Medical Assessment-Janelle McBain	$159.50
3216.7368-01	27/01/2016	7368	Eosh Consulting Pty Ltd	Dev of framework AMP	$1,650.00
3216.7398-01	27/01/2016	7398	AP Photography	Photography for Freakfest - 2.5 hours pl	$535.00
3216.7415-01	27/01/2016	7415	Hames Sharley Pty Ltd	Professional Services-15/10/15-30/11/15	$8,712.00
3216.7436-01	27/01/2016	7436	Action Glass Pty Ltd	The Zone - Reglazed broken lowlite windo	$643.23
3216.7445-01	27/01/2016	7445	Mustang Welding & Fabrication	PL275, Reg: 1TKL116 PLANT TRAILER, RO	$3,578.26
3216.7503-01	27/01/2016	7503	Priceless Discount Kwinana	Darius Wells - Christmas supplies for af	$100.00
3216.7515-01	27/01/2016	7515	Replants.com	Supply & Install 3 grass trees	$1,243.00
3216.7544-01	27/01/2016	7544	Mantrac Pty Ltd	Firebreak Mulching, Millar Wellard Reser	$1,743.50
3216.7606-01	27/01/2016	7606	Hartley Software Services	Training Sessions for Office 2010 Upgrad	$3,960.00
3216.7609-01	27/01/2016	7609	Rockingham Roofing Pty Ltd	BP - renewal to gutters and downpipes at	$42,770.53
3216.7611-01	27/01/2016	7611	Alpha Pest Animal Solutions	Release of RHDV for Rabbit control at Wi	$2,200.00
3216.762-01	27/01/2016	762	Blackwood & Sons Ltd	Purchase Lamp Revolving Amber 12V Hella	$1,384.68
3216.7625-01	27/01/2016	7625	Flex Industries Pty Ltd	Carried out fault & repairs to KWN704P t	$5,919.37
3216.7627-01	27/01/2016	7627	Digrite	1600m Wide open face bucket broom	$5,643.00
3216.7643-01	27/01/2016	7643	Starik Fire Protection Inspection	Wandi Community Centre - Prepare all bas	$1,809.50
3216.7666-01	27/01/2016	7666	Asset Infrastructure Management	Road & Footpath Condition Rating Inspect	$32,324.60
3216.7669-01	27/01/2016	7669	Calibre Consulting	INV# 29221 - Casuarina District Structur	$3,597.00
3216.7679-01	27/01/2016	7679	Mark Lloyd	Freakfest - 30 minute set at Freakfest 2	$500.00
3216.7692-01	27/01/2016	7692	Jamilla Music	Freakfest - Jamilla Music performance Fr	$50.00
3216.770-01	27/01/2016	770	Jason Signmakers	Parking Signs for Medina Citizen Hall as	$126.50
3216.7748-01	27/01/2016	7748	Xyanthe Lee	Freakfest Performance 05/12/15	$50.00
3216.7749-01	27/01/2016	7749	Peel Chamber of Commerce & Industry	Conflict Management Training A Harold	$550.00
3216.7750-01	27/01/2016	7750	Morley Panthers Rollers Skating Clu	Kidsport Payment C Noordink	$200.00
3216.7752-01	27/01/2016	7752	Candice Faye Keeble	Reimbursement of frames for Aust Day Pre	$90.00
3216.7753-01	27/01/2016	7753	Marlene Anderson	Book-Ledge Point:A Town of Innovation &	$37.30

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Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3216.7754-01	27/01/2016	7754	Patricia Dearlove	Refund swimming lessons	$47.00
3216.806-01	27/01/2016	806	Kearns Garden & Hardware Supplies	Hardware supplies for December, 2015	$638.80
3216.827-01	27/01/2016	827	Kwinana Bowling Club Inc	Seniors Christmas lunch - 150 people x $	$3,300.00
3216.888-01	27/01/2016	888	Les Mills Australia	Les Mills license fees January 2016	$639.21
3216.934-01	27/01/2016	934	Mandogalup Volunteer Fire Brigade	DFES ESL Recoup Oct - Dec 2015	$2,177.29
3216.959-01	27/01/2016	959	McLeods Barristers & Solicitors	Legal expenses - Employment Law Advice	$7,696.60
3216.982-01	27/01/2016	982	Milmar Distributors	Single Ply Thermal Sensitive Paper 57mm	$366.00
3216.985-01	27/01/2016	985	Squire Patton Boggs Au	Proceedings commenced by Lehman Brother	$4,045.24
3216.999-01	27/01/2016	999	Mrs Mac's Pty Ltd	Cafe Splash Drinks Order	$119.75
3217.549-01	20/01/2016	549	Esanda	2016 - Monthly lease fees x 6 for KWN70	$1,294.70
3218.7690-01	21/01/2016	7690	Wright Express Australia Pty Ltd	Puma fleet fuel 1/12/15-31/12/15	$8,260.82
3219.153-01	27/01/2016	153	Australian Taxation Office	Taxation	$182,098.00
3219.4805-01	27/01/2016	4805	TPG Internet Pty Ltd	Monthly Internet Kwinana South Station 3	$49.99
3220.2765-01	29/01/2016	2765	Toyota Financial Services	End of lease fee for 1DED529 plant#267,	$728.20

