Ordinary Council Meeting

26 October 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 CAROL ADAMS
DEPUTY MAYOR PETER FEASEY
CR R ALEXANDER
CR S MILLS
CR B THOMPSON
CR D WOOD

MS C MIHOVILOVICH	-	Acting Director City Strategy
MR P NIELSON	-	Acting Director City Development
MR E LAWRENCE	-	Director Corporate and Engineering Services
MS A MCKENZIE	-	Council Administration Officer

Members of the Press	0
Members of the Public	1

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 Bob Thompson 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

Councillor Sandra Lee

Leave(s) of Absence (previously approved):

Councillor Wendy Cooper from 25 October 2016 to 26 October 2016 inclusive.

4 Public Question Time:

Nil

5 Applications for Leave of Absence:

COUNCIL DECISION
347
MOVED CR B THOMPSON **SECONDED CR P FEASEY**

That Councillor Ruth Alexander be granted a leave of absence from 14 November 2016 to 18 November 2016 inclusive.

That Councillor Ruth Alexander be granted a leave of absence from 9 January 2017 to 9 February 2017 inclusive.

CARRIED
6/0

6 Declarations of Interest by Members and City Officers:

Nil

7 Community Submissions:

7.1 Nik Hidding, Peter Webb & Associates, regarding Item 15.1 Application for Additions and Alterations to an Aged Care Facility: Lot: 99 (20) Bright Road, Calista, 6167

The purpose of my community submission is to confirm the applicant's acceptance of the officers recommendation for approval, and thank the City of Kwinana for its ongoing support for Aged Care services.

8 Minutes to be Confirmed:

8.1 Ordinary Meeting of Council held on 12 October 2016:

COUNCIL DECISION
348
MOVED CR P FEASEY **SECONDED CR S MILLS**

That the Minutes of the Ordinary Meeting of Council held on 12 October 2016 be confirmed as a true and correct record of the meeting.

CARRIED
6/0

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

Nil

15 Reports – Built Infrastructure

15.1 Application for Additions and Alterations to an Aged Care Facility: Lot: 99 (20) Bright Road, Calista, 6167

SUMMARY:

An application has been received for the construction of additions to the Banksia Park Aged Care Facility on Lot 99 Bright Road, Calista (refer to Attachments C-E). The application has been referred to Council as it involves the approval of an application within a Special Use Zone under Town Planning Scheme No.2 (TPS2).

The applicant proposes to modernise the existing aged care facility and expand the oldest High Care section to the north of the site. The additions will add a further 55 beds taking the total capacity of the facility up to 168 beds. City Officers have considered the additions and alternations against TPS2 and policies. Matters of car parking, setbacks and landscaping/trees have been considered.

Following this assessment, it is considered that the proposal seeks to best utilise the lot and meet the needs of the Aged Care facility use. The proposal will also provide increased capacity for aged care within the local community. The application is recommended for conditional approval on this basis.

OFFICER RECOMMENDATION:

That Council approves the Additions and Alterations to the Aged Care Facility on Lot 99 (20) Bright Road, Calista subject to the following conditions and advice notes:

1. Conditions
   - 1.1 The premises being kept in a neat/tidy condition at all times by the owner/occupier to the satisfaction of the City of Kwinana.
   - 1.2 Stormwater drainage from roofed and paved areas to be contained and disposed of on site at all times.
   - 1.3 The applicant shall implement dust control measures for the duration of site works to the satisfaction of the City of Kwinana.
   - 1.4 Crossover(s) shall be of concrete construction and located to the specifications and satisfaction of the City of Kwinana.
   - 1.5 The provision of a minimum of an additional three (3) vehicle parking bays of the dimensions 5.5 x 2.5 metres, to be clearly marked on the ground and constructed of bitumen, brick or concrete and drained to the satisfaction of the City of Kwinana.
   - 1.6 All vehicle parking to be accommodated within the boundaries of the subject lot.

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

1.7 Landscaping areas, vehicle parking spaces, accessways and all other development as detailed on the attached plans are to be installed prior to occupying the proposed development and maintained thereafter by the owner/occupier to the satisfaction of the City of Kwinana.

1.8 All regularly trafficked areas to be sealed and drained to comply with the City of Kwinana's 'Specification for Pavement and Drainage of Trafficable Areas'.

1.9 Prior to lodgement of a building permit application, the applicant shall submit an Arborist report, from a suitably qualified organisation, detailing any potential impacts to the adjacent street trees by the proposed works, as required under AS4970:2009 "Protection of Trees on Development Sites". Any unavoidable impacts will require notification to, and negotiation with the City of Kwinana.

1.10 This approval is valid for 24 months only. If development is not substantially commenced within this period a new approval must be obtained.

2. Advice Notes

2.1 The applicant is advised that all future development must be submitted to the City of Kwinana prior to the commencement of works or alteration of land use.

2.2 Should the applicant be aggrieved by the decision or any condition imposed, then a right of review should be lodged with the State Administrative Tribunal within 28 days of the date of this decision.

2.3 The applicant is advised that this is not a building permit the City of Kwinana issues to enable construction to commence. A building permit is a separate Council requirement and construction cannot be commenced until a building permit is obtained.

2.4 The applicant should ensure the proposed development complies with all other relevant legislation, including but not limited to, the Environmental Protection Act 1986 and Regulations, Health Act 1911 and Regulations, and the National Construction Code.

2.5 In regards to the parking provision condition, the City of Kwinana Town Planning Scheme No.2 requires a minimum of 81 vehicle parking bays. Should the use of the site change then a reassessment of the parking required on site will be required.

DISCUSSION:

Land Status

Metropolitan Region Scheme:	Urban Zone
City of Kwinana Town Planning Scheme No. 2:	Special Use Zone

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

Background

The site is currently occupied by the Banksia Park Aged Care Facility (refer to Attachments A and B). The facility is owned and operated by Aegis who acquired the facility from the then Town of Kwinana, when it operated as the Kwinana Nursing Home. At that time, the facility offered 65 places across several levels of care available at the facility. Previously, the Town of Kwinana had been granted an additional 71 provisionally allocated places ("AIPs" – Approval in Principle) to permit a potential expansion to 132 beds.

With a significant shift in social policy, funding arrangements and regulatory requirements being implemented by the Federal Government with respect to the provision of residential aged care accommodation, the Town assessed it's involvement in the industry and concluded that specialist non government and private sector providers were best placed to meet the needs of residents requiring residential aged care into the future. It subsequently sold its aged care facilities to Aegis Aged Care via a tender process in 2008.

Aegis then changed the name of the facility to Aegis Banksia Park Aged Care and undertook to proceed with the planned building expansion. Stage 1 of the building works focussed on refurbishing the existing Low Care and Dementia wings in conjunction with a substantial extension of the facility which was completed in March 2011.

The facility has operated to date with 113 beds and records indicate that Aegis holds 147 licensed beds at Banksia Park as there are 34 beds held offline pending the final stage of the long planned rebuilding of the original nursing home facility. In addition to this, the Department of Health has approved 21 additional bed licenses totalling 168 beds for the completed facility.

The applicant states there is now a need to modernise and expand the oldest High Care section of the original nursing home. This will increase the facility to 168 beds from the existing 113. The applicant is seeking planning approval for proposed single storey additions and internal alterations to the existing facility (refer to Attachments C - E) to allow for the increase in bed numbers. Council approval is required as the proposal is within a Special Use Zone and City Officers do not have delegation to determine the application.

Town Planning Scheme No.2 Implications

The proposal represents an addition to an existing Aged Care Facility within a Special Use Zone of TPS2. Clause 6.14 of the Scheme states:

"Land within a Special Use Zone may be used for the purposes specified on the Scheme Map and in the Third Schedule and for purposes incidental thereto and for no other purpose.

6.14.1 - The site requirements of lot area, minimum effective frontage, development type, plot ratio, car parking, setbacks and other development provisions shall be determined by Council in its absolute discretion, providing that such standards are not less than that pertaining to similar uses under the Scheme."

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

The property is identified as a Special Use Zone – APH (Aged Person Home) according to the Scheme maps and therefore, the additions are considered appropriate for this zone. City Officers do not have delegation to approve a substantial development within a 'Special Use Zone' therefore requiring the Council to make a decision on the development proposal.

The proposal does not require advertising as it is for additions to an existing use already established and operating on the property for the purpose of the "APH Special Use Zone". Further, the subject site is adjacent to City owned aged persons accommodation.

Assessment of Application

Car Parking

The facility is providing low and high care to the elderly and car parking bays are generally required for visitors and staff only. The existing facility currently has 78 car parking bays on site for both visitors and staff. There is also a bus bay and a delivery bay. The proposed development will add an additional three (3) car parking bays.

Upon review of past development applications for the site it is unclear as to how parking calculations were derived for previous approvals. In light of this, City Officers consider the most appropriate use classification for the facility is a "Hospital" in accordance with the definition provided under the Scheme. The parking requirements for a "Hospital" use is one (1) parking bay for every three (3) beds. Using this ratio, the facility requires a total of 56 car parking bays to be provided. Therefore, the 81 parking bays proposed for the site under this application is satisfactory and provides 25 bays more than required under the Scheme.

Setbacks

Table 2 of TPS2 outlines the minimum setbacks for development within the zones identified under TPS2. Setbacks, like parking requirements, are at the discretion of the Council.

The proposed additions have a minimum setback of 3.87m to Chilcott Street and 5.10m to Bright Road. Given the current streetscape of Chillcott Street and Bright Road, where there are other single storey 'Aged Care Homes' with similar setbacks, the proposed setbacks for the additions of the facility are not considered to detract from the amenity of the current streetscape.

City Officers consider the proposed extension is appropriately setback and do not consider the building bulk will negatively impact on the streetscape.

Landscaping and Trees

In respect to streetscape however, City Officers have been mindful of the impact on existing trees within the City's verge and on private land.

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

The City's Environment Manager reviewed the application and carried out a site inspection with City Planning Officers. The Environment Manager confirmed that there were no grounds for retention of trees within the development site. Even so, the trees within the road reserve, adjacent to the proposed development, will require an appropriate protection zone to be implemented as per AS4970:2009 and arboricultural advice will be required to clarify there will not be any potential impacts or excessive encroachment into these tree protection zones.

The arboricultural advice will be required as a condition of approval and be submitted prior to the submission for a building permit.

Conclusion

The provision of a greater supply of Aged Care within the City of Kwinana is important for the aging community. The proposed additions will provide 55 new beds and the Banksia Park Aged Care Facility will provide 168 beds in total. This will supply increased bed availability, enhance the standard of the accommodation already being provided and improve current services.

The application is consistent with the objectives of the City's Planning Framework and the development is consistent with the purposes of the Special Use Zone. City Officers are satisfied that the application can be supported and discretion applied against TPS2 provisions applicable to the development proposal.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering a financial or impartiality interest only, the owner is Aegis Aged Care Group Pty Ltd and the applicant is Peter Webb and Associates.

City of Kwinana Town Planning Scheme No.2
Local Planning Policy No. 1 – Landscape Features and Tree Retention

A building permit is required to be submitted and issued by the City of Kwinana prior to construction of the proposed development.

FINANCIAL/BUDGET IMPLICATIONS:

No financial/budget implications have been identified as a result of this report or recommendation.

ENVIRONMENTAL IMPLICATIONS:

As detailed previously, it is important that the trees located within the road are not adversely impacted on by the development. The recommended conditions include one which seeks to ensure the impact of the fence/wall associated with the development takes account of the retention of the trees.

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

STRATEGIC/SOCIAL IMPLICATIONS:

The development will enhance Aged Care availability and promote job creation within the local area.

Given that the City of Kwinana operates two retirement villages in close proximity to the Banksia Park Aged Care facility, and the desirability for ageing in place options to be available to residents, the refurbishment of the existing facility and expansion to increase the number of beds available into the future will mean that the needs of Kwinana's ageing community will continue to be adequately catered for.

RISK IMPLICATIONS:

Council approves development under its Town Planning 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 to meet Council and State Government policies and practices, community values and provide protection to the environment. The Officer Recommendation for this proposal particularly aims to reduce the risk of development occurring in a manner which may detract from the amenity of the area.

This proposal has been assessed in accordance with the Scheme. It is considered that there are minimal risk implications in this respect.

COUNCIL DECISION

349

MOVED CR D WOOD **SECONDED CR R ALEXANDER**

That Council approves the Additions and Alterations to the Aged Care Facility on Lot 99 (20) Bright Road, Calista subject to the following conditions and advice notes:

1. Conditions

1.11 The premises being kept in a neat/tidy condition at all times by the owner/occupier to the satisfaction of the City of Kwinana.

1.12 Stormwater drainage from roofed and paved areas to be contained and disposed of on site at all times.

1.13 The applicant shall implement dust control measures for the duration of site works to the satisfaction of the City of Kwinana.

1.14 Crossover(s) shall be of concrete construction and located to the specifications and satisfaction of the City of Kwinana.

1.15 The provision of a minimum of an additional three (3) vehicle parking bays of the dimensions 5.5 x 2.5 metres, to be clearly marked on the ground and constructed of bitumen, brick or concrete and drained to the satisfaction of the City of Kwinana.

15.1 APPLICATION FOR ADDITIONS AND ALTERATIONS TO AN AGED CARE FACILITY: LOT: 99 (20) BRIGHT ROAD, CALISTA, 6167

1.16 All vehicle parking to be accommodated within the boundaries of the subject lot.

1.17 Landscaping areas, vehicle parking spaces, accessways and all other development as detailed on the attached plans are to be installed prior to occupying the proposed development and maintained thereafter by the owner/occupier to the satisfaction of the City of Kwinana.

1.18 All regularly trafficked areas to be sealed and drained to comply with the City of Kwinana's 'Specification for Pavement and Drainage of Trafficable Areas'.

1.19 Prior to lodgement of a building permit application, the applicant shall submit an Arborist report, from a suitably qualified organisation, detailing any potential impacts to the adjacent street trees by the proposed works, as required under AS4970:2009 "Protection of Trees on Development Sites". Any unavoidable impacts will require notification to, and negotiation with the City of Kwinana.

1.20 This approval is valid for 24 months only. If development is not substantially commenced within this period a new approval must be obtained.

2. <u>Advice Notes</u>

2.1 The applicant is advised that all future development must be submitted to the City of Kwinana prior to the commencement of works or alteration of land use.

2.2 Should the applicant be aggrieved by the decision or any condition imposed, then a right of review should be lodged with the State Administrative Tribunal within 28 days of the date of this decision.

2.3 The applicant is advised that this is not a building permit the City of Kwinana issues to enable construction to commence. A building permit is a separate Council requirement and construction cannot be commenced until a building permit is obtained.

2.4 The applicant should ensure the proposed development complies with all other relevant legislation, including but not limited to, the Environmental Protection Act 1986 and Regulations, Health Act 1911 and Regulations, and the National Construction Code.

2.5 In regards to the parking provision condition, the City of Kwinana Town Planning Scheme No.2 requires a minimum of 81 vehicle parking bays. Should the use of the site change then a reassessment of the parking required on site will be required.

CARRIED
6/0

ATTACHMENT A

ATTACHMENT B

MONTAGUE GRANT ARCHITECTS PTY LTD

26 BRISBANE ST, PERTH WA 6000 TELEPHONE: 9328 2233 FAX: 9227 6346 A.C.N. 009 072 593

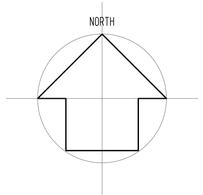
DRAWING EXISTING FLOOR PLAN
CLIENT AEGIS AGED CARE GROUP PTY LTD
JOB ALTERATIONS & ADDITIONS TO BANKSIA PARK AGED CARE
SITE LOT 99 (NO. 44) CHILCOTT STREET
CALISTA
TOWN OF KWINANA

JOB NO 14.01
DRAWN MGA
SCALES 1:200
DRG NO EX1.
DATE 8/07/16
ISSUE DA

Contractor must verify all Dimensions before commencing Work or Shop Drawings

DRAWINGS MUST NOT BE SCALED

ATTACHMENT C



BANKSIA PARK AGED CARE ALTERATIONS AND ADDITIONS

MONTAGUE GRANT ARCHITECTS PTY LTD
26 BRISBANE ST, PERTH WA 6000 TELEPHONE: 9328 2233 FAX: 9227 6346 A.C.N. 009 072 593

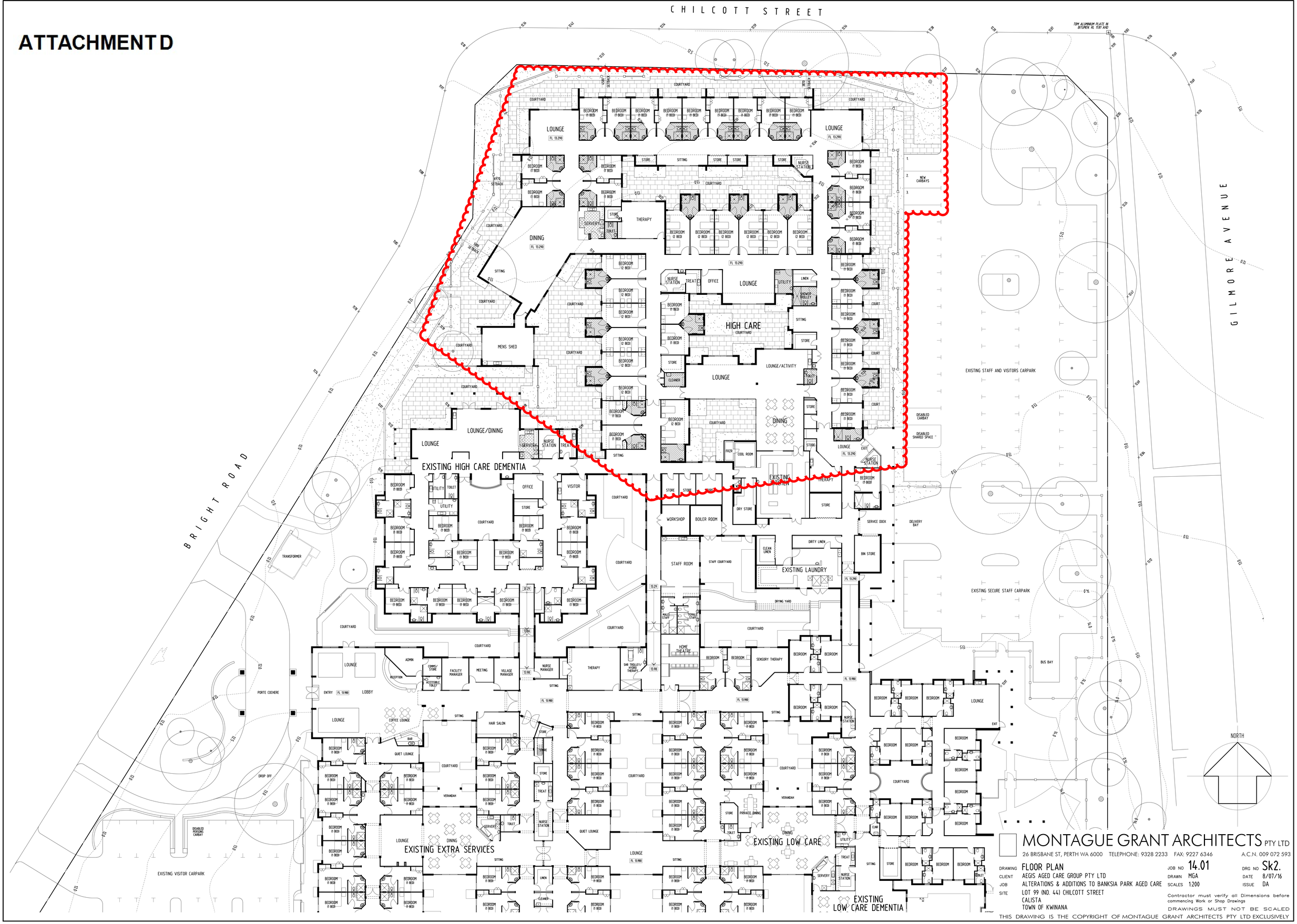
DRAWING SITE PLAN
CLIENT AEGIS AGED CARE GROUP PTY LTD
JOB ALTERATIONS & ADDITIONS TO BANKSIA PARK AGED CARE
SITE LOT 99 (NO. 44) CHILCOTT STREET
CALISTA
TOWN OF KWINANA

JOB NO 14.01 DRG NO Sk1.
DRAWN MGA DATE 8/07/16
SCALES 1:500 ISSUE DA

Contractor must verify all Dimensions before commencing Work or Shop Drawings

DRAWINGS MUST NOT BE SCALED

ATTACHMENT D



MONTAGUE GRANT ARCHITECTS PTY LTD

26 BRISBANE ST, PERTH WA 6000 TELEPHONE: 9328 2233 FAX: 9227 6346 A.C.N. 009 072 593

DRAWING FLOOR PLAN
CLIENT AEGIS AGED CARE GROUP PTY LTD
JOB ALTERATIONS & ADDITIONS TO BANKSIA PARK AGED CARE
SITE LOT 99 (NO. 44) CHILCOTT STREET
CALISTA
TOWN OF KWINANA

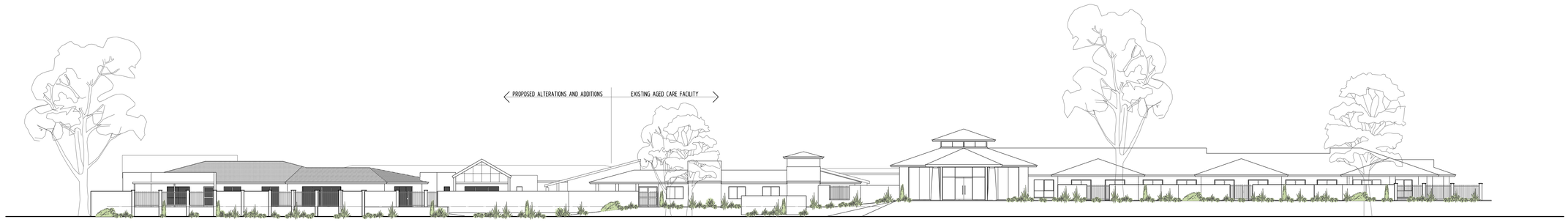
JOB NO 14.01
DRAWN MGA
SCALES 1:200

DRG NO Sk2.
DATE 8/07/16
ISSUE DA

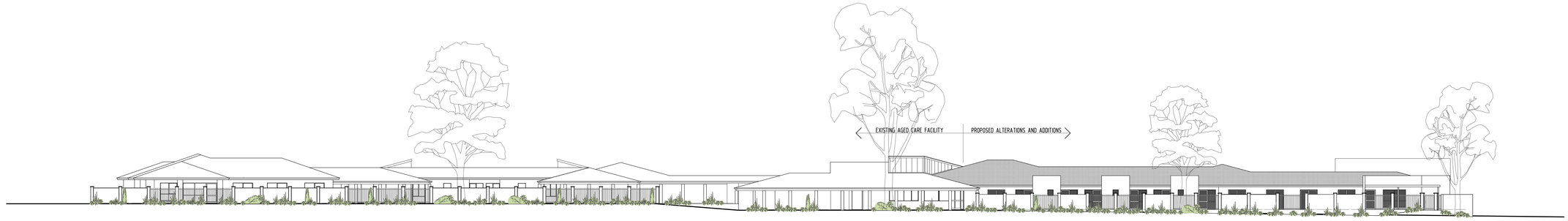
Contractor must verify all Dimensions before commencing Work or Shop Drawings

DRAWINGS MUST NOT BE SCALED

ATTACHMENT E



WEST ELEVATION (BRIGHT ROAD)



EAST ELEVATION (GILMORE AVENUE)

NORTH ELEVATION (CHILCOTT STREET)

MONTAGUE GRANT ARCHITECTS PTY LTD
26 BRISBANE ST, PERTH WA 6000 TELEPHONE: 9328 2233 FAX: 9227 6346 A.C.N. 009 072 593

DRAWING ELEVATIONS
CLIENT AEGIS AGED CARE GROUP PTY LTD
JOB ALTERATIONS & ADDITIONS TO BANKSIA PARK AGED CARE
SITE LOT 99 (NO. 44) CHILCOTT STREET
CALISTA
TOWN OF KWINANA

JOB NO 14.01
DRAWN MGA
SCALES 1:200

DRG NO Sk3.
DATE 8/07/16
ISSUE DA

Contractor must verify all Dimensions before commencing Work or Shop Drawings
DRAWINGS MUST NOT BE SCALED

15.2 Submission on draft Perth Transport Plan for 3.5 Million People and Beyond

SUMMARY:

The Department of Transport (DoT), in conjunction with the Public Transport Authority (PTA) and Main Roads WA (MRWA), have released a Transport Plan for Perth for public consultation entitled *Transport @ 3.5 Million; Perth Transport Plan for 3.5 Million People and Beyond (draft Transport Plan)*. The plan provides a long term vision for the development of the transport network for the Perth and Peel regions up to and beyond a population of 3.5 million people. The draft Transport Plan is supported by technical reports that relate to different transport modes in more detail (such as cycling, public transport, roads, the freight network and travel demand management).

This report outlines the key elements of the draft Transport Plan that relate to the City of Kwinana and presents a submission prepared by City Officers for Council's consideration and endorsement. The draft Transport Plan is comprehensive and as such, the City's submission is focused on the key elements that affect Kwinana, particularly the freight and road network elements of the plan.

OFFICER RECOMMENDATION:

That Council submit Attachment A as the City's submission to the Department of Transport's draft Transport Plan.

BACKGROUND:

Overview of draft Perth Transport Plan for 3.5 Million People and Beyond

The draft Transport Plan aims to provide an integrated transport strategy for the Perth and Peel regions. In the past, strategic documents have been prepared for individual elements of the transport network by individual agencies; for example the *Public Transport Plan for Perth at 2031,* the *Metropolitan Freight Network Plan* and the *Bicycle Network Plan 2014 - 2031.* The draft Transport Plan is very visionary in nature and identifies a large number of large scale infrastructure projects, of which the majority are congregated around the Perth CBD and inner ring suburbs. The draft Transport Plan attempts to reduce the disjointed nature of transport planning by individual government agencies by combining all the transport modes into one document, coordinated by the DoT.

The plan also aims to integrate transport infrastructure decision making with land use planning. The draft Transport Plan has been based on the government's long term spatial plan: Perth and Peel @ 3.5 Million released last year. Rather than prioritising infrastructure items by year, the plan uses population thresholds to determine the timing and priority of infrastructure projects.

The key objectives of the plan are to:

- Increase the mode share for public transport, walking and cycling particularly for peak travel trips to and from the CBD;
- Integrate land use with all forms of transport and;
- Provide free flowing, efficient freight and road networks.

15.2 SUBMISSION ON DRAFT PERTH TRANSPORT PLAN FOR 3.5 MILLION PEOPLE AND BEYOND

The draft Transport Plan is attached to this report as Attachment B. The key elements of the draft Transport Plan with respect to the City of Kwinana are:

- The delay of the development of Kwinana Outer Harbour and Intermodal Facility until 3.5 million population (assumed to be 2050);
- The lack of implementation and budgetary considerations included in the plan;
- The limited integration between different transport modes within the draft Transport Plan;
- Limited certainty provided in the timing of infrastructure projects due to the use of population thresholds;
- A focus on short term road infrastructure proposals to service the Fremantle Inner Harbour, namely the development of Roe Highway stages 8, 9 and 10;
- Limited short term investment in road and rail upgrade proposals to service the Kwinana Industrial Area and future Outer Harbour;
- Inconsistencies between the Road Network Plan and the recently proposed Fremantle Rockingham Controlled Access Highway (FRCAH) Route Definition Study;
- A proposed Principal Shared Dual Use Path along the Mandurah Railway between the Kwinana Freeway and Rockingham;
- Proposed off road cycle path providing connectivity north on Stock Road and associated off road recreational path network around Mount Brown Lake in the Beeliar Regional Park;
- No new railway stations proposed on the Perth - Mandurah Railway within the City of Kwinana;

The DoT is advertising the draft Perth Transport Plan for public comment until 28 October 2016.

DISCUSSION

Noting the comprehensive nature of the plan, the ‘Discussion’ section of this report focusses on the elements of the draft Transport Plan which relate to the City of Kwinana. This section is divided into discussion on each point raised in the City’s submission.

1. <u>Outer Harbour Port and Latitude 32 Intermodal Facility</u>

The Outer Harbour Port is a necessary piece of strategic infrastructure that will unlock the economic potential of this state. Industrial development within the Western Trade Coast is reliant upon efficient road, rail and port access. The delivery of the Outer Harbour is pivotal for business to make the capital investment in establishing new industries in this area. Industries are on record as stating that trading through Fremantle Port is impacting their international competitiveness and that certainty is required regarding the timing of construction of the Outer Harbour so this can be factored into their 10 and 20 year planning. The City is therefore disappointed that the draft Transport Plan identifies a delay to the development of the Outer Harbour and intermodal facility until the Perth population reaches 3.5 million.

The City also notes the road connections to service the port have been delayed until a population of 3.5 million. These include the construction of the FRCAH, Rowley Road and upgrades to Anketell Road. The City also advises that the government should ensure funding is allocated towards the land acquisition required for the reservation of these roads. As with the critical road connections, investment in freight rail infrastructure is essential. The upgrade of freight rail within the Kwinana Industrial Area and between the Cockburn and Kwinana Triangles is vital to resolving the capacity constraints of the system. The City recommends the duplication of the railway from the Cockburn Triangle to the Kwinana Triangle and the grade separation of existing level crossings be undertaken regardless of the timing of the Outer Harbour development to assist the efficiency of freight rail operations to and from the KIA. The City also welcomes the principle of investigating the development a second rail access corridor to the Kwinana Triangle (referred to as the Kwinana Loop Railway), however the City holds concerns regarding the proposed route alignment. The draft Transport Plan identifies a possible route which runs adjacent to Dixon Road to connect the CBH loop to the Kwinana to Mundijong Junction line. Whilst the City supports investigation into a second rail loop the proposed route is problematic due to its close proximity to the Rockingham Strategic Metropolitan Centre. The City recommends instead investigations be undertaken to consider possible routes further north through the Rockingham Industry Zone.

The development of the Outer Harbour port is a catalyst to the development of this land, to generate more economic activity and to provide significant employment opportunities to the sub region. The commitment by government to develop the Outer Harbour is critical to future investment in the Western Trade Coast. The need to give priority to the construction of the Outer Harbour was also identified by the Property Council of Australia report ‘Keep WA Growing’, within Regional Development Australia Perth’s report ‘Driving Change: Perth and Peel Economic Development Strategy and Infrastructure Priority Plan to 2050’ and by a recent Senate Inquiry into the decision to fund the Perth Freight Link undertaken by the Rural and Regional Affairs and Transport References Committee.

The draft plan instead indicates significant investment will continue toward the Inner Harbour. The plan includes upgrades to road and rail freight links to the Inner Harbour, the most controversial being the Perth Freight Link which is proposed to be constructed by a population of 2.7 million. The City seeks greater commitment from the State Government to deliver the Outer Harbour Port or at least that the benefits of funding major infrastructure investment on the Inner Harbour Port, such as the Perth Freight Link, be measured against the longer term benefits of investing in the Outer Harbour Port.

2. Implementation and Budgetary Considerations

Whilst it is welcomed that the State government prepare an integrated and visionary transport plan, the City does have concerns regarding the implementation of the plan. There appears to be no detail within the plan to demonstrate how projects will be delivered and funded, with no specific detail on the timing of infrastructure other than the vague population projection ranges. The City is aware of the long term nature of the Transport Plan, which identifies some projects for development around 2050 and is also conscious of the scale and costs of some of the larger infrastructure items. However without clearer prioritisation, timing and budgetary commitment, it is difficult to understand the implementation strategy of the draft Transport Plan. Rather than a clear and measureable plan, the draft Transport Plan presents more as a wish list of infrastructure projects that may or may not be picked up by future governments.

3. Integration Between Transport Modes

The City welcomes the approach taken to integrate different modes of transport into a single transport plan. The City has reservations however that the individual supporting technical reports of the plan have been prepared in isolation of each other. Furthermore, there is no integrated plan which shows all proposals across all transport modes on the one plan. The City considers that further thought should be given to ensuring the proposals identified in each of the technical reports (Public Transport, Road Network, Freight Network and the Cycling Network plans) are considered together to ensure the Transport Plan delivers a fully integrated transport network.

4. Focus on the Central and Northern Sub-regions of Perth

The City notes an overall emphasis of the draft Transport Plan in concentrating most infrastructure projects in the central Perth sub-region and the northern urban corridor of Perth. The City is disappointed at the limited attention given to the southern sub-region, particularly with respect to public transport infrastructure. The southern sub-region is the fastest growing area of Perth, with 60% of Perth's future land supply located in the southern sub-region. Kwinana, in particular, is expected to double its population in the next 10-15 years. The draft Transport Plan cites the southern sub-region's higher self sufficiency in terms of people employed in the sub-region as the justification for this limited attention on transport investment in the southern suburbs. In this respect however, the bulk of travel undertaken within the sub-region is private vehicle use. Greater investment in public transport infrastructure is needed to reduce this reliance and to cater for the significant growth projected.

5. Certainty regarding the Timing of Infrastructure Project Delivery

The draft Transport Plan identifies three population thresholds to prioritise infrastructure projects. These are populations of 2.7 million, 3.5 million and beyond 3.5 million people. Many of the infrastructure projects in the draft Transport Plan, particularly the Outer Harbour and associated road and rail infrastructure are major projects that require a number of years of lead in planning to deliver. Using population numbers as trigger points does not provide the necessary certainty or commitment for government and industry to appropriately plan and invest. The City does not support this timing methodology and suggests projects be prioritised by year rather than population. In addition, the City is eager to understand how it is determined that a population threshold is reached. As the census is only undertaken every 5 years, will the government wait until the census is published to confirm the current population of the Perth Metropolitan Area, or will decisions be made based on population projections?

6. Mode Share Assumptions

The City does not support the use of existing mode share trends used in the report to project out future mode share data as a basis for determining transport investment for different travel modes. Perth has a low proportion of trips being made by walking, cycling and public transport in relation to other cities in Australia. This situation requires investment in both active and public transport infrastructure to change the current mode split. The City is disappointed that due to the low numbers of trips using public transport, walking and cycling, transport investment is focussed on road infrastructure. Rather than basing investment decisions on relatively minor travel behaviour changes over time, the government has an opportunity to create a paradigm shift in travel behaviour by increasing investment in the historically under funded public transport and active transport sectors.

7. Inconsistencies between the draft Road Network Plan and the Fremantle Rockingham Controlled Access Highway (FRCAH) Route Definition Study

The City considered the FRCAH Route Definition Study prepared by Main Roads WA which was recently circulated for comment in May 2016. This document identified intersection arrangements for existing roads which intersect the FRCAH. One of the City's recommendations to MRWA was the need for Wellard Road to continue to provide a connection between the KIA and the Kwinana townsite. The City recommended Wellard Road not be terminated and instead the FRCAH be constructed as an overpass over Wellard Road. The City is pleased to see the Road Network Plan provided as part of the draft Transport Plan shows this grade separated intersection being constructed at a population of 3.5 million, however notes the inconsistency with the recently reviewed FRCAH Route Definition Study.

Another of the City's recommendations in relation to the FRCAH is to modify the intersection of the FRCAH and Gilmore Avenue/Dixon Road/Mandurah Road. The study proposes only a half diamond interchange at the intersection of Gilmore Avenue/ Dixon Road/Mandurah Road. This results in there being no access for vehicles entering the FRCAH travelling south from Gilmore Avenue. Also, there is no access available for traffic travelling north on the FRCAH wishing to exit at Gilmore Avenue. The City does not support this limited and indirect access to Gilmore Avenue, particularly when approaching along the FRCAH from the south. The City believes clear and direct access is critical for the economic development of the City and the viability of local business and residents in the area.

The current design provides stronger connectivity with Dixon Road rather than Gilmore Avenue. This is flawed as this reduces the accessibility to Kwinana's City Centre which has been identified as a Secondary Centre in the State's Activity Centres Policy State Planning Policy 4.2.

The City is not satisfied that the alternative means of access to the City along Mandurah Road and Dixon Road are appropriate. The City has requested further justification for the design concept (i.e. travel times and modelling) or a redesign of this intersection to provide direct access to Gilmore Avenue. The City also recommends planning for an upgrade of the Gilmore Avenue/Dixon Road/Mandurah Road intersection should be considered as part of the planning for the FRCAH to resolve existing congestion issues.