Total:	Creditors		497	$4,335,685.66

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Minimum Amount: **$0.00**

Non-Creditors

Cheque No.	Chq Date	Payee	Description	Amount
00018063	06/01/2016	Westpac Banking Corporation IBN9	Audit Certificate for year ended 30 June 2015	$30.00
00018064	06/01/2016	& Rebecca Amelia Adams Michael John	Rates Refund	$498.52
00018065	06/01/2016	Katherine Fraser	Refund of membership	$17.00
00018066	06/01/2016	Tresna Shorter 8 Dove Court	Thesis on the Peel Estate 1919-1936	$132.00
00018067	06/01/2016	Elijah Walker 21 Chapel Street	Refund- amount credited from account in erro	$100.00
00018068	06/01/2016	QBE Insurance	Overpayment of Invoices 359847 Tira Edwarc	$659.96
00018069	06/01/2016	Homezone Building Pty Ltd	Refund sec dep-L315 Brantwood Turn	$1,456.00
00018070	06/01/2016	Homezone Building Pty Ltd	Refund sec dep-L452 Furness Loop	$1,456.00
00018071	06/01/2016	Pure Homes Pty Ltd T/A B1homes	Refund sec dep-L234 Sapphire Chase	$1,456.00
00018072	06/01/2016	Melissa E & Stacey Tuli	Refund sec dep-L181 Ellsworth Road	$1,500.00
00018073	06/01/2016	Gordana Douglas	Refund bond-animal trap 18/12/2015	$103.00
00018074	06/01/2016	Tahlia Dorrington	Refund bond-Hall hire 19/12/2015	$2,000.00
00018076	06/01/2016	Niche Living Po Box 51	Refund O/payment of fees-BSL not required	$61.65
00018088	13/01/2016	Tahlia Dorrington 14 Whinhill Loop	Refund hire fees-Medina Hall 19/12/2015	$338.10
00018089	13/01/2016	Att: Craig O'Donoghue Chicken Treat	Refund bond-Hall hire 06/01/2016	$300.00
00018090	13/01/2016	Disability Services Commission PO B	Refund of bond - Hall hire 4/11/2015	$40.00
00018091	13/01/2016	Disability Services Commission PO B	Refund bond-Hall hire 4/11/2015	$360.00
00018100	20/01/2016	WA Disabled Sports	Cancelled hire of Fiona Harris Pavillion - Tues	$90.75
00018101	20/01/2016	Valerie Gray 9 Blackboy Rise	Snrs Security Subsidy Scheme-20150113	$100.00
00018102	20/01/2016	Housing Authority	Rates Refund	$184.72
00018115	27/01/2016	BP Refinery (Kwinana) Ltd	Refund Bond Hall Hire 24/09/15 Receipt #849	$300.00

Total:	Non-Creditors	21	$11,183.70

Grand Total:	520	$4,348,042.93

Additional Page 11 to include Payroll Payments

256818623	20/01/2016	City of Kwinana	Payroll f/e 20/1/2016		$584,360.71
254998087	6/01/2016	City of Kwinana	Payroll f/e 06/1/2016		$551,892.30
Total: Payroll				2	$1,136,253.01
Total: Creditors, Non Creditors, Cancelled Chqs				520	$ 4,348,042.93
Grand Total:				**522**	**$5,484,295.94**

17 Urgent Business

COUNCIL DECISION

124

MOVED CR B THOMPSON **SECONDED CR R ALEXANDER**

That Council deal with the item of urgent business as presented in the Addendum to the Agenda.

CARRIED
7/0

17.1 Amendments to Register of Delegated Authority – Local Government Officer to Chief Executive Officer, Officers and Committees 2016

SUMMARY:

At its 10 February 2016 meeting, Council resolved to delegate certain functions to the Chief Executive Officer (CEO), Officers and Committees, to have the discretion to exercise delegated authority under the relevant legislation. As part of the on-going review to ensure that all delegations and appointments have been captured, a new delegation and an amendment to an existing delegation have been identified as follows:

1.13 Administration of local laws (new delegation);
3.2 Subdivision and development control (amended delegation)

OFFICER RECOMMENDATION:

That Council authorise the following amendments to the Register of Delegated Authority – Local Government to Chief Executive Officer, Officers and Committees 2016, as detailed in Attachment A:

- 1.13 Administration of local laws
- 3.2 Subdivision and development control

NOTE – AN ABSOLUTE MAJORITY OF COUNCIL IS REQUIRED

DISCUSSION:

These delegations are required to ensure the services the local government provides, in relation to powers and duties of the local government under the Local Government Act 1995 and other legislation for which a local government has responsibility, can be delivered in a timely and efficient manner and are recommended for adoption.

1.13 Administration of local laws

Section 3.18(1) of the Local Government Act 1995 (Act) allows a local government to administer its local laws to perform functions under the Act.

17.1 AMENDMENTS TO REGISTER OF DELEGATED AUTHORITY – LOCAL GOVERNMENT OFFICER TO CHIEF EXECUTIVE OFFICER, OFFICERS AND COMMITTEES 2016

At present, the current delegation register doesn't include a specific delegation to the CEO to administer local laws. To ensure clarity and remove any doubt in the administration of the local laws, it is considered appropriate for the delegated authority register to be amended to include a new delegation. The new delegation provides the CEO with the authority to perform those requirements for which the City's local laws have been created. It also gives the CEO the ability to manage the daily operations of the local government that involve local laws.

3.2 Subdivision and development control

In October 2015, the State Government gazetted the *Planning and Development (Local Planning Schemes) Regulations 2015* (Regulations). Amongst many measures to standardise local planning schemes throughout the state, the Regulations introduced new provisions relating to delegations by local government. It has come to the attention of City Officers that due to the changes implemented by the Regulations, the Register of Delegated Authority – Local Government to CEO, Officers and Committees 2016 (Register) is required to be amended.

The Regulations incorporate 'Deemed Provisions' which apply to all planning schemes within Western Australia. Schedule 2 - Clause 82 of the deemed provisions for local planning schemes (deemed provisions), states:

(1) The local government may, by resolution, delegate to a committee or to the local government CEO the exercise of any of the local government's powers or the discharge of any of the local government's duties under this Scheme other than this power of delegation.
(2) A resolution referred to in subclause (1) must be by absolute majority of the council of the local government.
(3) The delegation must be in writing and may be general or as otherwise provided in the instrument of delegation.

In this regard, Schedule 2 - Clause 82(1) of the deemed provisions requires that if the local government is to delegate its functions under the Scheme then it shall be directly to the CEO of the local government.

The current delegation refers to Clause 2.6 of the Scheme (which is now superseded by Schedule 2 - Clause 82(1) of the Deemed Provisions). Clause 2.6 of the Scheme states:

> "*The Council may delegate to an officer of the Council the power to determine applications for Planning Approval, including the discretionary power of Council, which it is entitled to exercise by virtue of the Scheme."*

In regard to the current delegation, the functions to be performed have been delegated to the CEO and a number of City Officers. This current delegation is now technically in conflict with Schedule 2 - Clause 82(1) of the deemed provisions. For the Register to be in accordance with the requirements of Schedule 2 - Clause 82(1) of the deemed provisions, an amendment to the Register is required delegating the local government's functions of the Scheme to the CEO only. Under Schedule 2 - Clause 83 of the deemed provisions, the CEO may then sub-delegate any functions under the Scheme to an employee of the local government as granted under Schedule 2 - Clause 82.

17.1 AMENDMENTS TO REGISTER OF DELEGATED AUTHORITY – LOCAL GOVERNMENT OFFICER TO CHIEF EXECUTIVE OFFICER, OFFICERS AND COMMITTEES 2016

It should also be noted that the new Clause 82 provides a wider range of delegation for development matters than did the previous Clause 2.6 under the Scheme which referred only to '*applications for Planning Approval*'. City Officers are currently considering how best to apply this wider range of delegation for greater efficiencies but also to take account of the changes to process brought about via the new regulations themselves. Prior to a Council Report seeking changes to the delegations, it is intended to hold a Councillor Forum to discuss any proposals with Councillors.

A copy of the current delegation 3.2 – Subdivision and development control, is at Attachment B.

LEGAL/POLICY IMPLICATIONS:

Local Government Act 1995

3.18. Performing executive functions

(1) A local government is to administer its local laws and may do all other things that are necessary or convenient to be done for, or in connection with, performing its functions under this Act.

5.41. Functions of CEO

The CEO's functions are to —

(i) perform any other function specified or delegated by the local government or imposed under this Act or any other written law as a function to be performed by the CEO.

5.42. Delegation of some powers and duties to CEO

(1) A local government may delegate* to the CEO the exercise of any of its powers or the discharge of any of its duties under —
   (a) this Act other than those referred to in section 5.43; or
   (b) the Planning and Development Act 2005 section 214(2), (3) or (5).
   * Absolute majority required.