8. The identification of a Proposed Dual Use Path along the Mandurah Railway between the Kwinana Freeway and Rockingham

The City supports this initiative which will provide a much needed, safe commuter cycle route between Kwinana, the Kwinana Freeway Principal Shared Path (PSP) and Rockingham. Limited detail is provided on the timing of the proposed Dual Use Path. The City recommends a construction timeframe be identified.

9. Proposed off road cycle path providing connectivity north on Stock Road and associated off road recreational path network around Mount Brown Lake in the Beeliar Regional Park

The City advocates active transport options wherever possible and welcomes any investment in cycling infrastructure in the City and surrounding areas. The City supports the identification of off road cycle routes near Mount Brown within the Beeliar Regional Park. The City recommends that the proposed off road route travelling north from the Kwinana Industrial Area along Stock Road towards Fremantle should be substituted with an off road route on Cockburn Road instead of using Stock/Rockingham Roads.

This is due to the potential cost saving by using Cockburn Road and that Cockburn Road is a safer cycling environment than Stock Road. There are existing sections of off road cycle path adjacent to Cockburn Road between Russell Road and Sutton Road which are already constructed and could be extended, which will reduce the cost of constructing an entirely new path using the Stock Road route. There is ample space on the eastern side of Cockburn Road within the road reserve to extend the off road path. Also, the use of Cockburn Road instead of Stock Road is also recommended due to concerns regarding the poor amenity for the pedestrian or cyclist using a cycle path adjacent to Stock Road. Stock Road is currently a Primary Regional Road and major truck route between the KIA and Fremantle Inner Harbour. The road is also proposed to be upgraded to freeway standard as part of the FRCAH. This is not a suitable environment for pedestrians and cyclists. Cockburn Road provides a more suitable coastal recreational off road cycle route.

10. New railway stations for the Perth-Mandurah Railway

The Perth-Mandurah Railway has two stations within the City of Kwinana at Kwinana and Wellard – both of which are being developed as genuine transit orientated developments. Previous planning for the railway has also set aside land under the Metropolitan Region Scheme (MRS) for future stations at Wandi and Parmelia, however the City understands that these stations are no longer being pursued by the PTA due to its goal to maintain a set Perth-Mandurah travel time. The City recommends the Parmelia and Wandi railway stations be noted in the draft Transport Plan as future stations which may be constructed beyond 3.5 million.

11. High Frequency On Road Public Transit to service Kwinana and Wellard Stations

The current bus feeder services which provide connections from Kwinana City Centre to Kwinana and Wellard stations on the Mandurah Railway are inadequate and result in increased pressure on car parking facilities at these stations from commuters choosing to park and ride at stations rather than utilise infrequent bus services. This is disappointing, particularly in the case of Wellard, (the first greenfields Transit Oriented Development constructed in Western Australia) which is being inundated by rail commuters from surrounding suburbs choosing to park and ride at Wellard station rather than use bus feeder services.

These stations were designed with limited car parking to discourage the use of the station as a park and ride. The situation has not reached crisis point to date as commuters use vacant lots as informal car parking, however the City is conscious with the development of these vacant lots and the imminent introduction of timed parking restrictions to surrounding streets the City is finalising, the current informal park and ride arrangement at Wellard will need to be resolved. The City requests that consideration be given to replacing these bus services with high frequency BRT or LRT connecting Kwinana station to Wellard station via the Kwinana City Centre. Given the visionary nature of the draft Perth Transport Plan the City believes the Department should consider the introduction of a shuttle service as a longer term measure to provide much needed rapid transit connections from activity centres to stations on the Mandurah Railway.

12. Other Comments

City Officers also make a number of minor comments in relation to the draft Transport Plan:

- Some of the data used to show mode share is very out of date. Page 36 of the Road Network Plan references household survey data as old as 1976 to demonstrate the dominance of the private car as the preferred mode of transport.
- The City recommends the government ensure funding is allocated to allow for compensation claims as a result of the MRS amendments to cater for additional road infrastructure.
- A recommendation has been made to ensure Anketell Road is placed under the care and control of MRWA.
- The City supports the identification of Thomas Road as a secondary road. The City advises DoT land to the north of Thomas Road in the Postans area is identified for long term development.
- Whilst the Road Network Plan identifies a Rowley Road, Anketell Road, Thomas Road and the FRCAH as freight routes there is some uncertainty regarding the intersection standards to cater for this heavy vehicle traffic. The City recommends the following intersections be constructed as grade separated intersections to allow for freight traffic:

    - Thomas Road/Anketell Road
    - Franklin Avenue/Rowley Road
    - Rowley Road/Abercrombie Road
    - Rowley Road/Rockingham Road
    - Rowley Road/Cockburn Road
    - Anketell Road/Abercrombie Road
    - Anketell Road/FRCAH
    - Thomas Road/FRCAH
    - Kulija Road/FRCAH

In conclusion, the City is disappointed with the shortage of long term foresight included in the draft Transport Plan, particularly regarding the great opportunity that exists to develop the Western Trade Coast through the construction of the Outer Harbour. There are noticeable absences within the implementation section of the plan. The City recommends the government consider transport as an integral element of the spatial plan for Perth and reaffirm its position that the government consider the long term transport needs of the metropolitan area. City Officers recommend Council endorse the City's submission (Attachment A) as per the officer recommendation and forward this submission to the Department of Transport.

LEGAL/POLICY IMPLICATIONS:

Acts and Regulations

Planning and Development Act 2005

Strategies

State Planning Strategy;
Directions 2031 and Beyond; and
Perth and Peel @ 3.5 Million

Schemes

Metropolitan Region Scheme
City of Kwinana Town Planning Scheme No.2

FINANCIAL/BUDGET IMPLICATIONS:

The draft Transport Plan presents an opportunity for investment into freight road and rail links which will assist alleviating congestion on roads and freight rail in Kwinana. Indirectly this investment will reduce congestion of the City's roads and reduce maintenance costs. The City has recommended the state government set a clear timeframe and allocate funds towards constructing key freight infrastructure.

ENVIRONMENTAL IMPLICATIONS:

The City's submission on the draft Transport Plan recommends the state government use its ability to invest in public and active transport to drive a paradigm shift in travel behaviour to reduce the proportion of trips being made by car. In this way, the draft Transport Plan provides an opportunity to reduce the number of trips being made by car. The City's submission welcomes the investment in future dual use paths within the City for both recreational and commuting use.

STRATEGIC/SOCIAL IMPLICATIONS:

The draft Transport Plan sets the transport infrastructure direction for Perth for the next 35 years. The submission recommended by this report expresses Council's key objectives in relation to this high level strategic document.

Strategy 4.4.8 of the City's Strategic Community Plan 2015-2025 states:

Ensure that the City has significant input on planning and strategic growth decisions at the Regional and State level.

The preparation of this recommended submission is consistent with this strategy.

RISK IMPLICATIONS:

No risk implications have been identified as a result of this report or recommendation.

COUNCIL DECISION

350

MOVED CR B THOMPSON **SECONDED CR P FEASEY**

That Council submit Attachment A as the City's submission to the Department of Transport's draft Transport Plan.

CARRIED
6/0

19 October 2016

Our Ref: D16/65388

Department of Transport
140 William Street
PERTH WA 6000

Dear Sir/Madam

DRAFT PERTH TRANSPORT PLAN @ 3.5 MILLION AND BEYOND – CITY OF KWINANA SUBMISSION

I refer to your letter dated 29 July 2016 seeking the City of Kwinana's (City) comments on the draft Perth Transport Plan for 3.5 Million People and Beyond. The City appreciates the opportunity to comment on the plan and congratulates the Department of Transport on the preparation of a consolidated plan which considers all transport modes. The City also applauds the visionary nature of the plan, however the City does have concerns regarding the lack of detail surrounding the funding and implementation arrangements of the plan. These broad concerns and comments specific to each section of the plan are discussed under the following headings.

1. Outer Harbour Port and Latitude 32 Intermodal Facility

The Outer Harbour Port is a necessary piece of strategic infrastructure that will unlock the economic potential of this state. Industrial development within the Western Trade Coast is reliant upon efficient road, rail and port access. The delivery of the Outer Harbour is pivotal for business to make the capital investment in establishing new industries in this area. Industries are on record as stating that trading through Fremantle Port is impacting their international competitiveness and that certainty is required regarding the timing of construction of the Outer Harbour so this can be factored into their 10 and 20 year planning. The City is therefore disappointed that the draft Transport Plan identifies a delay to the development of the Outer Harbour and intermodal facility until the population reaches 3.5 million.

The City also notes the road connections to service the port have been delayed until a population of 3.5 million. These include the construction of the FRCAH, Rowley Road and upgrades to Anketell Road. The City also advises that the government should ensure funding is allocated towards the land acquisition required for the reservation of these roads. As with the critical road connections, investment in freight rail infrastructure is essential. The upgrade of freight rail within the Kwinana Industrial Area and between the Cockburn and Kwinana Triangles is vital to resolving the capacity constraints of the system. The City recommends the duplication of the

railway from the Cockburn Triangle to the Kwinana Triangle and the grade separation of existing level crossings be undertaken regardless of the timing of the Outer Harbour development to assist the efficiency of freight rail operations to and from the KIA. The City also welcomes the principle of investigating the development a second rail access corridor to the Kwinana Triangle (referred to as the Kwinana Loop Railway), however the City holds concerns regarding the proposed route alignment. The draft Transport Plan identifies a possible route which runs adjacent to Dixon Road to connect the CBH loop to the Kwinana to Mundijong Junction line. Whilst the City supports investigation into a second rail loop the proposed route is problematic due to its close proximity to the Rockingham Strategic Metropolitan Centre. The City recommends instead investigations be undertaken to consider possible routes further north through the Rockingham Industry Zone.

The development of the Outer Harbour port is a catalyst to the development of this land, to generate more economic activity and to provide significant employment opportunities to the sub region. The commitment by government to develop the Outer Harbour is critical to future investment in the Western Trade Coast. The need to give priority to the construction of the Outer Harbour was also identified by the Property Council of Australia report 'Keep WA Growing', within Regional Development Australia Perth's report 'Driving Change: Perth and Peel Economic Development Strategy and Infrastructure Priority Plan to 2050' and by a recent Senate Inquiry into the decision to fund the Perth Freight Link undertaken by the Rural and Regional Affairs and Transport References Committee.

The draft plan instead indicates significant investment will continue toward the constrained Inner Harbour. The plan includes upgrades to be road and rail freight links to the Inner Harbour, the most controversial being the Perth Freight Link which is proposed to be constructed by a population of 2.7 million. The City seeks greater commitment from the State Government to deliver the Outer Harbour Port or at least that the benefits of funding major infrastructure investment on the Inner Harbour Port, such as the Perth Freight Link, be measured against the longer term benefits of investing in the Outer Harbour Port.

2. Implementation and Budgetary Considerations

Whilst it is welcomed that the State government prepare an integrated and visionary transport plan, the City does have concerns regarding the implementation of the plan. There appears to be no detail within the plan to demonstrate how projects will be delivered and funded, with no specific detail on the timing of infrastructure other than the vague population projection ranges. The City is aware of the long term nature of the Transport Plan, which identifies some projects for development around 2050 and is also conscious of the scale and costs of some of the larger infrastructure items. However without clearer prioritisation, timing and budgetary commitment, it is difficult to understand the implementation strategy of the draft Transport Plan. Rather than a clear and measureable plan, the draft Transport Plan presents more as a wish list of infrastructure projects that may or may not be picked up by future governments.

3. Integration Between Transport Modes

The City welcomes the approach taken to integrate different modes of transport into a single transport plan. The City has reservations however that the individual supporting technical reports of the plan have been prepared in isolation of each other. Furthermore, there is no integrated plan which shows all proposals across all transport modes on the one plan. The City considers that further thought should be given to ensuring the proposals identified in each of the technical reports (Public Transport, Road Network, Freight Network and the Cycling Network plans) are considered together to ensure the Transport Plan delivers a fully integrated transport network.

4. Focus on the Central and Northern Sub-regions of Perth

The City notes an overall emphasis of the draft Transport Plan in concentrating most infrastructure projects in the central Perth sub-region and the northern urban corridor of Perth. The City is disappointed at the limited attention given to the southern sub-region, particularly with respect to public transport infrastructure. This sub-region is the fastest growing area of Perth, with 60% of Perth's future land supply located within the southern sub-region. Kwinana, in particular, is expected to double its population in the next 10-15 years. The draft Transport Plan cites the southern sub-region's higher self sufficiency in terms of people employed in the sub-region they live in as the justification for this limited attention on transport investment in the southern suburbs, however the bulk of travel undertaken within the sub-region is private vehicle use. Greater investment in public transport infrastructure is needed to reduce this reliance and to cater for the significant growth projected.

5. Certainty regarding the Timing of Infrastructure Project Delivery

The draft Transport Plan identifies three population thresholds to prioritise infrastructure projects. These are populations of 2.7 million, 3.5 million and beyond 3.5 million people. Many of the infrastructure projects in the draft Transport Plan, particularly the Outer Harbour and associated road and rail infrastructure are major projects that require a number of years of lead in planning to deliver. Using population numbers as trigger points does not provide the necessary certainty or commitment for government and industry to appropriately plan and invest. The City does not support this timing methodology and suggests projects be prioritised by year rather than population. In addition, the City is eager to understand how it is determined that a population threshold is reached. As the census is only undertaken every 5 years, will the government wait until the census is published to confirm the current population of the Perth Metropolitan Area, or will decisions be made based on population projections?

6. Mode Share Assumptions

The City does not support the use of existing mode share trends used in the report to project out future mode share data as a basis for determining transport investment for different travel modes. Perth has a low proportion of trips being made by walking, cycling and public transport in relation to other cities in Australia. This situation requires investment in both active and public transport infrastructure to change the

current mode split. The City is disappointed that due to the low numbers of trips using public transport, walking and cycling, transport investment is focussed on road infrastructure. Rather than basing investment decisions on relatively minor travel behaviour changes over time, the government has an opportunity to create a paradigm shift in travel behaviour by increasing investment in the historically under funded public transport and active transport sectors.

7. Inconsistencies between the draft Road Network Plan and the Fremantle Rockingham Controlled Access Highway (FRCAH) Route Definition Study

The City considered the FRCAH Route Definition Study prepared by Main Roads WA which was recently circulated for comment in May 2016. This document identified intersection arrangements for existing roads which intersect the FRCAH. One of the City's recommendations to MRWA was the need for Wellard Road to continue to provide a connection between the KIA and the Kwinana townsite. The City recommended Wellard Road not be terminated and instead the FRCAH be constructed as an overpass over Wellard Road. The City is pleased to see the Road Network Plan provided as part of the draft Transport Plan shows this grade separated intersection being constructed at a population of 3.5 million, however notes the inconsistency with the recently reviewed FRCAH Route Definition Study.

Another of the City's recommendations in relation to the FRCAH is to modify the intersection of the FRCAH and Gilmore Avenue/Dixon Road/Mandurah Road. The study proposes only a half diamond interchange at the intersection of Gilmore Avenue/ Dixon Road/Mandurah Road. This results in there being no access for vehicles entering the FRCAH travelling south from Gilmore Avenue. Also, there is no access available for traffic travelling north on the FRCAH wishing to exit at Gilmore Avenue. The City does not support this limited and indirect access to Gilmore Avenue, particularly when approaching along the FRCAH from the south. The City believes clear and direct access is critical for the economic development of the City and the viability of local business and residents in the area.

The current design provides stronger connectivity with Dixon Road rather than Gilmore Avenue. This is flawed as this reduces the accessibility to Kwinana's City Centre which has been identified as a Secondary Centre in the State's Activity Centres Policy State Planning Policy 4.2.

The City is not satisfied that the alternative means of access to the City along Mandurah Road and Dixon Road are appropriate. The City has requested further justification for the design concept (i.e. travel times and modelling) or a redesign of this intersection to provide direct access to Gilmore Avenue. The City also recommends planning for an upgrade of the Gilmore Avenue/Dixon Road/Mandurah Road intersection be considered as part of the planning for the FRCAH to resolve existing congestion issues.

8. The identification of a Proposed Dual Use Path along the Mandurah Railway between the Kwinana Freeway and Rockingham

The City supports this initiative which will provide a much needed, safe commuter cycle route between Kwinana and the Kwinana Freeway PSP to Rockingham.

Limited detail is provided on the timing of the proposed PSP. The City recommends a construction timeframe be identified.

9. Proposed off road cycle path providing connectivity north on Stock Road and associated off road recreational path network around Mount Brown Lake in the Beeliar Regional Park

The City advocates active transport options wherever possible and welcomes any investment in cycling infrastructure in the City and surrounding areas. The City supports the identification of off road cycle routes near Mount Brown within the Beeliar Regional Park. The City recommends the proposed off road route travelling north from the Kwinana Industrial Area along Stock Road towards Fremantle should be substituted with a off road route on Cockburn Road instead of using Stock/Rockingham Roads.

This is due to the potential cost saving by using Cockburn Road and that Cockburn Road is a safer cycling environment than Stock Road. There are existing sections of off road cycle path adjacent to Cockburn Road between Russell Road and Sutton Road which are already constructed and could be extended, which will reduce the cost of constructing an entirely new path using the Stock Road route. There is ample space on the eastern side of Cockburn Road within the road reserve to extend the off road path. Also, the use of Cockburn Road instead of Stock Road is also recommended due to concerns regarding the poor amenity for the pedestrian or cyclist using a PSP adjacent to Stock Road. Stock Road is currently a Primary Regional Road and major truck route between the KIA and Fremantle Inner Harbour. The road is also proposed to be upgraded to freeway standard as part of the FRCAH. This is not a suitable environment for pedestrians and cyclists. Cockburn Road provides a more suitable coastal recreational off road cycle route.

10. New railway stations for the Perth-Mandurah Railway

The Perth-Mandurah Railway has two stations within the City of Kwinana at Kwinana and Wellard – both of which are being developed as genuine transit orientated developments. Previous planning for the railway has also set aside land under the Metropolitan Region Scheme (MRS) for future stations at Wandi and Parmelia, however the City understands that these stations are no longer being pursued by the PTA due to its goal to maintain a set Perth-Mandurah travel time. The City recommends the Parmelia and Wandi railway stations be noted in the draft Transport Plan as future stations which may be constructed beyond 3.5 million.