(2) A delegation under this section is to be in writing and may be general or as otherwise provided in the instrument of delegation.

Planning and Development (Local Planning Scheme) Regulations 2015

Schedule 2 — Deemed provisions for local planning schemes
82. Delegations by local government

(1) The local government may, by resolution, delegate to a committee or to the local government CEO the exercise of any of the local government's powers or the discharge of any of the local government's duties under this Scheme other than this power of delegation.

(2) A resolution referred to in subclause (1) must be by absolute majority of the council of the local government.

(3) The delegation must be in writing and may be general or as otherwise provided in the instrument of delegation.

Schedule 2 — Deemed provisions for local planning schemes
83. Local government CEO may delegate powers

(1) The local government CEO may delegate to any employee of the local government the exercise of any of the CEO's powers or the discharge of any of the CEO's functions under this Scheme other than this power of delegation.

17.1 AMENDMENTS TO REGISTER OF DELEGATED AUTHORITY – LOCAL GOVERNMENT OFFICER TO CHIEF EXECUTIVE OFFICER, OFFICERS AND COMMITTEES 2016

(2) A delegation under this clause must be in writing and may be general or as otherwise provided in the instrument of delegation.
(3) Subject to any conditions imposed by the local government on its delegation to the local government CEO under clause 82, this clause extends to a power or duty the exercise or discharge of which has been delegated by the local government to the CEO under that clause.

FINANCIAL/BUDGET IMPLICATIONS:

There are no direct financial implications related to this report.

ASSET MANAGEMENT IMPLICATIONS:

There are no direct asset management implications related to this report.

ENVIRONMENTAL IMPLICATIONS:

There are no direct environmental implications related to this report.

STRATEGIC/SOCIAL IMPLICATIONS:

The role of Council is to ensure that the Council's delegations are aligned with the key goals and aspirations as set out in our Plan for the Future.

RISK IMPLICATIONS:

There are no risk implications related to this report.

COUNCIL DECISION

125

MOVED CR B THOMPSON **SECONDED CR R ALEXANDER**

That Council authorise the following amendments to the Register of Delegated Authority – Local Government to Chief Executive Officer, Officers and Committees 2016, as detailed in Attachment A:

- **1.13 Administration of local laws, with amendments to the Function to be performed and Reporting Requirements sections**
- **3.2 Subdivision and development control**

CARRIED BY AN ABSOLUTE MAJORITY OF COUNCIL 7/0

NOTE – That the Officers Recommendation has been amended due to amendments to Attachment A, relating to 1.13 Administration of Local Laws.

ATTACHMENT A

1.13 Administration of local laws	
Function to be performed:	Authorised to: Administer the City of Kwinana's local laws and do things required by those local laws that are necessary or convenient to be done for, or in connection with, performing its functions under the Local Government Act.
Legislative power or duty delegated:	Local Government Act 1995 s3.18 Performing executive functions
Legislative Power to Delegate:	Local Government Act 1995 s5.42 Delegation of some powers to the CEO
Date Delegation made or reviewed:	February 2016
Delegation to:	Chief Executive Officer
Conditions and Exceptions:	Nil
Statutory Power to sub-delegate:	Local Government Act 1995 s5.44 CEO may delegate some powers and duties to other employees
Reporting Requirements:	Any exercise of this delegation is to be recorded in the Delegated Authority Register.

3.2 Subdivision and development control	
Function to be performed:	Authority to: 1 Determine applications for Planning Approval in regards to development including change of use and variations to development standards; 2 Make objections or recommendations in respect of Subdivision Applications to the West Australian Planning Commission, including recommendations for the imposition of subdivision conditions; 3 Make recommendations for approval or refusal of development within Planning Control Areas; and 4 Determine applications for variations to previously approved Planning Applications 5 Give a written direction in accordance with section 214 of the Planning and Development act 2005 to the owner or any other person undertaking a development.
Legislative power or duty delegated:	Town of Kwinana Town Planning Scheme No. 2 Town of Kwinana Town Planning Scheme No. 3 Planning & Development Act 2005 Part 7 Planning Control Areas Part 8 Improvement Plans and Schemes Part 13 Enforcement and Legal Proceedings
Legislative Power to Delegate:	Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 – Part 10 - Clause 82(1) Delegations by local government
Date Delegation made or reviewed:	November 2011 D11/90333 December 2012 D12/77148 February 2015 D15/8358 August 2015 Resolution 551 10 February 2016 D16/1283
Delegation to:	Chief Executive Officer
Conditions and Exceptions:	**Conditions**: 1. The authority is only to be exercised for those uses or other applications specified in: ***Table 1 - Use Classes; and***

	Table 1A Use Classes for Other Applications. (attached) 2. May determine variations to Planning Applications including Planning Applications previously approved by resolution of Council, that are of a minor nature and if amended, would not substantially change the development approved and for which no objection has been received during advertising (if applicable). 3. Prosecutions The authority to proceed with any prosecution under the Planning and Development Act 2005 must be approved by the Chief Executive Officer prior to commencement. **Exceptions:** Excluding <u>variations</u> to Planning Applications as stated in Condition (2) above, this delegation does not include the following: • The acceptance of mediated outcomes or determinations of s31 reconsiderations for appeals lodged with the State Administrative Tribunal • Local Development Plans • Local Planning Policies including amendments • Major development within the Town Centre
Reporting Requirements:	1. Any exercise of this delegation is to be recorded in the Delegated Authority Register. 2. In relation to Condition (2) above, any variation to a planning approval for which a prior resolution by Council applies, must be preceded by a memo to Council prior to any determination being made.

Table 1. – Use classes

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Aged/Dependent Persons Dwelling	D	D					D					D	
Ancillary Accommodation	D						D		D	D		D	Provided Compliance With LPP 3.3.30
Amenity Building	D	D	D	D	D	D	D	D				D	
Amusement Centre		D	D	D			D					D	
Aqua Culture							D						
Boat Sales			D	D	D	D							
Boatel					D	D							
Bus Station					D								
Car Park	D	D	D		D	D	D	D				D	
Caravan park						D	D	D					
Caretakers House/Flat	D	D	D	D	D	D	D	D					Where Incidental to Existing Use
Chicken farm							D						
Child Care Centre	D	D										D	
Civic Building		D	D	D		D						D	
Club		D	D									D	
Commercial Hall		D	D	D								D	
Consultation Rooms		D	D			D						D	
Dog Kennels						D	D						
Drive-in Takeaway Food Shop		D				D						D	
Drive-In Theatre						D						D	
Dry Cleaning Premises		D	D	D		D							
Eating House	D	D	D		D	D						D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Educational Establishment	D	D			D	D	D					D	
Equestrian uses							D			D			Provided No Clearing of vegetation is required Outside Building Envelopes and consistent with scheme TPS 2
Extractive Industry					D	D	D	D					
Factory Units				D	D	D							
Family Day Care centre	D	D	D		D	D	D	D				D	
Fish Shop		D	D									D	
Forestry (selective)							D	D					
Fuel Depot			D		D	D		D					
Funeral parlour		D	D	D	D	D	D					D	
General Industry					D			D					
Grouped Dwelling	D	D											
Hazardous Industry					D								Where no objection received during advertising
Health Centre		D	D		D	D							
Health Studio	D	D	D		D	D						D	
Holiday Accommodation				D		D	D	D					
Home Occupation	D	D					D		D	D		D	
Hospital	D	D	D	D		D	D	D				D	Where no objection received during advertising
Hotel		D		D								D	Where no objection received during advertising
Intensive Agriculture							D						
Laundry (Industrial)			D	D	D	D							
Laundrette		D	D	D		D						D	
Licensed Restaurant	D	D	D			D						D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Light Industry					D	D		D					
Liquor Sore		D	D	D								D	
Local Shop	D	D	D	D	D	D	D					D	Where no objection received during advertising
Lodging House	D	D				D						D	
Marina					D	D							
Medical Clinic	D	D	D	D		D	D					D	Where no objection received during advertising
Motel	D	D	D	D									Where no objection received during advertising
Motor Racing Track			D		D		D						
Motor Repair Station		D	D		D	D						D	
Multiple Dwelling	D	D										D	
Museum	D	D	D									D	
Non-residential Health Centre	D	D	D	D	D	D						D	Where no objection received during advertising
Noxious Industry					D								Where no objection received during advertising
Office		D	D	D	D	D						D	
Open Air Display		D	D	D	D	D						D	
Open Air Storage Yard				D	D	D							
Petrol Filling Station		D	D	D	D	D		D				D	
Piggery					D		D						Where no objection received during advertising
Private Hotel		D	D	D								D	
Private Recreation		D	D	D		D	D					D	
Private Utility	D	D	D	D	D	D	D	D				D	
Professional Office		D	D	D								D	
Public Amusement	D	D	D	D			D	D				D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Public Assembly – Place of	D	D	D	D	D	D	D					D	Where no objection received during advertising
Public Recreation	D	D	D	D	D	D	D	D				D	
Public Utility	D	D	D	D	D	D	D	D	D	D	D	D	
Public Worship	D	D	D	D	D	D	D	D				D	Where no objection received during advertising
Recreation facilities	D	D	D	D	D	D	D	D				D	
Residential Building	D						D		D	D		D	
Restricted Premises		D	D	D		D						D	Where no objection received during advertising
Retail Plant Nurseries		D	D	D		D	D						Where no objection received during advertising
Rural Industry					D	D	D	D					
Rural Produce Stall							D						
Service Industry		D	D	D	D	D						D	Where no objection received during advertising
Service Station		D	D	D	D	D						D	
Shop		D		D								D	
Showroom,		D	D	D	D	D						D	
Single House	D	D	D		D	D	D		D	D	D	D	
Stables							D	D		D			
Tailing Ponds								D					
Tavern		D	D	D								D	
Telecommunication Infrastructure	D	D	D	D	D	D	D	D				D	Where no objection received during advertising
Trade Display		D	D	D	D	D						D	
Transport Depot				D	D	D		D					
Vehicles Sales		D	D	D		D						D	