11. High Frequency On Road Public Transit to service Kwinana and Wellard Stations

The current bus feeder services which provide connections from Kwinana City Centre to Kwinana and Wellard stations on the Mandurah Railway are inadequate and result in increased pressure on car parking facilities at these stations from commuters choosing to park and ride at stations rather than utilise infrequent bus services. This is disappointing, particularly in the case of Wellard, (the first greenfields Transit Oriented Development constructed in Western Australia) which is being inundated by

rail commuters from surrounding suburbs choosing to park and ride at Wellard station rather than use bus feeder services.

These stations were designed with limited car parking to discourage the use of the station as a park and ride. The situation has not reached crisis point to date as commuters use vacant lots as informal car parking, however the City is conscious with the development of these vacant lots and the imminent introduction of timed parking restrictions to surrounding streets the City is finalising, the current informal park and ride arrangement at Wellard will need to be resolved. The City requests that consideration be given to replacing these bus services with high frequency BRT or LRT connecting Kwinana station to Wellard station via the Kwinana City Centre. Given the visionary nature of the draft Perth Transport Plan the City believes the Department should consider the introduction of a shuttle service as a longer term measure to provide much needed rapid transit connections from activity centres to stations on the Mandurah Railway.

12. Other Comments

The City also makes a number of minor comments in relation to the draft Transport Plan:

- Some of the data used to show mode share is very out of date. Page 36 of the Road Network Plan references household survey data as old as 1976 to demonstrate the dominance of the private car as the preferred mode of transport.
- The City recommends the government ensure funding is allocated to allow for compensation claims as a result of the MRS amendments to cater for additional road infrastructure.
- A recommendation has been made to ensure Anketell Road is placed under the care and control of MRWA.
- The City supports the identification of Thomas Road as a secondary road. The City advises DoT land to the north of Thomas Road in the Postans area is identified for long term development.
- Whilst the Road Network Plan identifies a Rowley Road, Anketell Road, Thomas Road and the FRCAH as freight routes there is some uncertainty regarding the intersection standards to cater for this heavy vehicle traffic. The City recommends the following intersections be constructed as grade separated intersections to allow for freight traffic:

    - Thomas Road/Anketell Road
    - Franklin Avenue/Rowley Road
    - Rowley Road/Abercrombie Road
    - Rowley Road/Rockingham Road
    - Rowley Road/Cockburn Road
    - Anketell Road/Abercrombie Road
    - Anketell Road/FRCAH
    - Thomas Road/FRCAH
    - Kulija Road/FRCAH

In conclusion, the City is disappointed with the shortage of long term foresight included in the draft Transport Plan, particularly regarding the great opportunity that exists to develop the Western Trade Coast through the construction of the Outer Harbour. There are noticeable absences within the implementation section of the plan. The City recommends the government consider transport as an integral element of the spatial plan for Perth and reaffirm its position that the government consider the long term transport needs of the city.

Please contact Janni Curtis of the City's Strategic Planning Department on 9439 0204 if you require more information or wish to discuss this matter further.

Yours sincerely

Joanne Abbiss
Chief Executive Officer

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Transport**
Public Transport Authority
Main Roads Western Australia

TRANSPORT @ 3.5 MILLION

PERTH TRANSPORT PLAN

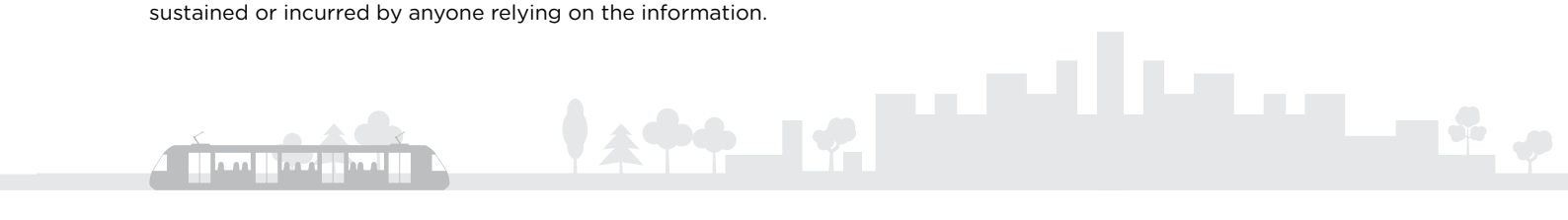
FOR 3.5 MILLION PEOPLE
AND BEYOND

FOR CONSULTATION

Department of Transport

Email: transportplan@transport.wa.gov.au

www.transport.wa.gov.au/transportplan



FOREWORD

The Government's objective in this plan is simple – establish what we need to do when it comes to transport infrastructure to ensure Perth remains one of the most liveable cities in the world.

While this document is built on extensive research and modelling by Government, it is just the start of a broader conversation with the community, business and industry about what we aspire Perth's transport network to look like into the future.

It has been many decades since Perth undertook a long term study of its transport requirements. The Stephenson-Hepburn Plan has served this city well as it has grown to its current level.

The last decade has shown how important Perth's transport system is and the pressures placed on it by rapid economic and population growth. Indeed, while Perth has a modern and effective transport system, we have started to see the levels of congestion on major roads and freeways, and crowding on trains and buses that are experienced in other cities.

With over two million people, Perth has a unique geography that stretches over 150 km along the coast from Yanchep in the north to beyond Mandurah in the south. As we move to a population of 3.5 million, nominally by 2050, we will require fundamental changes to the city's transport network to service growth areas and keep Perth moving.

It is clear that we need to plan for a transport network that will drive urbanisation around infrastructure and enable high levels of accessibility for work, education and other activities. *Transport @ 3.5 Million* is based on a significant shift in travel activity towards greater use of public transport in the peak periods and a continued shift to active transport (cycling and walking) for many trips. The priority investments will be within the city's Central Sector (within 15 -20 km of the Perth CBD) to promote higher density urban living and serve the major strategic centres. Whilst we need to accommodate urban expansion, we need to avoid the trap of retrofitting our transport infrastructure to urban sprawl.

Some major structural changes are needed to the network we see in Perth today – a new radial railway from the CBD to the north eastern suburbs via Morley, a major new orbital railway from Murdoch to Stirling, an inner city light rail network, new river crossings and a more substantial free-flowing freeway network to serve all parts of the city.

Another new feature will be to establish an underground CBD 'subway' to provide better connectivity in the city and encourage people to change their travel behaviour leading to higher public transport and active travel usage.

Cycling has grown rapidly in recent years, with trips on paths to the Perth CBD increasing by over 35 per cent in the last four years. To support ongoing growth in cycling, both for commuters and recreational cyclists, the Principal Shared Path network is proposed to be expanded from the current 172 km to over 850 km, linked by an interlocking network of strategic and local paths.

We have started to demonstrate the possibility of shifting throughput of traffic underground and there are potential benefits from improving the surrounding amenity of communities and property values from doing so. Whilst value capture has become topical recently in Australia it is possible that in the near future, developers, industry and local communities may work together to encourage further infrastructure and development once the potential value opportunity is better understood. Governments across the world are becoming increasingly capital constrained. It is important we become more innovative in how we fund future infrastructure.

It is also important that we focus on the customer experience when it comes to catching public transport. I want travellers to see public transport as a first class experience and a smart way to travel around our city. The new underground bus port is a statement of this, integrating new technology like dynamic stands and USB ports which make the journey easier. I want to understand what needs to be done to encourage more people to get on board our public transport network.

Transport @ 3.5 Million considers all modes of transport and is based on extensive research, knowledge, experience and predictive modelling. The mass transit network is based on independent advice from the Planning and Transport Research Centre (PATREC) led by Adjunct Professor Fred Affleck. The Plan takes into account many influencing factors, including future land use and employment distribution, changing demographics, social trends and expected advances in technology.

This plan will be a living document that continues to evolve as the city grows. Technological developments will change the way we plan and implement transport solutions as things that we cannot yet imagine are invented and impact the way we move around. The plan will be reviewed every five years to ensure it continues to meet the needs of Perth's growing population.

The plan is now being released to provide the opportunity for consultation with federal, state and local government bodies, business, industry, academia and the wider community. The plan will be reviewed based on feedback from a consultation period before being finalised.

I encourage you to consider *Transport @ 3.5 Million* and provide your feedback to the Department of Transport. In closing, I believe it is important to acknowledge Reece Waldock, Director General of Transport for his leadership in developing this plan. I believe he leaves an important and valuable legacy for generations to come.

Hon Dean C Nalder MLA
Minister for Transport

NAVIGATING TRANSPORT @ 3.5 MILLION

CONTENTS

LIST OF FIGURES

1

EXECUTIVE SUMMARY

Perth is one of the most liveable cities in the world. *Transport @ 3.5 Million* and beyond is aimed at keeping it that way. Vibrant. Connected. Productive.

Transport @ 3.5 Million is modelled on the Western Australian Planning Commission's draft *Perth and Peel @ 3.5 Million* planning frameworks of where people will live and work. It also aligns with the *Perth and Peel Green Growth Plan for 3.5 Million*.

Planning a transport network for the long term is inherently challenging. We are forecasting the travel needs and behaviours of a society as far away from us today as 2016 was for transport planners in the 1970s. In addition to social and economic externalities, technology is an increasingly active influence and we will need to closely monitor its future impact on our transport choices.

Our Vision

A vibrant, connected and productive Perth will need a transport network that meets the following objectives:

- optimises use of the existing network and as it grows;
- integrates with land use and across the public transport, active transport and road networks;
- delivers high frequency, 'turn up and go' mass rapid transit connected with effective public transport feeder services;
- provides a safe, connected active transport network of primarily off-road cycleways and walkways; and
- maintains a free-flowing freeway and arterial road network for the efficient distribution of people and freight.

Outcomes

Delivering *Transport @ 3.5 Million* will:

- increase public transport use to
  - 11 per cent of all-day trips, including 65 per cent of peak period trips to the Perth CBD; and
  - 32 per cent of person kilometres travelled by motorised vehicles during peak periods;
- increase cycling and walking to 18 per cent of all-day trips; and
- reduce the mode share of car driver trips to 50 per cent of all-day trips, and to 29 per cent of peak period trips to the CBD.

TRIPS PER DAY	BASELINE – LAST CENSUS 2011	@3.5 MILLION	% INCREASE	@ 3.5 MILLION % MODE SHARE
	IN MILLIONS			
Car driver	3.6	6.3	75	50
Car passenger	1.4	2.6	86	21
Public transport	0.4	1.4	250	11
Cycling	0.1	0.5	400	4
Walking	0.8	1.7	112	14
Total	6.3	12.5	98	100

Figure 1: All-day trips now and in the future

MOTORISED TRIPS IN THE AM PEAK PERIOD @ 3.5 MILLION		
	MILLIONS	%
Car driver vehicle-kms	11.3	53
Car passenger person-kms	3.2	15
Bus persons-kms	1.6	8
Rail persons-kms	5.0	23
Light Rail Transit persons-kms	0.2	1
Total	21.3	100

Figure 2: Peak period motorised trips @ 3.5 million

Public transport

Perth's world class integrated public transport network will be optimised and expanded to make public transport the mode of choice for those travelling in peak periods to major centres. High frequency services connecting strategic activity centres will mean people choosing mass transit can 'turn up and go'.

New, higher capacity rail cars, improved signalling and increased station capacity will help get the most out of the existing rail network.

NEW RAIL LINES

The East Wanneroo Rail Link will be a new rail line servicing Morley, East Wanneroo and the northern suburbs. It will alleviate pressure on the Joondalup line and connect the north east sector to the wider mass transit network. A rail spur from Marshall Road to Ellenbrook is being considered in the very long term.

Cross city mobility will be improved with two new orbital routes. The Stirling-Murdoch Orbital will be mostly underground, linking specialist hospital and university centres and connecting to stations on the Joondalup, Fremantle and Mandurah rail lines. Ultimately it will continue on to the Armadale line via Thornlie and from Stirling to Morley.

Perth Light Rail will create an inner orbital route, providing high frequency services between UWA–QEII and Canning Bridge via the Perth CBD and Curtin University.

Beyond 3.5 million, a separate inner-city 'subway' will provide high capacity, high frequency short distance connections between central Perth, East Perth, West Perth, Northbridge, Leederville and other inner city centres. It is possible that elements of the subway could be undertaken in the development of radial lines through the CBD.

Existing rail lines will be extended to cater for growing suburbs, with the Joondalup line extending to Yanchep, the Armadale line to Byford, Midland line to Bellevue and Thornlie line to Cockburn Central.

Roads

Roads will continue to play a major role in Perth's transport system.

To get the most out of our freeways and expressways, new technologies will be used to manage traffic flow and provide drivers with real-time information on travel times, average speeds and road conditions.

The freeway network will consist of two long north-south spines, consisting of the Kwinana-Mitchell Freeways and Tonkin Highway, extending the full length of Perth. A new Whiteman-Yanchep Highway will join the spines in the northern suburbs. In the south, the Fremantle-Rockingham Highway will connect to the Kwinana Freeway near Rockingham and extend northwards via Stock Road.

The Reid and Roe Highways will create a ring around the central region and provide connections to the north, east and south.

NEW RIVER CROSSINGS

The Stock Road tunnel will run from Leach Highway to Mitchell Freeway providing a new, major north-south route bypassing the city centre.

Links around the city will be augmented with the new East-West Tunnel under Perth Water that will connect with a new bridge or tunnel west of the Causeway to the Narrows interchange. This link will enable better access to the city river front and divert some traffic from the Causeway.

Active transport

Active transport includes walking and cycling. *Transport @ 3.5 Million* increases today's 172 km of off-road commuter cycleways to 850 km.

Of the more than six million trips taken each day, cycling represents about 2 per cent and walking 13 per cent. Extending and connecting the active transport network will see the share of cycle trips double to 4 per cent and walking will increase to 14 per cent.

NEW GREEN BRIDGES

Green bridges will cater for active transport, improving connectivity across the rivers and over lakes.

The new Three Points Bridge will connect Chidley Point, Point Walter and Point Resolution, creating a 40-minute bike ride from Fremantle to Perth.

There will be three new bridges across the river between

Heirisson Island and Maylands, three over the Canning River between Salter Point and Waterford and bridges across Lake Joondalup and Lake Goollelal in the northern suburbs.

Freight

A strategic freight corridor from Muchea to the Fremantle Port Inner and Outer Harbours will be the core of the freight network. Perth Freight Link will be completed in full to the Inner Harbour; and Rowley, Anketell and Mundijong roads will be upgraded from this strategic corridor to the Outer Harbour.

The freight rail line will transport containers between the harbours and intermodal terminals. Rail and road routes will service the new Latitude 32 intermodal terminal, which will play a key role in any new container port development in the Outer Harbour, along with new intermodal terminals in Kewdale and South Bullsbrook.

From this strategic corridor, freight will access regional areas via the Great Northern Highway, Great Eastern Highway (including a new highway north of the existing route), and the Forrest, Albany and Brookton highways.

Influencing travel choices

In addition to optimising and growing the network, *Transport @ 3.5 Million* includes strategies to manage congestion and get the most from our infrastructure. By 3.5 million:

- *Travel plans* – major commercial and residential developments in and around activity centres will have plans to encourage sustainable travel options and manage traffic;
- *Parking strategies* – similar to the current Perth Parking Management Area, strategies will be introduced to promote public and active travel options;
- *Transport pricing* – we will engage with the Commonwealth and other States on national road pricing reforms and create a differential between peak and off-peak public transport fares to encourage changes in travel patterns that reduce overcrowding; and
- *TravelSmart and Your Move programs* – will be extended to more workplaces, schools and households to inform people about their travel choices and encourage voluntary changes in travel behaviour.

Future Trends

Future trends, particularly in technology, will be closely monitored to ensure we keep pace with change and grow our transport system in the most appropriate manner. Of particular interest will be how electric vehicles, automated vehicles and the internet of things influence transport in the future.

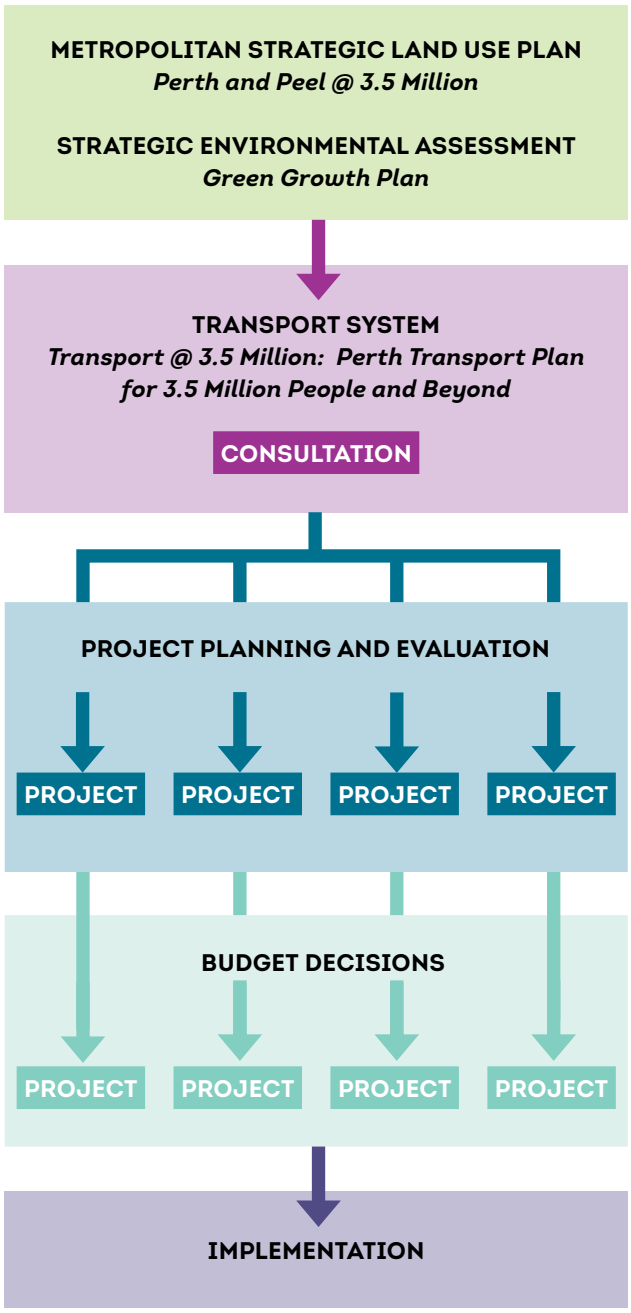


Figure 3: The Transport Planning Process

Implementing Transport @ 3.5 Million

Transport @ 3.5 Million sets the vision for a generational change to Perth's transport network. Many of the projects in the Plan are new and conceptual – these will be the subject of further examination in regard to scope, engineering and design, cost and funding, as well as timing. This will occur as part of the Government's usual planning and investment decision making processes.