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Vehicle Wreckers					D	D							
Veterinary Clinic	D	D	D	D	D	D	D					D	Where no objection received during advertising
Veterinary Hospital			D	D	D	D	D					D	
Warehouse		D	D	D	D	D						D	

Table 1A

Use classes for other applications

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Other Applications													
Amalgamation	D	D	D	D	D	D	D	D	D	D	D	D	
Antennae (attached to building <5m height)	D	D	D	D	D	D	D	D	D	D	D	D	
Building Envelope Variations									D	D			In accordance with TPS No. 2
Satellite Dishes	D	D	D		D	D	D	D	D	D	D	D	In accordance with TPS No.2
Second Storey Addition	D						D		D	D			
Setback Variation		D	D		D	D						D	
Signs	D	D	D	D	D	D	D	D	D	D		D	Provided compliance with Local Law
Subdivision (Freehold/Strata)	D	D	D	D	D	D	D	D	D	D		D	
Vegetation removal (Diseased or Dangerous)							D		D	D			
Verandahs (within road reserves)		D										D	

ATTACHMENT B **CURRENT DELEGATION**

3.2 Subdivision and development control	
Function to be performed:	Authority to: 6 Determine applications for Planning Approval in regards to development including change of use and variations to development standards; 7 Make objections or recommendations in respect of Subdivision Applications to the West Australian Planning Commission, including recommendations for the imposition of subdivision conditions; 8 Make recommendations for approval or refusal of development within Planning Control Areas; and 9 Determine applications for variations to previously approved Planning Applications 10 Give a written direction in accordance with section 214 of the Planning and Development act 2005 to the owner or any other person undertaking a development.
Legislative power or duty delegated:	Town of Kwinana Town Planning Scheme No. 2 – clause 2.6 Town of Kwinana Town Planning Scheme No. 3 - clause 1.7 Part II – Planning Approval Planning & Development Act 2005 Part 7 Planning Control Areas Part 8 Improvement Plans and Schemes Part 13 Enforcement and Legal Proceedings
Legislative Power to Delegate:	Town of Kwinana Town Planning Scheme No. 2 cl. 2.6 Delegations Town of Kwinana Town Planning Scheme No. 3 cl.1.7 Relationship to the Operative TPS
Date Delegation made or reviewed:	November 2011 D11/90333 December 2012 D12/77148 February 2015 D15/8358 August 2015 Resolution 551 10 February 2016 D16/1283
Delegation to:	Chief Executive Officer Director City Development Co-Coordinator Statutory Planning Senior Statutory Planner Planning Compliance Officer Planning Compliance Technical Officer
Conditions and Exceptions:	**Conditions**: 1. The authority is only to be exercised for those uses or other applications specified in:

	Table 1 - Use Classes; and ***Table 1A Use Classes for Other Applications***. (attached) 2. May determine variations to Planning Applications including Planning Applications previously approved by resolution of Council, that are of a minor nature and if amended, would not substantially change the development approved and for which no objection has been received during advertising (if applicable). 3. Prosecutions The authority to proceed with any prosecution under the Planning and Development Act 2005 must be approved by the Chief Executive Officer prior to commencement. **Exceptions:** Excluding variations to Planning Applications as stated in Condition (2) above, this delegation does not include the following: • The acceptance of mediated outcomes or determinations of s31 reconsiderations for appeals lodged with the State Administrative Tribunal • Local Development Plans • Local Planning Policies including amendments • Major development within the Town Centre **Planning Compliance Officer** **Planning Compliance Technical Officer** • Part 13 Enforcement and Legal Proceedings only
Reporting Requirements:	1. Any exercise of this delegation is to be recorded in the Delegated Authority Register. 2. In relation to Condition (2) above, any variation to a Planning Approval for which a prior resolution by Council applies, must be preceded by a memo to Council prior to any determination being made.