Further modelling and analysis will be required over the decade as new information becomes available.

Transport @ 3.5 Million will be reviewed every five years to ensure it continues to meet the needs of Perth's growing population.

2

INTRODUCTION

Transport @ 3.5 Million provides a long term plan to guide development of a strategic, sustainable and robust transport network for Perth and Peel.

It describes a future transport network that provides people with more than one viable option for travelling to work, school and shops and for accessing services and recreational activities.

Transport @ 3.5 Million is an integrated plan that considers not just transport, but the intersection of transport, land use, health and environmental management. It considers how the public transport, active transport and road networks will work together to ensure the best transport, lifestyle and economic outcomes for Perth.

The plan will guide future investment, planning and policy decisions for the metropolitan transport system, as well as inform local government planning, industry, developers and the community.

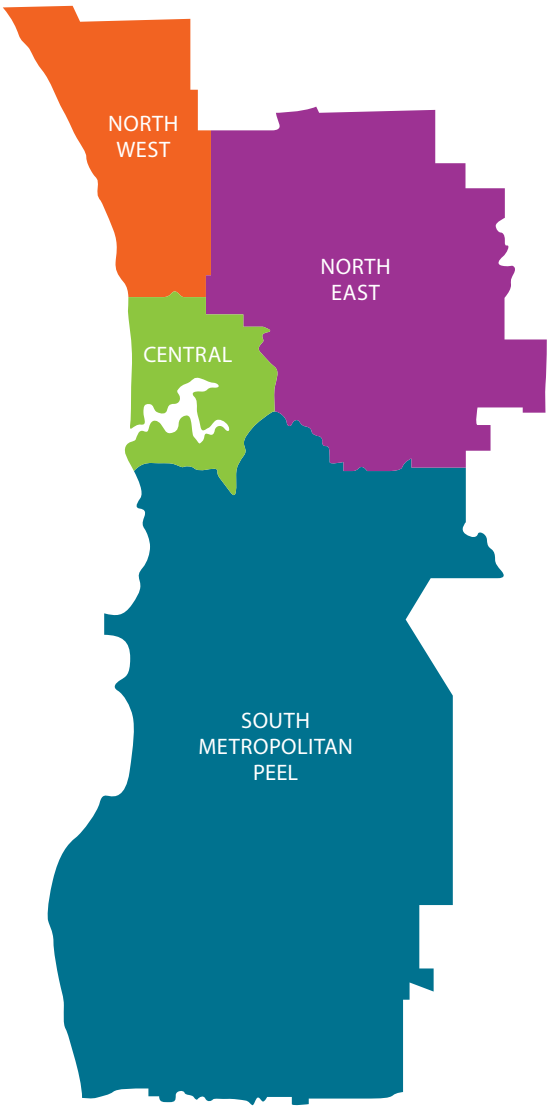
Vibrant. Connected. Productive.

Transport @ 3.5 Million has established five key objectives to support its vision of a vibrant, connected and productive city:

- optimise the use of the existing network and as it grows;
- integrate with land use and across the public transport, active transport and road networks;
- deliver high frequency, 'turn up and go' mass rapid transit connected with effective public transport feeder services;
- provide a safe, connected network of primarily off-road cycleways and walkways; and
- maintain a free-flowing freeway and arterial road network for the efficient distribution of people and freight.

Achieving these objectives by the time Perth reaches a population of 3.5 million will keep Perth liveable, enable economic growth and provide more viable transport options for residents and visitors.

Over the next 35–40 years, 800,000 new homes will be required to accommodate Perth's growing population.



REGION		2011	2050
NORTH WEST			
	People	322,486	740,318
	Jobs	80,566	229,089
	Homes	114,923	283,716
NORTH EAST			
	People	209,156	450,590
	Jobs	82,379	187,986
	Homes	76,547	179,101
CENTRAL			
	People	782,974	1.2m
	Jobs	540,000	780,000
	Homes	2050 infill target of 215,000 homes	
SOUTH METROPOLITAN PEEL			
	People	523,406	1.26m
	Jobs	143,971	437,725
	Homes	205,493	507,670

Figure 4: Perth's population, jobs and homes targets

(Source: Perth and Peel @ 3.5 Million - what will Perth and Peel look like in 2050? Western Australian Planning Commission, 2015)

Transport challenges

There are a number of challenges facing Perth as our city grows. The future transport network needs to adapt and, in many cases, influence how Perth grows to keep us vibrant, connected and productive.

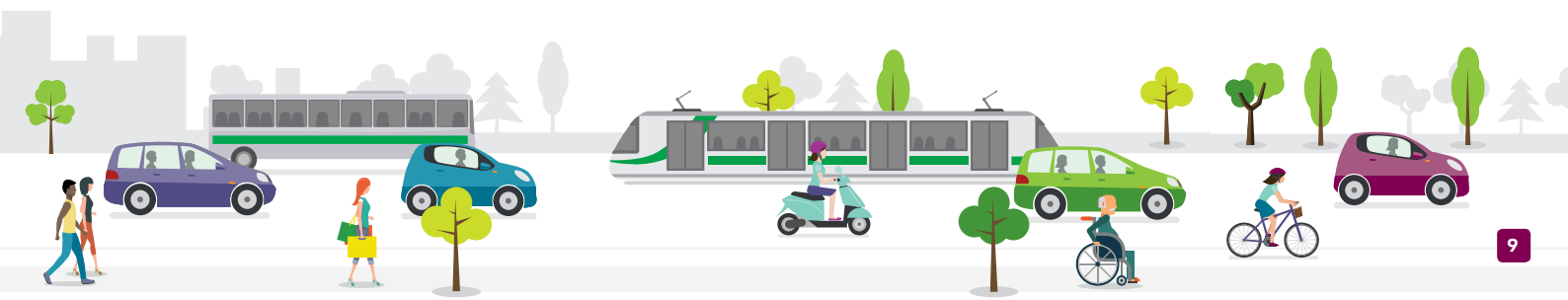
POPULATION GROWTH

Transport @ 3.5 Million is part of a suite of Government plans to prepare for a 70 per cent increase in Perth's population. This plan adopts the population projections, land use patterns and employment distribution targets set out in the Western Australian Planning Commission's (WAPC's) draft *Perth and Peel @ 3.5 Million* planning framework. It takes into account the environmental strategies identified in the *Perth and Peel Green Growth Plan for 3.5 Million*.

Over the next 35 – 40 years, 800,000 new homes will be required to accommodate Perth's growing population.

This will nearly double the number of trips made every day in and around Perth – leading to over 12 million trips per day. Freight and commercial traffic will also increase significantly, fuelled by industry, business and retail changes, including online shopping.

Increasing the share of trips made by public transport, walking and cycling will be critical to managing the travel demands of Perth's growing population. This is linked to providing timely infrastructure and efficient services to promote infill development around activity centres as well as new growth areas.



LOW DENSITY DEVELOPMENT

Perth is a low density city stretching over 150 km from north to south. Almost three quarters of new housing is on the metropolitan fringe, while most jobs are in the central region.

Low density suburbs disperse commuter demand. This creates a reliance on cars as the primary mode of travel. Low densities make it difficult to provide an efficient public transport network and expensive to deliver new and ever-expanding infrastructure.

The WAPC's *Perth and Peel @ 3.5 Million* land use planning framework sets the vision for a more sustainable city that limits urban sprawl. It sets a 47 per cent target for residential infill and is designed to encourage employment opportunities outside the CBD.

Transport @ 3.5 Million is predicated on the WAPC's land use plan. It aims to drive an increase in higher density living in the central area and around activity centres and provide access to new employment opportunities. Meeting the targets set out in *Perth and Peel @ 3.5 Million* is essential to the effectiveness of the future transport network proposed in this plan.

CONGESTION

Today, we make nearly seven million trips every day in and around Perth. Over five million of those trips are by car.

This proportion decreases during peak periods, however the majority of cars on the road during the peak contain a single person. This may be convenient for some people but it is also unsustainable, attracting significant infrastructure costs and impacting economic activity.

Congestion is not just inconvenient for private travellers, it impacts on freight and commercial vehicles by increasing the cost of business (e.g. loss of productivity and increased fuel costs). In 2015 the avoidable cost of congestion in Perth was estimated at $2 billion per annum. Without change, by 2030 this will more than double to between $4.4 billion and $5.7 billion per annum.[1]

While roads will continue to play an important role in Perth's transport system, particularly for those living in the outer suburbs, a key focus of this plan is providing more viable travel choices to keep Perth moving in the future.

Congestion will be managed by attracting more people to use public transport, improving traffic flows at congestion hot spots, boosting participation in cycling and walking, encouraging individuals to make informed travel choices, and making the investments contained in this Plan.

NETWORK EFFICIENCY

Providing more viable choices means we use our transport network more efficiently, sharing the load across modes and throughout the day.

The network has to be designed to accommodate the heaviest load. If we can 'spread the peak' so fewer people are travelling in the same direction at the same time and increase the proportion of people travelling by public transport, car-pooling, walking and cycling, then we can optimise the performance of the network and get the most value from our investments.

Technology will play an important role in optimising the network and informing travel choices before and during our journeys, by providing real-time information on travel times, average speeds and road conditions.

New technologies will be used to get more out of our public transport system and to manage traffic flows on our roads. These include improved rail signalling, which will enable higher frequency train services, real-time tracking of buses and traffic signal priority systems which work together to improve the reliability of bus services.

HEALTH AND THE ENVIRONMENT

By providing a transport system that supports active and public transport choices, we can improve economic, health and environmental outcomes for Perth.

Physical inactivity and obesity are major health concerns in Australian cities. Obesity added $2 billion in direct costs to Australia's health system in 2008.[2]

In 2013, two out of three people in Perth were classed as overweight or obese.[3] Active transport, such as walking and cycling, helps make physical activity a part of our daily routine.

Everyone can play a part in helping to improve air quality in Perth by choosing to walk, cycle and use public transport more often. In the future, the increasing use of electric-powered vehicles, especially when powered from renewable energy sources, will also help to keep our air clean and city liveable.

Transport accounts for 17 per cent of greenhouse gas emissions in Australia.[4] Incremental gains in the energy efficiency of vehicles are being outstripped by growth in vehicle numbers, particularly large private vehicles such as SUVs and 4WDs.

The Australian Government has set a target to reduce greenhouse gas emissions to 26-28 per cent below 2005 levels, by 2030.[5]

Perth will need to do its part in achieving this target, while also planning and delivering changes to the transport network that adapt to predicted climate change impacts, such as sea level rises and increasing frequency of extreme weather events.

1 BITRE (2015) Information Sheet 74:Traffic and congestion cost trends for Australian capital cities: https://bitre.gov.au/publications/2015/is_074.aspx

2 Access Economics (2008) The growing cost of obesity in 2008: three years on: https://www.diabetesaustralia.com.au/reports

3 National Health Performance Authority (2013) Overweight and Obesity Report: http://www.myhealthycommunities.gov.au/Content/publications/downloads/NHPA_HC_Report_Overweight_and_Obesity_Report_October_2013.pdf?t=1458259200026

4 Department of Environment (Cth) Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2015: http://www.environment.gov.au/system/files/resources/cb14abbb-3a4b-406f-a22d-86f565674c3e/files/nggi-quarterly-update-jun-2015.pdf

5 Department of Environment (Cth) Paris Agreement: http://www.environment.gov.au/climate-change/international/paris-agreement

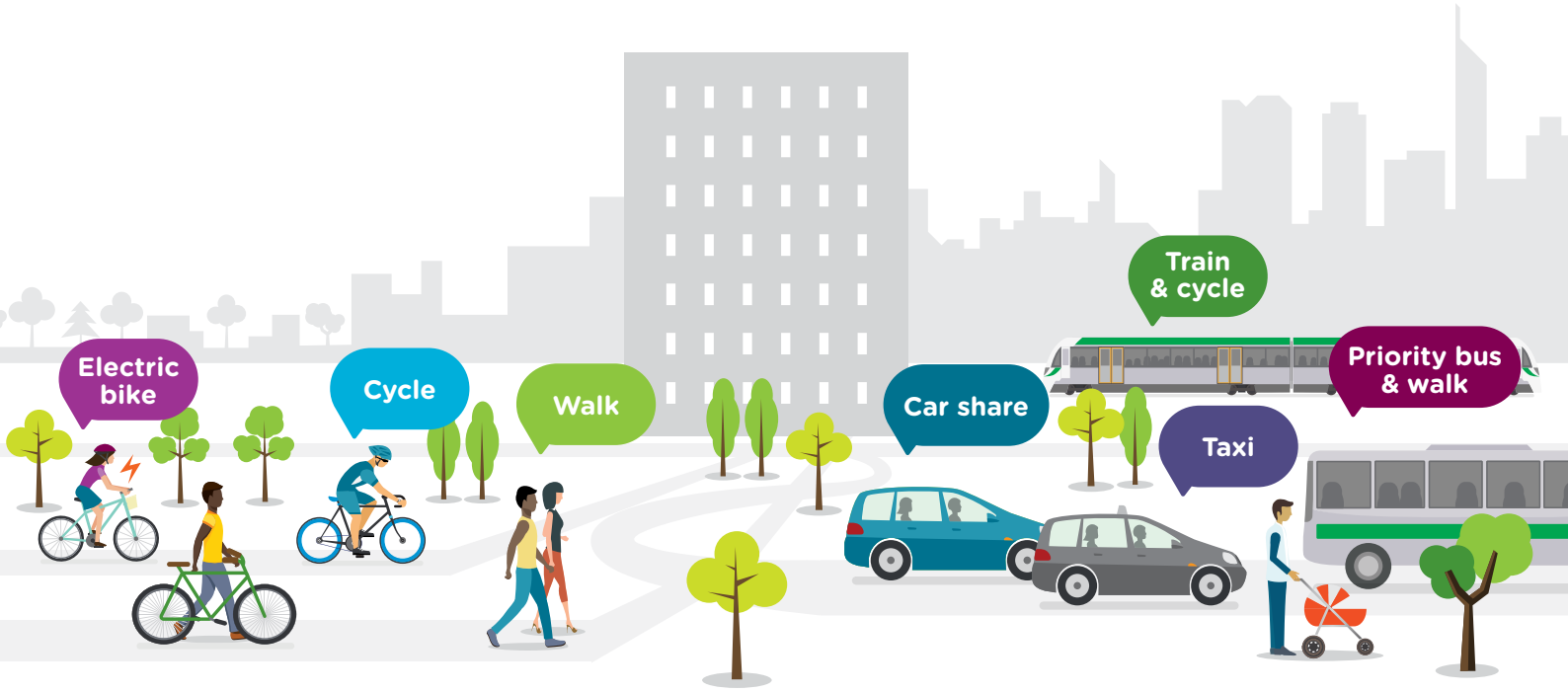


Figure 5: Your move, your choice

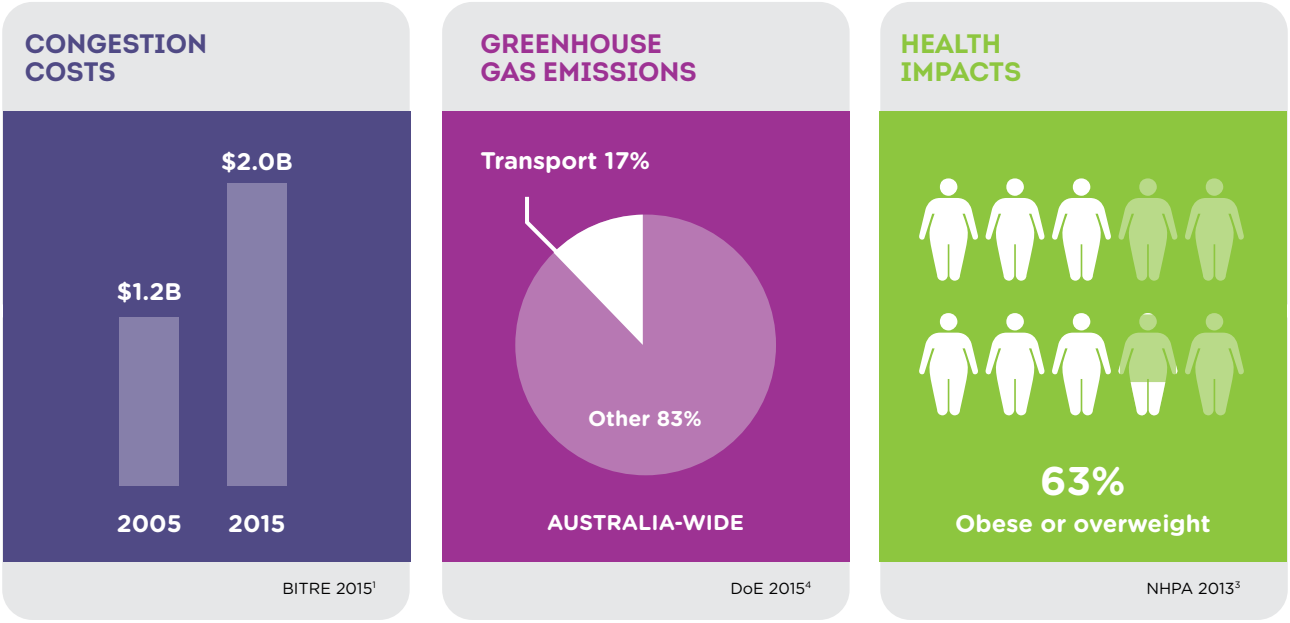


Figure 6: Congestion, environment and health

In 2015 the avoidable cost of congestion in Perth was estimated at $2 billion per annum. Without change, by 2030 this will more than double to between $4.4 billion and $5.7 billion per annum.[1]

3

INTEGRATED TRANSPORT NETWORK

Perth's integrated transport network will be expanded to provide more travel choices on more routes to keep Perth moving as the city grows.

Our city's future success will be based on how accessible, efficient and reliable the transport network is and how well we are able to manage congestion. More travel will be to and from activity centres that will increasingly cater for our work, education, health, social and recreational needs.

The integrated network for 3.5 million people:

- focuses on connecting major activity centres and encouraging transit-oriented development that is well-serviced by all modes of transport;
- prioritises active and public transport to meet the significant increase in travel demand that population growth will generate;
- completes the strategic road network and identifies ways to use the network more efficiently; and
- serves increasing freight demand with efficient links to ports, airports and intermodal hubs.

This section sets out major changes to our transport infrastructure that will allow the network to meet Perth's future needs. The next section identifies ways to optimise the transport system, so we get the most out of existing assets and future investments.

The Perth CBD will continue to be a major centre of employment. One of the biggest challenges will be to create more river crossings so that people can traverse the city without creating bottlenecks into the Perth CBD.

Although the network plans are presented separately (as public transport, road, active transport and freight network plans), they have been developed in a coordinated and integrated way.

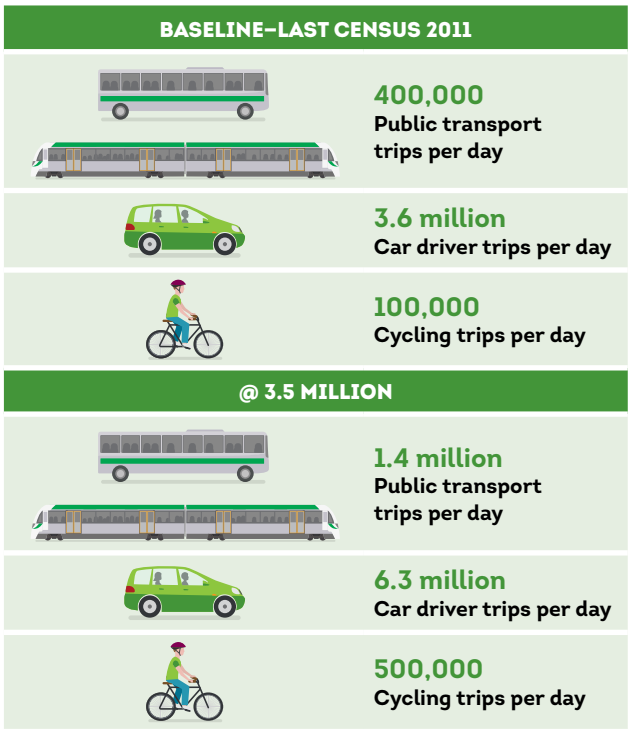


Figure 7: Comparison of public transport, car driver and cycling trips

The plan is based on the *Perth and Peel @ 3.5 Million* land use patterns, employment and housing distribution and aims to connect people to activity centres and connect freight from its origins to its destinations.

The plan is also consistent with the *Perth and Peel Green Growth Plan for 3.5 Million* and supports our environment, health, safety and social amenity by encouraging the uptake of public transport and more cycling and walking.

The public transport, active transport and road networks are complementary with active transport routes connecting to public transport and major strategic activity centres. The extended freeway network is mostly achieved by upgrading existing highways and, with new river crossings, will help to spread the traffic load as the city grows.

Underpinning the economy is our freight network. *Transport @ 3.5 Million* will keep our major industrial areas connected with ports and airports and provide clear access to major routes out of the city to keep Perth connected with regional areas and other states.

This overall network integration ensures that the right modes are servicing the right areas, so that we all have transport choices that will keep Perth vibrant, connected and productive in the future.

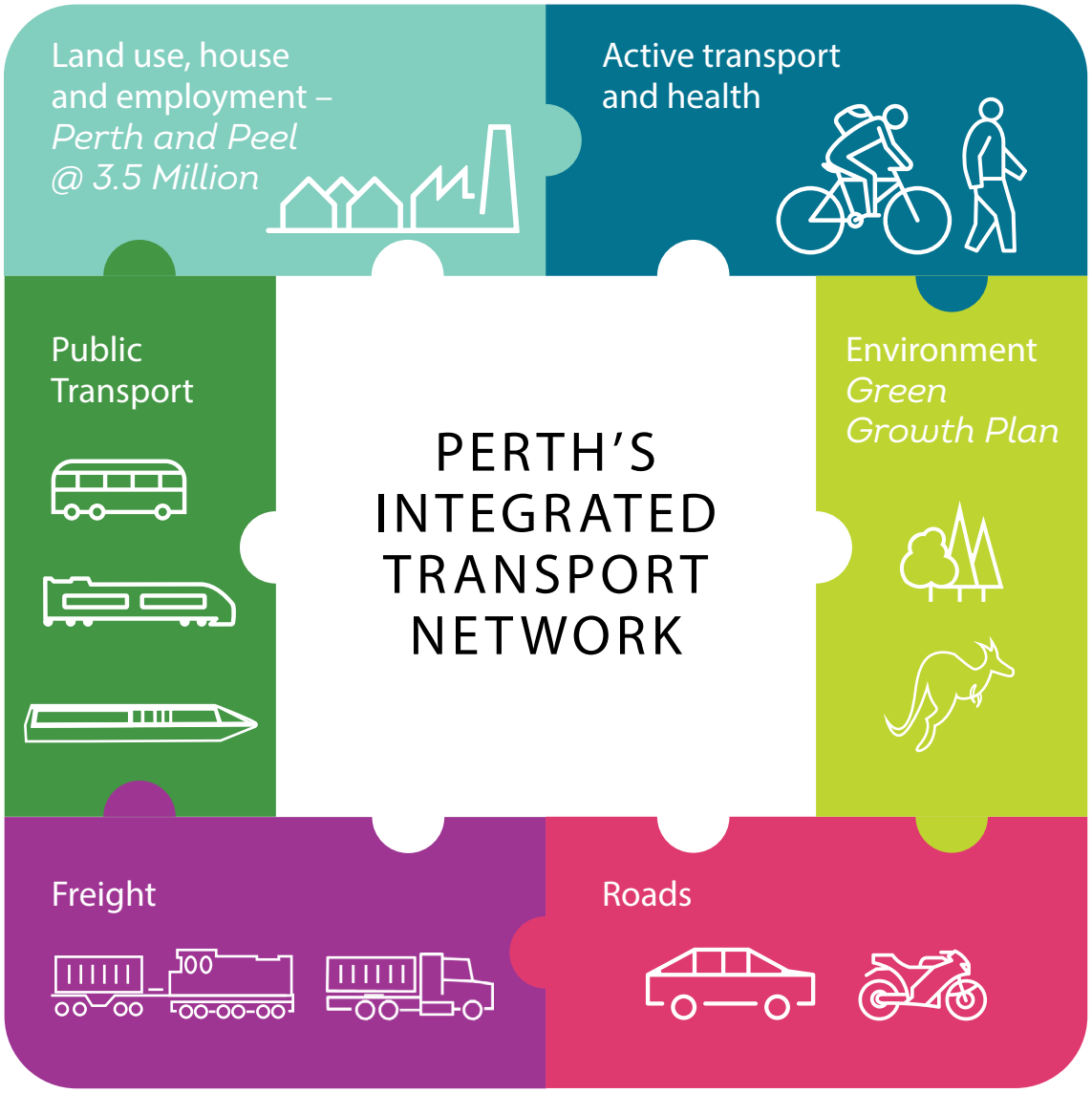


Figure 8: Perth's Integrated Transport Network

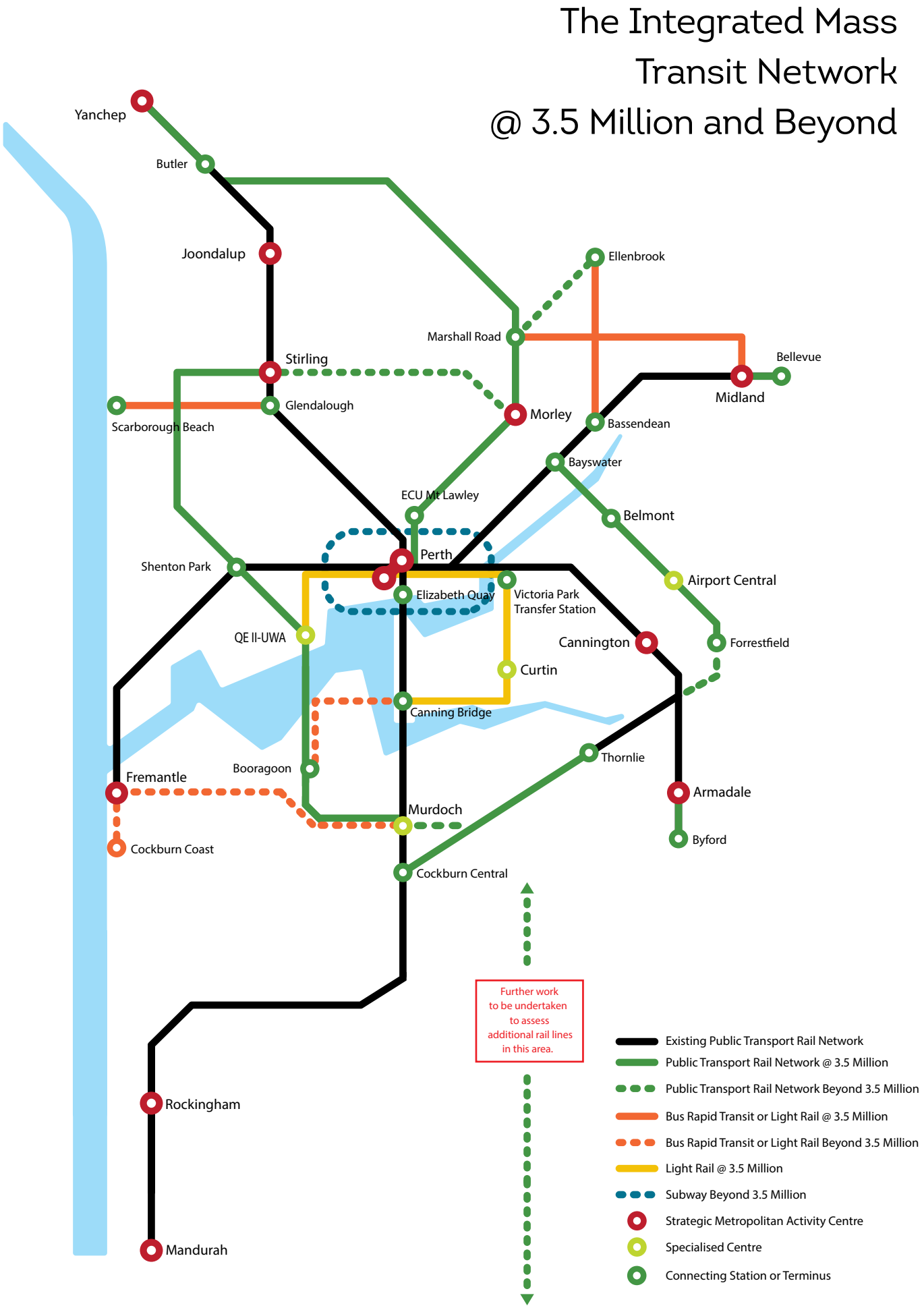


Figure 9: Map – The Integrated Mass Transit Network at 3.5 Million people and beyond

3.1 PUBLIC TRANSPORT NETWORK

At a glance

EAST WANNEROO RAIL LINK

A new suburban radial rail line to service Morley and East Wanneroo, connecting to the Joondalup line to service the far northern suburbs.

Stage 1 City to Morley and Marshall Road – by 2.7 million

Stage 2 Marshall Road to the Joondalup Line – by 3.5 million

Stage 3 Ellenbrook spur – beyond 3.5 million

STIRLING-MURDOCH ORBITAL

An orbital rail service connecting the significant activity centres of UWA-QEII and Murdoch (which includes Fiona Stanley Hospital and Murdoch University).

Stage 1 Stirling to UWA-QEII – by 3.5 million

Stage 2 UWA-QEII to Murdoch – by 3.5 million

Stage 3 Murdoch to Thornlie line – beyond 3.5 million

Stage 4 Stirling to Morley – beyond 3.5 million

RADIAL EXTENSIONS

Existing rail lines will be extended to cater for growing suburbs

Joondalup line to Yanchep – by 2.7 million

Midland line to Bellevue – by 2.7 million

Thornlie line to Cockburn Central – by 2.7 million

Armadale line to Byford – by 3.5 million

Forrestfield Airport Link to connect to Thornlie line – beyond 3.5 million

PERTH LIGHT RAIL

Light rail will provide an inner orbital link connecting UWA–QEII to Canning Bridge, via the Perth CBD, Victoria Park and Curtin–Bentley.

Stage 1 UWA–QEII to Curtin–Bentley – by 2.7 million

Stage 2 Curtin–Bentley to Canning Bridge – by 3.5 million

INNER-CITY SUBWAY SYSTEM

In the long term, a separate inner-city subway system will provide high capacity, high frequency, short distance connections between central Perth, East Perth, West Perth, Northbridge, Leederville and other inner city centres *– beyond 3.5 million*

BUS RAPID TRANSIT (BRT) OR LIGHT RAIL

BRT routes will connect Ellenbrook to Bassendean Station, Midland and the new East Wanneroo Rail Link; Glendalough Station to Scarborough Beach; and, in the very long term, Canning Bridge to Booragoon, and Murdoch Station to the Cockburn Coast via Fremantle. Light rail may be considered for some of these routes, as an alternative to BRT.

Ellenbrook to Bassendean Station, Midland and East Wanneroo Rail Link – by 2.7 million

Glendalough Station to Scarborough Beach – by 2.7 million

Canning Bridge to Booragoon – beyond 3.5 million

Murdoch Station to Fremantle and the Cockburn Coast – beyond 3.5 million

BUS PRIORITY MEASURES

Queue jumps, signal priority and bus only lanes will be provided for over 20 key corridors to cater for high volumes of passengers. These are in addition to any local area bus priority initiatives that may be required.

Public Transport Network Planning Principles

1. The network should **serve growth corridors** and link activity centres with the heavy rail network, supplemented by road-based light rail, bus rapid transit and bus priority services. Beyond the 3.5 million population horizon a subway system will be required in the central area, separate to the heavy rail system.
2. **New orbital links** should be provided for connections between activity centres and the radial network, and to enhance network capacity.
3. New radial and orbital links should be provided to enhance **network operating robustness**.
4. **New technology** should be employed to enhance the travelling experience and lift operating performance (capacity, frequency and/or speed).
5. Links to the Perth central area should aim to protect the efficient operation of existing **'through-routing'** rail-based services.
6. The passenger network should **avoid using transport freight corridors** so as to preserve space in road reserves for future growth in road freight. Passenger rail tracks and freight rail tracks must remain separate.
7. **New links should be placed in corridors,** provided they will not impact future capacity to accommodate freight vehicles (Principle 6) or compromise the quality of potential future transit-oriented development precincts, or otherwise be placed in tunnels.
8. New links in the network should strengthen the demand-based network structure aimed at achieving user-friendly high-frequency services, so that passengers can **'turn up and go'.**

Figure 10: Public Transport Network Planning Principles

Public transport is essential to moving large numbers of people during peak periods and alleviating the pressure on our roads. It also plays an important role in the mobility of people who do not have access to private vehicles.

As Perth's population grows towards 3.5 million, the number of trips by all modes (private vehicle, public transport, cycling and walking) will increase from nearly seven million to over 12 million trips a day.

Today the public transport system in Perth carries around six per cent of daily trips. In order to provide a more balanced and sustainable transport network, over the next 35–40 years this will need to increase to around 11 per cent. While this doesn't sound like much, it is a near four-fold increase in public transport usage, to around 1.4 million trips each day.

The public transport mode share in peak periods will need to do most of the heavy lifting. Today, around 13 per cent of commuters travel by public transport. This includes almost half of all journeys to work in the CBD. When the population reaches 3.5 million, public transport will account for around 65 per cent of peak period trips to the Perth CBD and over 70 per cent of work trips to the wider business district, including West Perth, East Perth and Northbridge.

Public transport has to service all parts of the metropolitan area, but it is most efficient and convenient in more densely populated areas where there is sufficient demand for high-frequency 'turn up and go' services.

Transport @ 3.5 Million focuses on connecting places where the highest numbers of people live and work, so that public transport is the preferred choice for peak period travel and a viable option at other times.

The Public Transport Authority will continue to develop Perth's world class integration of train, bus and ferry services, offering seamless connections between different modes of transport.

Rail network

Heavy rail is used to rapidly transport large numbers of people over long distances. Today, the average distance travelled per trip is 18.8 km by rail and 5.8 km by bus. By the time the population reaches 3.5 million these average distances are expected to rise to 26.8 km by rail and 10.6 km by bus.

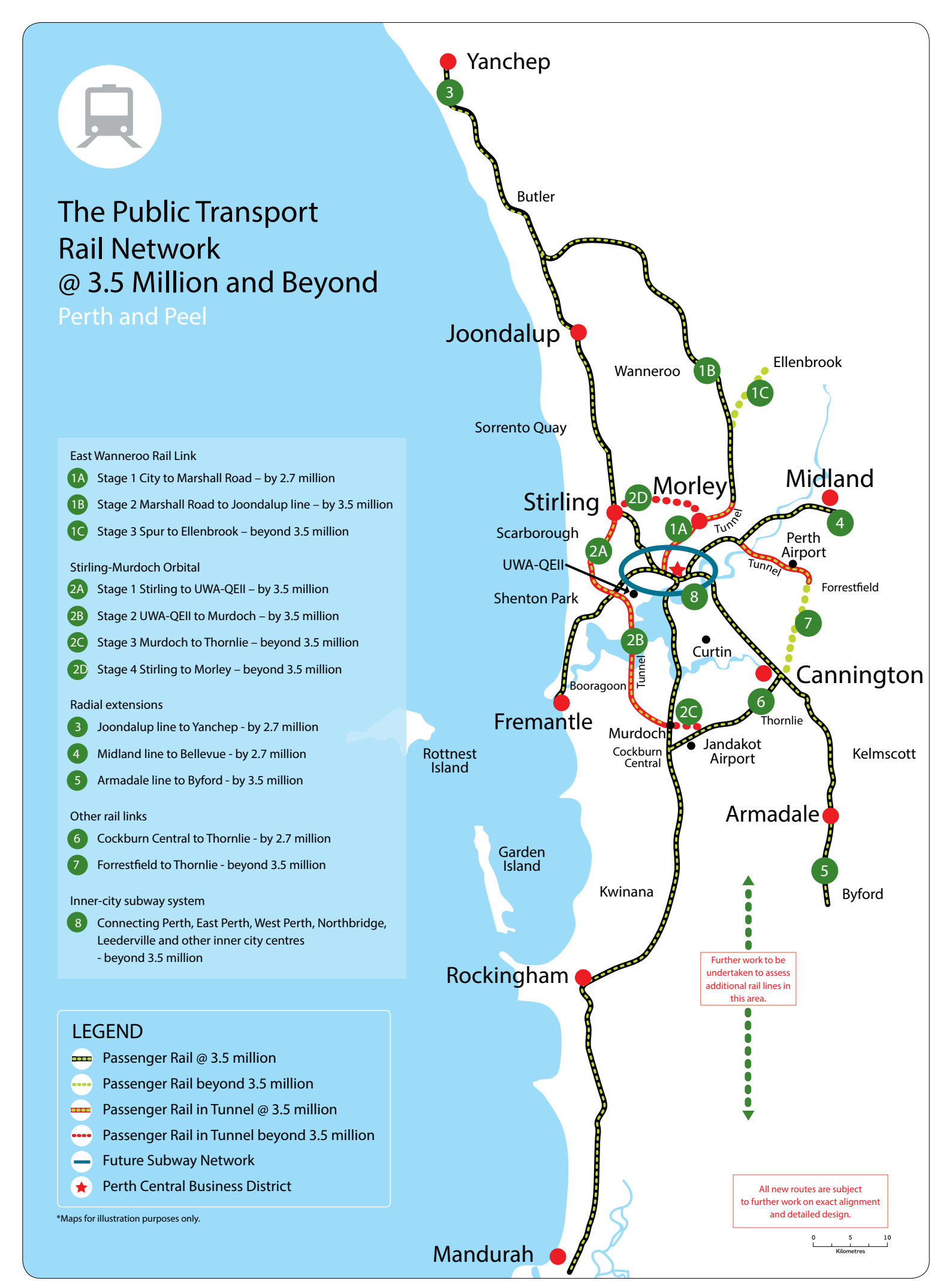
Between 1988 and 2007, the State electrified and expanded the heavy rail network serving the Perth and Peel regions. The most recent extension (Joondalup line to Butler) was completed in 2014.