Table 1. – Use classes

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS

Aged/Dependent Persons Dwelling	D	D					D					D	
Ancillary Accommodation	D						D		D	D		D	Provided Compliance With LPP 3.3.30
Amenity Building	D	D	D	D	D	D	D	D				D	
Amusement Centre		D	D	D			D					D	
Aqua Culture							D						
Boat Sales			D	D	D	D							
Boatel					D	D							
Bus Station					D								
Car Park	D	D	D		D	D	D	D				D	
Caravan park						D	D	D					
Caretakers House/Flat	D	D	D	D	D	D	D	D					Where Incidental to Existing Use
Chicken farm							D						
Child Care Centre	D	D										D	
Civic Building		D	D	D		D						D	
Club		D	D									D	
Commercial Hall		D	D	D								D	
Consultation Rooms		D	D			D						D	
Dog Kennels						D	D						
Drive-in Takeaway Food Shop		D				D						D	
Drive-In Theatre						D						D	
Dry Cleaning Premises		D	D	D		D							
Eating House	D	D	D		D	D						D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Educational Establishment	D	D			D	D	D					D	

Equestrian uses							D			D			Provided No Clearing of vegetation is required Outside Building Envelopes and consistent with scheme TPS 2
Extractive Industry					D	D	D	D					
Factory Units				D	D	D							
Family Day Care centre	D	D	D		D	D	D	D				D	
Fish Shop		D	D									D	
Forestry (selective)							D	D					
Fuel Depot			D		D	D		D					
Funeral parlour		D	D	D	D	D	D					D	
General Industry					D			D					
Grouped Dwelling	D	D											
Hazardous Industry					D								Where no objection received during advertising
Health Centre		D	D		D	D							
Health Studio	D	D	D		D	D						D	
Holiday Accommodation				D		D	D	D					
Home Occupation	D	D					D		D	D		D	
Hospital	D	D	D	D		D	D	D				D	Where no objection received during advertising
Hotel		D		D								D	Where no objection received during advertising
Intensive Agriculture							D						
Laundry (Industrial)			D	D	D	D							
Laundrette		D	D	D		D						D	
Licensed Restaurant	D	D	D			D						D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Light Industry					D	D		D					
Liquor Sore		D	D	D								D	
Local Shop	D	D	D	D	D	D	D					D	Where no objection received during advertising
Lodging House	D	D				D						D	

Marina					D	D							
Medical Clinic	D	D	D	D		D	D					D	Where no objection received during advertising
Motel	D	D	D	D									Where no objection received during advertising
Motor Racing Track			D		D		D						
Motor Repair Station		D	D		D	D						D	
Multiple Dwelling	D	D										D	
Museum	D	D	D									D	
Non-residential Health Centre	D	D	D	D	D	D						D	Where no objection received during advertising
Noxious Industry					D								Where no objection received during advertising
Office		D	D	D	D	D						D	
Open Air Display		D	D	D	D	D						D	
Open Air Storage Yard				D	D	D							
Petrol Filling Station		D	D	D	D	D		D				D	
Piggery					D		D						Where no objection received during advertising
Private Hotel		D	D	D								D	
Private Recreation		D	D	D		D	D					D	
Private Utility	D	D	D	D	D	D	D	D				D	
Professional Office		D	D	D								D	
Public Amusement	D	D	D	D			D	D				D	Where no objection received during advertising

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Public Assembly – Place of	D	D	D	D	D	D	D					D	Where no objection received during advertising
Public Recreation	D	D	D	D	D	D	D	D				D	
Public Utility	D	D	D	D	D	D	D	D	D	D	D	D	
Public Worship	D	D	D	D	D	D	D	D				D	Where no objection received during advertising

Recreation facilities	D	D	D	D	D	D	D	D				D	
Residential Building	D						D		D	D		D	
Restricted Premises		D	D	D		D						D	Where no objection received during advertising
Retail Plant Nurseries		D	D	D		D	D						Where no objection received during advertising
Rural Industry					D	D	D	D					
Rural Produce Stall							D						
Service Industry		D	D	D	D	D						D	Where no objection received during advertising
Service Station		D	D	D	D	D						D	
Shop		D		D								D	
Showroom,		D	D	D	D	D						D	
Single House	D	D	D		D	D	D		D	D	D	D	
Stables							D	D		D			
Tailing Ponds								D					
Tavern		D	D	D								D	
Telecommunication Infrastructure	D	D	D	D	D	D	D	D				D	Where no objection received during advertising
Trade Display		D	D	D	D	D						D	
Transport Depot				D	D	D		D					
Vehicles Sales		D	D	D		D						D	

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Vehicle Wreckers					D	D							
Veterinary Clinic	D	D	D	D	D	D	D					D	Where no objection received during advertising
Veterinary Hospital			D	D	D	D	D					D	
Warehouse		D	D	D	D	D						D	

Table 1A

Use classes for other applications

USE CLASS	Residential	Commercial	Service Commercial	Mixed Business 1	General Industry	Light Industry	Rural A	Rural B	Special Residential	Special Rural	Special use	Town centre	COMMENTS
Other Applications													
Amalgamation	D	D	D	D	D	D	D	D	D	D	D	D	
Antennae (attached to building <5m height)	D	D	D	D	D	D	D	D	D	D	D	D	
Building Envelope Variations									D	D			In accordance with TPS No. 2
Satellite Dishes	D	D	D		D	D	D	D	D	D	D	D	In accordance with TPS No.2
Second Storey Addition	D						D		D	D			
Setback Variation		D	D		D	D						D	
Signs	D	D	D	D	D	D	D	D	D	D		D	Provided compliance with Local Law
Subdivision (Freehold/Strata)	D	D	D	D	D	D	D	D	D	D		D	
Vegetation removal (Diseased or Dangerous)							D		D	D			
Verandahs (within road reserves)		D										D	

18 Councillor Reports

18.1 Councillor Ruth Alexander

Councillor Ruth Alexander reported that she had attended the Calista Primary School Board Meeting and was pleased to announce that a School Crossing Patrol has been approved for outside the school on Harlow Road. Councillor Alexander mentioned that it was discussed at the meeting that it was good to see the Child Health Centre that is built adjacent to Calista Primary School has proven to be very successful.

18.2 Councillor Wendy Cooper

Councillor Wendy Cooper reported that she had attended the Healthways new Policy Launch for Healthy Living in Kwinana, unfortunately our statistics are not particularly enlightening. Councillor Cooper referred to a movie called The Sugar Man which she explained was an eye opener.

Councillor Cooper mentioned that she had attended the City of Kwinana Citizenship Ceremony and that there had been quite a spread nationalities in attendance.

Councillor Cooper advised that she had attended the Moorditj Koort Open Day and it was lovely to see everyone being pampered.

Councillor Cooper reported that she had attended the City of Kwinana Christmas Lolly Run Thank you event and that it was delightful.

Councillor Cooper mentioned that she had attended the Registry Week Community Briefing Homelessness Forum where they gave some results of a registry they had taken and that there had only been four registered homeless people for our area and we were able to help in a positive manner.

Councillor Cooper advised that she had attended the Kwinana Industries Council (KIC) School Based Training and that she is very impressed to see the dedication and that she is very proud to be apart of it.

18.3 Councillor Bob Thompson

Councillor Bob Thompson reported that he had attended the Registry Week Community Briefing Homelessness Forum and that the overwhelming message that he got out of it was the need for collaboration at all levels of government as well as sponsorship and support from the private sector. Councillor Thompson said it had been very worthwhile attending and that the City of Kwinana was one of a few local governments in attendance.

18.4 Councillor Dennis Wood

Councillor Dennis Wood reported that he attended the Alcoa meeting which was a fairly long meeting and one of the topics covered was different materials that could be used in the mud lakes.

18.1 COUNCILLOR REPORTS CONTINUED

Councillor Wood mentioned that he had attended the South West Corridor Development Foundation Meeting in Melville and that the Australian Defence Force are looking at establishing a museum at Point Peron.

19 Response to Previous Questions

Nil

20 Mayoral Announcements (without discussion)

Mayor Carol Adams reported that she had attended the commissioning of the new school Chaplain at Peter Carnley, Melanie Simms and that it had been a very grand occasion.

The Mayor advised that she had attended Indian Ocean Gateway Meetings with Minister Glenn Sterle. The Mayor also advised that she had also attended a meeting with the City of Fremantle Mayor at the Meeting Place in Fremantle and they had given a joint presentation on the Indian Ocean Gateway and a new Port in Kwinana, it was very well attended with a lot of interest and not one person in attendance was against what was being proposed.

The Mayor attended the Kings College's 30th Anniversary and that the school is going on leaps and bounds and that she is always made to feel very welcome.

The Mayor reported that she had attended a presentation by Minister Helen Morton to launch the Fremantle Family Support Network, which is about bringing the whole of government and not for profit organisations together to assist families. The Mayor explained that this is a new initiative that the government is hoping to spread around the region.

The Mayor advised that she had attended a LyriK Thank You Event, which was for the original sponsors, Eclipse Resources to thank them for their ongoing support.

The Mayor mentioned that she had attended the City of Kwinana Christmas Lolly Run Thank you and that 11,000 bags of lollies had been distributed using 20 vehicles and over 50 volunteers were part of the Kwinana much loved tradition.

21 Matters Behind Closed Doors

Nil

22 Meeting Closure

The Mayor declared the Meeting closed 7:30pm.

Chairperson: 9 March 2016