Today, Perth's heavy rail network consists of a five-branch radial, electrified network with 70 stations, covering 180 km and operating through the Perth CBD hub.

To accommodate a predicted near four-fold increase in the number of public transport trips, there will need to be significant and ongoing investment in the network. This will include a further expansion of the rail network to nearly 300 kilometres.

The Public Transport Rail Network @ 3.5 Million and Beyond

Perth and Peel



East Wanneroo Rail Link

- 1A Stage 1 City to Marshall Road – by 2.7 million
- 1B Stage 2 Marshall Road to Joondalup line – by 3.5 million
- 1C Stage 3 Spur to Ellenbrook – beyond 3.5 million

Stirling-Murdoch Orbital

- 2A Stage 1 Stirling to UWA-QEII – by 3.5 million
- 2B Stage 2 UWA-QEII to Murdoch – by 3.5 million
- 2C Stage 3 Murdoch to Thornlie – beyond 3.5 million
- 2D Stage 4 Stirling to Morley – beyond 3.5 million

Radial extensions

- 3 Joondalup line to Yanchep - by 2.7 million
- 4 Midland line to Bellevue - by 2.7 million
- 5 Armadale line to Byford - by 3.5 million

Other rail links

- 6 Cockburn Central to Thornlie - by 2.7 million
- 7 Forrestfield to Thornlie - beyond 3.5 million

Inner-city subway system

- 8 Connecting Perth, East Perth, West Perth, Northbridge, Leederville and other inner city centres - beyond 3.5 million

LEGEND

- Passenger Rail @ 3.5 million
- Passenger Rail beyond 3.5 million
- Passenger Rail in Tunnel @ 3.5 million
- Passenger Rail in Tunnel beyond 3.5 million
- Future Subway Network
- Perth Central Business District

*Maps for illustration purposes only.

Figure 11: Map – The Public Transport Rail Network at 3.5 million people and beyond

The proposed changes are designed to promote public transport as a mode of choice and cater for the expected number of passengers travelling to work, education and other destinations during the morning peak period, when demand is highest. If the network can handle these peak periods it can readily meet demand during the rest of the day.

To make travel safer and more efficient for all road and rail users, wherever possible, high risk level crossings will be progressively replaced on existing lines by bridges or underpasses and new links will be designed without level crossings.

By a population of 2.7 million, enhancements to the existing rail network will include:

- the Forrestfield Airport Link;
- extending the Midland line to Bellevue;
- extending the Joondalup line to Yanchep; and
- connecting the Thornlie line to Cockburn Central, providing a link between the Armadale and Mandurah lines.

These will be the last extensions to the Joondalup and Midland lines.

To serve a population of 3.5 million, new heavy railways will include:

- the East Wanneroo Rail Link, built in stages to connect growing suburbs and strategic activity centres in the north east. Further investigation is required for station locations and to ensure integration with land use planning;
- the Stirling-Murdoch Orbital, connecting the significant activity centres of UWA-QEII and Murdoch (which includes Fiona Stanley Hospital and Murdoch University); and
- extending the Armadale line to Byford.

Beyond a population of 3.5 million, the East Wanneroo Rail Link will include a rail spur to Ellenbrook; the Stirling-Murdoch Orbital will be extended from Murdoch to Thornlie and Stirling to Morley; and the Forrestfield Airport Link will be extended to join the Thornlie line.

In the very long term, an additional heavy rail line will be needed in the southern region to meet the growing population in the Ravenswood Riverfront and the future Bunbury fast train.

Planning for 3.5 million is informed by detailed population and employment distribution data. Further planning and analysis will be required over the next decade to expand the plan towards a population of five million people.

FEATURE PROJECT

STIRLING-MURDOCH ORBITAL

Complementing Perth's robust radial rail network, new orbital services will provide easier access between major activity centres without requiring transfers through CBD stations.

The Stirling-Murdoch Orbital will connect to the Joondalup line at Stirling, the Fremantle line through a redeveloped station at Shenton Park, and the Mandurah line at Murdoch. The completed orbital, which will require extensive tunnelling, will ultimately allow travel eastward from Murdoch to the Armadale line, and Stirling to Morley, making a near complete circle around the CBD.

The Stirling-Murdoch Orbital will connect UWA-QEII, Murdoch (which includes Fiona Stanley Hospital, St John of God Murdoch private hospital and Murdoch University), Stirling, Shenton Park and Booragoon.

By providing direct opportunities for people destined mainly to the western suburbs and other destinations on the Fremantle rail line, this new orbital route will provide relief to the critical inner segment of the Joondalup line and Perth Underground Station, where capacity will be under most pressure in the future.

The Stirling-Murdoch Orbital has the potential to defer the need for a new road crossing the river.

Figure 12: Feature Project – Stirling-Murdoch Orbital Rail Link

FEATURE PROJECT

EAST WANNEROO RAIL LINK

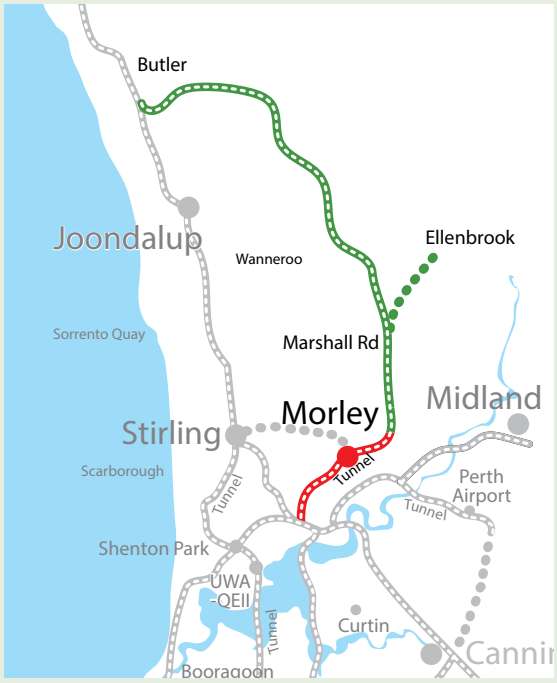
The East Wanneroo Rail Link is a new radial link in Perth's suburban railway system. The railway is expected to be delivered in three stages, with the first stage from the Perth CBD, via a tunnel to Morley, to a station near Marshall Road in Beechboro. The second stage connects to the Joondalup line. The third stage will see a rail spur built from Marshall Road to Ellenbrook.

The first and second stages will be required in full before the population of Perth reaches 3.5 million. The new railway will connect the north-east quadrant of the city to the wider rapid transit network and provide an alternative for some passengers currently using the Joondalup line.

This will result in significant gains in public transport mode share, reduce congestion on the surrounding road network and relieve pressure on complementary public transport services, such as the 950 Superbus.

The north east quadrant of Perth is currently not well-served by rapid transit. The popularity of routes such as the 950 Superbus highlights a strong demand for fast, reliable public transport in the area. As areas such as Morley continue to grow and develop as strategically important centres, a heavy rail line will be needed to move large numbers of people in and out of the area.

Stage 2 will give passengers travelling from Yanchep a choice of utilising either the Joondalup line or the East Wanneroo Rail Link. Modelling indicates the East Wanneroo Rail Link could account for over 20,000 CBD bound passengers during the morning peak period, attracting many CBD-bound patrons in the far northern suburbs. The third stage - a rail spur to Ellenbrook - will be required when the population exceeds 3.5 million.



A potential southern extension of the East Wanneroo Rail Link from the city will be the subject of further review.

Figure 13: Feature Project – East Wanneroo Rail Link

The passenger rail network will expand from 180 km to nearly 300 km.

FEATURE PROJECT

PERTH LIGHT RAIL

Perth Light Rail will provide an inner orbital link, connecting UWA-QEII, via the central and eastern CBD, Victoria Park and Curtin-Bentley to Canning Bridge. A substantial portion of this route has already been planned.

The inner orbital design will provide opportunities for travellers to transfer to Perth Light Rail from the heavy rail radial network, the northern corridor at West Perth (with connection to Fremantle), the Perth Station Complex (including Perth Central and Perth Underground railway stations, and the Wellington Street Bus Station), the eastern CBD and Canning Bridge.

These opportunities for transfers will help to reduce congestion at the Perth Station Complex.

The 960 Superbus service from Mirrabooka to Curtin University and the new East Wanneroo Rail Link provide an effective public transport solution for the north-eastern suburbs.

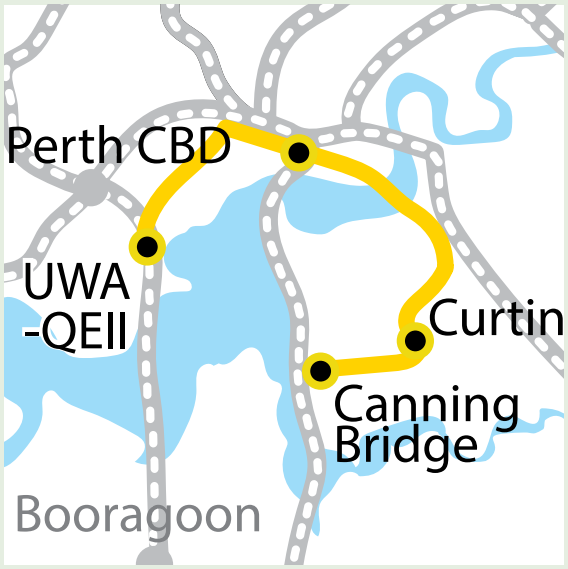


Figure 14: Feature Project – Perth Light Rail

Light Rail Transit (LRT) and Bus Rapid Transit (BRT)

LRT and BRT are used when the level of demand does not warrant an investment in heavy rail, but is too high for the regular bus system to operate efficiently in mixed traffic.

LRT and BRT usually operate in their own lane, separated from other traffic, providing a semi-rapid transport service.

By the time Perth's population reaches 2.7 million, the following routes will need to be serviced by either LRT or BRT:

- access between major activity centres at UWA–QEII through the Perth central area to Bentley–Curtin (Perth Light Rail);
- Ellenbrook to Bassendean Station, Midland and the new East Wanneroo Rail Link; and
- Glendalough Station to Scarborough Beach, via Scarborough Beach Road.

By time the population reaches 3.5 million, Perth Light Rail will be extended to Canning Bridge.

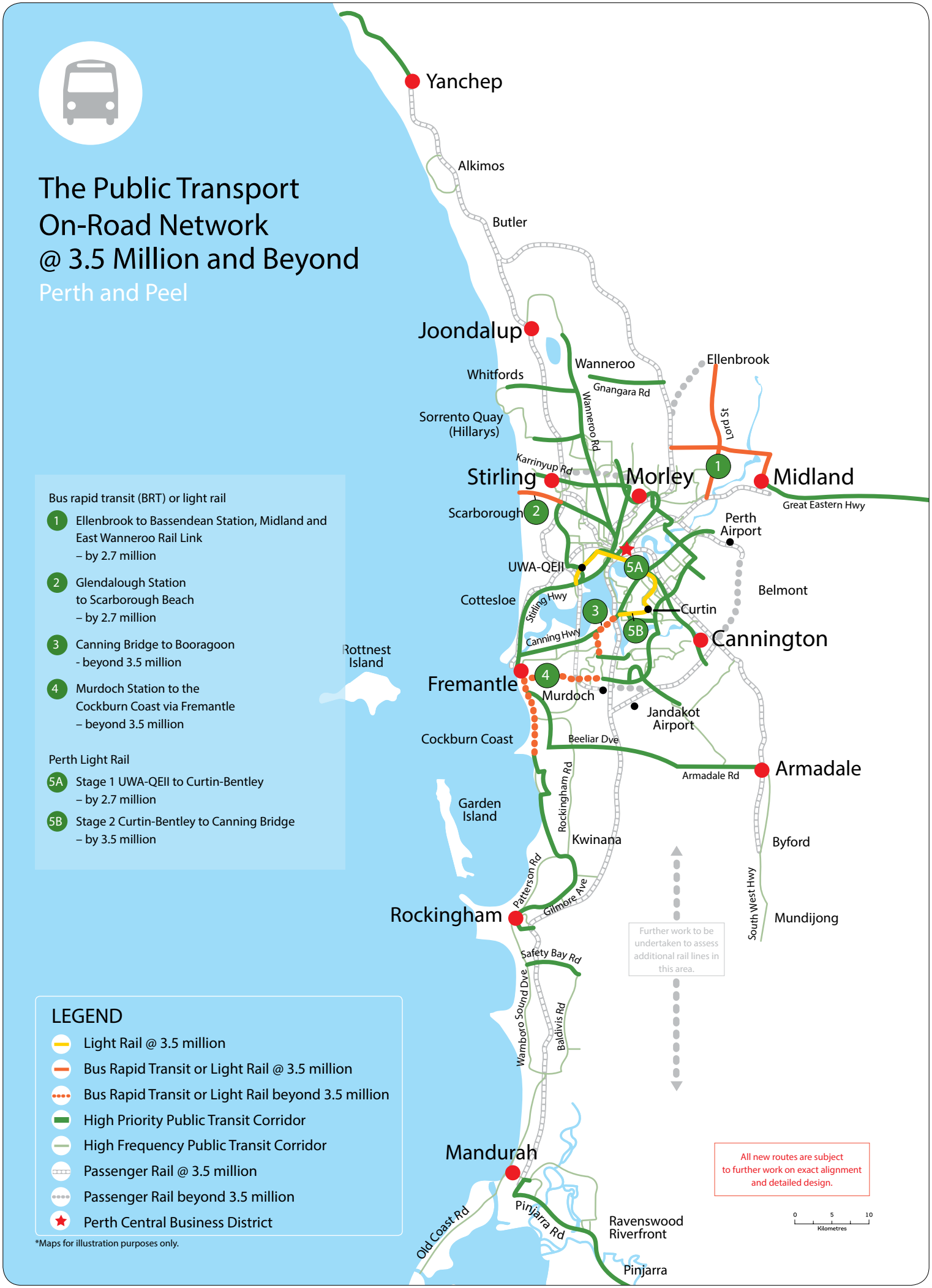
After the population grows beyond 3.5 million, LRT or BRT routes are proposed:

- from Canning Bridge to Booragoon, facilitating passenger transfers to the Stirling-Murdoch Orbital rail line; and
- connecting Murdoch Station to Fremantle and the Cockburn Coast.

When the population reaches 3.5 million, public transport will account for over 70 per cent of work trips to the wider Perth business district.

The Public Transport On-Road Network @ 3.5 Million and Beyond

Perth and Peel



*Maps for illustration purposes only.

Figure 15: Map – The Public Transport On-Road Network at 3.5 million people and beyond

Inner City Subway

Beyond the 3.5 million population horizon, an underground inner city subway system will be required to distribute travellers between the Perth central core, East Perth, West Perth, Northbridge, Leederville and other inner city centres.

Subway systems serve a different function to suburban radial networks like the one we currently have in Perth. Subway systems typically carry large numbers of passengers short distances, usually within high density inner city areas. Subway stations are close together, so the services travel at lower maximum speeds and operate most efficiently with different rolling stock than our higher speed, long distance suburban trains.

Subway systems are very expensive to build and operate. Perth's inner core will need to be much larger and denser before this kind of investment would be justified. However, in order to ensure a subway system is a feasible option for the future, it is important to plan early. It is possible that elements of the subway system could be undertaken with the development of the radial links through the Perth CBD.

Early planning will help to minimise the cost of land acquisition and infrastructure relocation in the longer term and provide certainty as to the future of public transport in and around the inner city.

Bus network

The current bus fleet of nearly 1,500 buses provides a feeder service to Perth's trains, services outer residential growth areas and helps distribute people within and between activity centres.

Central Area Transit (CAT) buses provide a free distributor service for short trips, taking cars off the roads in the Perth CBD, Fremantle and Joondalup.

In key transit corridors where there are sufficiently high volumes of passengers, and there is a risk of delays, buses will be given priority by creating:

- *Queue jumps* – where a lane leading up to a junction is made for 'buses only' and the traffic signalling lets the buses through the junction first;
- *Signal priority* – where a traffic signal detects the oncoming bus and changes the light sequence to give it priority, or where traffic signals are coordinated to create a 'green wave' for traffic along a transit route; or
- *Transit lanes* – where a lane is allocated as a 'bus only' lane.

Modelling has shown that, by a population of 3.5 million, about 20 key corridors will have volumes that warrant some form of bus priority. This will be in addition to any local area priority initiatives introduced by local governments.

MAYLANDS BUS BRIDGE

By the time the population reaches 3.5 million, a bus bridge will connect the Maylands peninsula to Rivervale. By connecting the two sides of the river, new destinations and opportunities will be opened up to residents on the peninsula, as well as the growing areas of Rivervale and Belmont.

The bridge will save buses around eight kilometres of travel and bring cyclists at least five kilometres closer to destinations across the river.

Upon completion of the link, a new orbital bus route will connect the Glendalough, Maylands and Oats Street train stations, via Belmont Forum, and provide improved access to events at Perth Stadium and the entertainment precinct on the Burswood peninsula.

Ferries

Ferries in Perth will never carry the passenger volumes of trains, light rail or buses. Nevertheless it is important to note that there is a role for higher volume ferry services in the future.

Where faster, low wash ferries have been successful (e.g. Brisbane, Sydney), the key has been to have major attractions/destinations and medium to high density residential areas adjacent to the ferry jetties. A prime example is Brisbane River's Citycats which serve a range of key attractions along the river.

Elizabeth Quay is the first signal of a site which will generate demand moving forward for additional ferry services.

Further planning will be undertaken in coming years of opportunities for higher volume ferry services to sites including East Perth, Claisebrook Cove, new Perth Stadium, Coode Street, Canning Bridge, Point Walter and UWA.

3.2 ROAD NETWORK

At a glance

PERTH FREIGHT LINK

Constructed from the Great Northern Highway (Muchea) to Fremantle Port, including a tunnel between Winterfold Road (Hamilton Hill) and High Street (White Gum Valley).

NorthLink, Gateway, Roe 8, Fremantle Tunnel, and Fremantle Port Connect (Canning Highway to the Inner Harbour)
– by 2.7 million

EAST-WEST CITY LINK

A new bridge (or tunnel) connecting Canning Highway at Berwick Street to Riverside Drive at Plain Street, and a complementary tunnel connecting Riverside Drive at Plain Street with the Narrows Interchange and Mounts Bay Road.

Riverside Bridge (or tunnel) and East-West Tunnel – by 3.5 million

STOCK ROAD TUNNEL

Stock Road extended northwards from Leach Highway (as a freeway) linking with Stephenson Avenue at Jon Sanders Drive, with an extension tying in to Mitchell Freeway south of Reid Highway.

Stock Road Tunnel
– by 3.5 million

FREMANTLE-ROCKINGHAM HIGHWAY

Serves the Western Trade Coast strategic industrial centre and the Rockingham Industry Zone; freeway standard between Leach Highway and Kwinana Freeway, Mundijong Road.

Fremantle-Rockingham Highway, to be completed in stages – by 3.5 million

TONKIN HIGHWAY

Extended to tie in with the Perth Darwin National Highway in the north and Forrest Highway, Pinjarra, in the south.

Freeway standard between the Perth Darwin National Highway and Mundijong Road - by 3.5 million

Freeway standard Mundijong Road to Forrest Highway
– beyond 3.5 million

MITCHELL FREEWAY

Extended to tie in with Indian Ocean Drive in the north and upgraded to freeway standard:
- to Yanchep– by 3.5 million

- between Yanchep and Indian Ocean Drive
– beyond 3.5 million

PERTH-ADELAIDE NATIONAL HIGHWAY

Constructed between Roe Highway at Midland and Great Eastern Highway; freeway standard to Gidgegannup
to be completed in stages
– by 3.5 million

REID AND ROE HIGHWAYS

Existing highways upgraded to freeway standard; Roe Highway extended to link to Stock Road (Roe 8)
– by 2.7 million

ALL LANE RUNNING

Implemented on parts of the:

Mitchell and Kwinana Freeways – by 2.7 million

Tonkin, Reid and Roe Highways as required by demand - by 3.5 million

WHITEMAN YANCHEP HIGHWAY

Constructed to link Tonkin Highway around Gnangara Road with Mitchell Freeway at Pipidinny Road, Eglinton.
- by 3.5 million

Road transport will remain a dominant way for people and freight to move around Perth. Roads are the most extensive part of the transport network, with local, regional and national connections.

A significant amount of land is required to provide roads. As Perth's population grows that land becomes more constrained and more valuable. Our ability to increase the capacity of existing roads, and to provide new roads, will become more limited. We will have to find smarter, more efficient ways to optimise use of existing road infrastructure.

Transport @ 3.5 Million has been developed with these future constraints in mind and with a view to creating the most appropriate strategic links to complement the public and active transport networks. The planned road network expands Perth's core system of freeways to connect the north and south of the city, linking future population centres with each other and the city.

The future road network will continue to be efficient, safe, sustainable and resilient. It will service freight, commercial and private vehicles, as well as on-road public transport.

New river crossings

Existing road river crossings, especially those in close proximity to the Perth CBD, will be under increasing pressure as the population grows to 3.5 million. Two new river crossings are proposed.

EAST-WEST CITY LINK

The East-West City Link reduces traffic on the Swan River crossings east of the city, including the Causeway and Graham Farmer Freeway. Traffic on the Causeway will be substantially reduced, creating additional capacity for on-road public transport and active transport into the CBD.

The link keeps traffic travelling through, not to, the Perth CBD, relieving pressure on city roads and taking pressure off the Graham Farmer Freeway. This plays an important role in the distribution of traffic around the city.

The East-West City Link consists of two new connections: the Riverside Bridge (or tunnel, pending further investigations), which connects Canning Highway at Berwick Street to Riverside Drive at Plain Street east of the Perth CBD; and the East-West Tunnel, which connects Riverside Drive west of Plain Street with the Narrows Interchange and Mounts Bay Road.

Road Network Planning Principles

1. **Network efficiency and productivity:** the freeway and strategic freight road networks operate at acceptable levels of service during peak periods. The need for new road infrastructure is determined in the context of a balanced transport outcome, taking into account future public transport servicing key routes and operational efficiency measures, such as Managed Freeways, to maximise network performance.

2. **Road safety:** the road network supports the State's *Towards Zero* road safety targets through the provision of divided roadways and grade separation (bridges or underpasses that separate road from rail) at intersections.

3. **Transport integration:** the arterial road network accommodates an appropriate level of on-road transit priority for high volume transit routes. The level of transit priority provides a balanced network solution with due regard for both general and public transport vehicles.

4. **Sustainability:** the road network strives to avoid impacting land that is not already reserved in the Metropolitan Region Scheme.

5. **Network resilience:** the network will have alternative routes, spare capacity and good communications systems so it can respond quickly to any incidents and a changing environment.

Figure 16: Road Network Planning Principles

FEATURE PROJECT

EAST-WEST CITY LINK

As the city grows and traffic volume increases, more routes around the Perth central area will be needed to avoid unmanageable congestion through the city and to keep our city liveable. Besides trips into the city, a strong demand for trips across the city exists, and the Graham Farmer Freeway and city roads will have inadequate capacity to cater for this demand.

The two sections of the East-West City Link will substantially improve east-west connectivity for cross-city trips. This initiative links suburbs to the east (East Victoria Park, Kensington, Bentley, Redcliffe and Kewdale) with those to the west (Subiaco, QEII, UWA and Nedlands), as well as the freeway north, relieving pressure on Graham Farmer Freeway and city roads.

As the city provides for an increase in public transport, pedestrian and cycling trips, city roads will have less capacity to service private car demand.

The East-West Tunnel will carry in the order of 50,000 vehicles per day, significantly reducing volumes on Riverside Drive. This creates the opportunity to close Riverside Drive with remaining traffic using Terrace Road, enabling activation of the Perth waterfront.

The Canning Highway to Riverside Drive section, improves connectivity to the Perth CBD from suburbs east of the river. The Riverside Bridge section (which could alternatively be a tunnel, pending further investigations) will significantly reduce volumes on the Causeway, improving public transport operations.

A high level transport assessment showed that the East-West City Link generates few additional vehicle trips into the Perth CBD during the morning peak period. Cross-river demand increases as the link facilitates cross-city movement, improving access to work, shopping, educational and recreational opportunities.

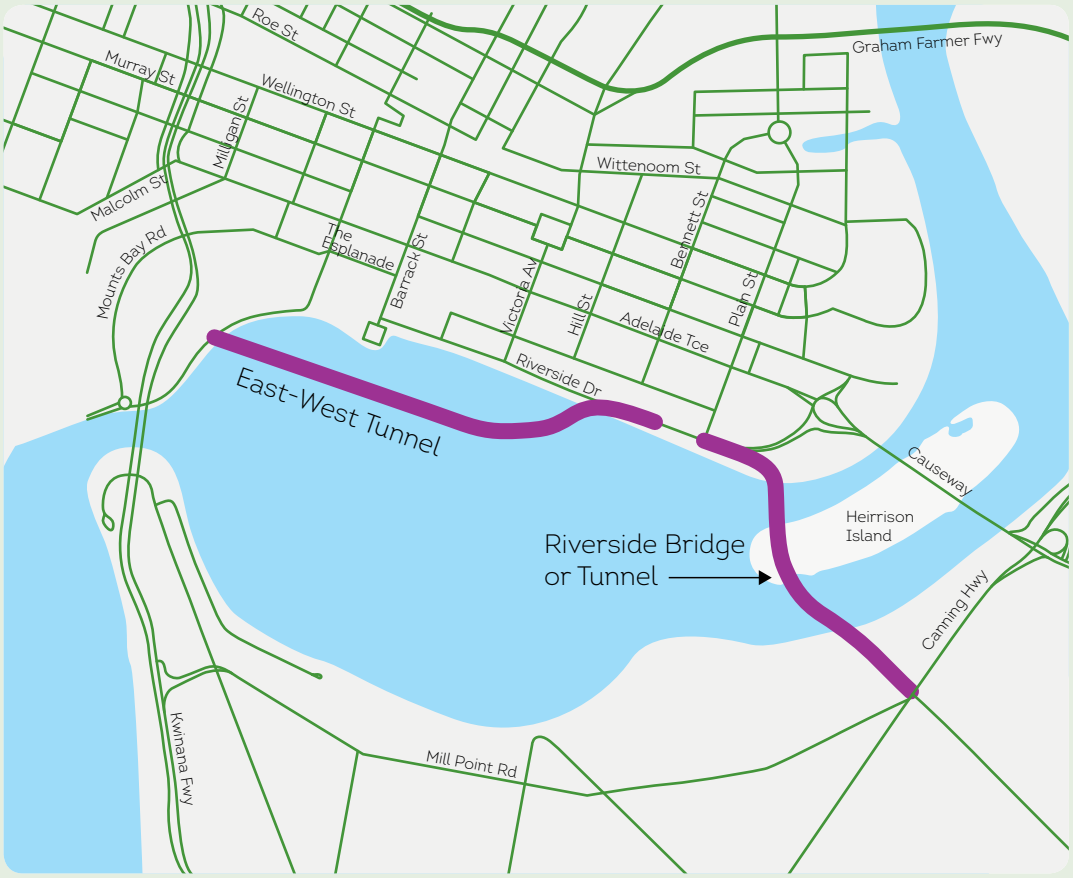


Figure 17: Feature Project – East-West City Link

STOCK ROAD TUNNEL

The Stock Road Tunnel reduces traffic on the Fremantle and Narrows bridges, and on sections of the Mitchell Freeway north of the city. It is expected to be tunnelled either in full or in part.

The tunnel connects to freeway standard roads at both ends. It facilitates good east-west distribution of traffic through connections north of the river at Railway Road, Underwood Avenue and Stephenson Avenue (at Jon Sanders Drive); and south at Leach Highway and Canning Highway.

The Railway Road connection will facilitate access to QEII Medical Centre; while the Mitchell Freeway connection to the north will reduce traffic volumes on Stephenson Avenue, making it easier for local traffic to access the Stirling activity centre.

FEATURE PROJECT

STOCK ROAD TUNNEL

Perth has developed as a north-south linear city with urban development concentrated between the Indian Ocean and the Darling Scarp. The Swan and Canning Rivers form a natural east-west constraint for the provision of essential north-south infrastructure networks including transport, particularly the road network. Very early transport planning for the Perth region (1950s/1960s) identified the need for additional high standard road crossings over the Swan River. These river crossings included a freeway concept to link Stock Road with Stephenson Avenue.

Modelling undertaken for this plan confirms the existing river crossings, especially those in close proximity to the Perth CBD, will not provide adequate capacity as the population grows. Extending Stock Road north to provide a new river crossing significantly improves access to work and education opportunities, especially for people in the southern suburbs. This link will complement developments at the Stirling activity centre.

The new route will extend Stock Road northwards from Leach Highway as a freeway linking to Stephenson Avenue at Jon Sanders Drive, with an extension tying in to Mitchell Freeway south of Reid Highway. This link will include two tunnels: one under the river from Leach Highway, surfacing north of the Fremantle rail line; and another between Underwood Avenue and Mitchell Freeway. The new route is forecast to carry around 100,000 vehicles per day.

The new river crossing will reduce projected traffic volumes on Stirling Bridge, the Fremantle Traffic Bridge and the Narrows Bridge.

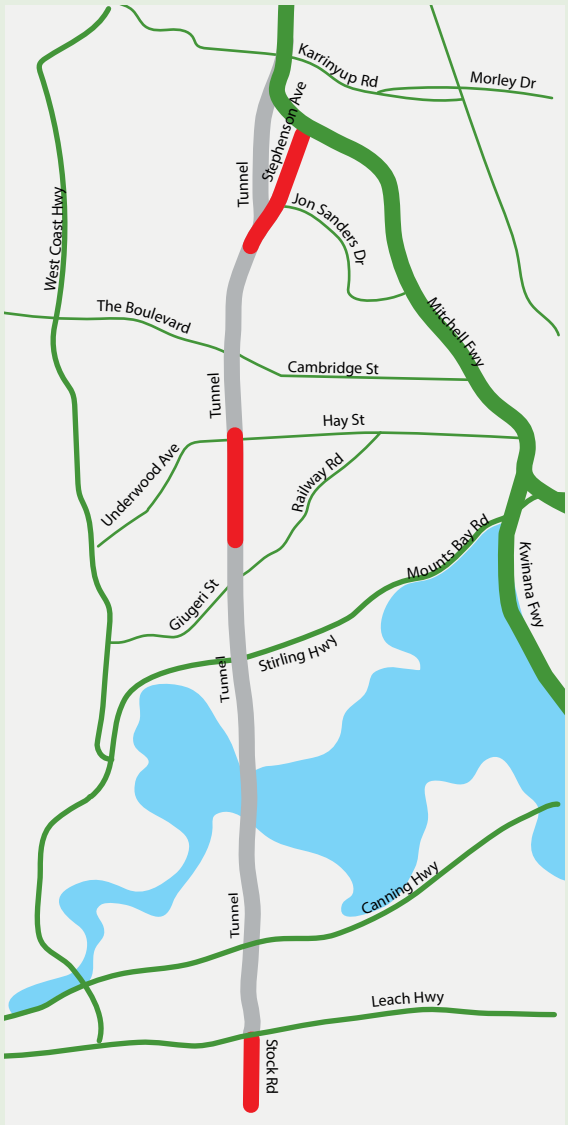


Figure 18: Feature Project – Stock Road Tunnel

The Freeway Network @ 3.5 Million and Beyond

Perth and Peel

River Crossings

1. East-West City Link: Riverside Bridge and East-West Tunnel – by 3.5 million
2. Stock Road Tunnel – by 3.5 million

Freeways

3. Mitchell Freeway extend to Indian Ocean Drive – by 3.5 million
4. Reid and Roe Highways: upgrade to freeway standard – by 2.7 million
5A. Tonkin Highway north: extend to Perth-Darwin National Highway; upgrade to freeway standard – by 3.5 million
5B. Tonkin Highway south: upgrade to freeway standard to Mundijong Road – by 3.5 million
5C. Tonkin Highway far south; extend from Mundijong Road to Forrest Highway, Pinjarra – beyond 3.5 million
6. Fremantle-Rockingham Highway: construct to freeway standard between Leach Highway and Kwinana Freeway at Mundijong Road – by 3.5 million
7. Mundijong Road: upgrade to freeway standard – beyond 3.5 million
8. Perth-Adelaide National Highway: construct between Roe Highway at Midland and Great Eastern Highway; freeway standard to Gidgegannup – by 3.5 million
9A. Whiteman-Yanchep Highway: construct to link Tonkin Highway with Mitchell Freeway; freeway standard between Tonkin Highway and Neerabup – by 3.5 million
9B. Whiteman-Yanchep Highway: upgrade to freeway standard Neerabup to Mitchell Freeway at Eglinton - beyond 3.5 million

LEGEND

- Freeway Network @ 3.5 million
- Freeway beyond 3.5 million
- Freeway in Tunnel
- Perth Central Business District

*Maps for illustration purposes only.

Figure 19: Map – The Freeway Network at 3.5 million people and beyond

The Freeway Network

The freeways and major highways will continue to serve as the principal high capacity distribution network for the metropolitan area. Managed Freeway solutions will be put in place to ensure a productive and efficient network.

By the time Perth's population reaches 2.7 million:

- all-lane running will be implemented on parts of Mitchell and Kwinana Freeways, providing additional lanes through conventional widening, interchange upgrades and the introduction of Managed Freeways;
- Reid Highway will be upgraded to freeway standard between Mitchell Freeway and Roe Highway, with freeway-to-freeway interchanges provided at Mitchell Freeway and Tonkin Highway; and
- to complete the inner metropolitan freeway ring, Roe Highway will be upgraded to freeway standard and extended from Kwinana Freeway to Stock Road (Roe 8).

By the time Perth's population reaches 3.5 million:

- Mitchell Freeway will be extended to tie in with Indian Ocean Drive in the north and be constructed to freeway standard to Toreopango Avenue, Yanchep;
- Tonkin Highway will be extended to tie in with the Perth Darwin National Highway in the north and Forrest Highway at Pinjarra in the south. It will be constructed to freeway standard between the Perth Darwin National Highway and Mundijong Road, with freeway-to-freeway interchanges at Reid and Roe Highways;
- the new Whiteman-Yanchep Highway will link Tonkin Highway around Gnangara Road with Mitchell Freeway at Pipidinny Road, Eglinton. It will be constructed to freeway standard between Tonkin Highway and Wattle Avenue north of Neaves Road in Neerabup. Tonkin Highway together with the Whiteman-Yanchep Highway will provide the second north-south distribution spine across the metropolitan area;
- the Fremantle-Rockingham Highway will follow the Stock Road and Rockingham Road alignments to Hope Valley and then a new alignment to Kwinana Freeway at Mundijong Road. It will provide high standard connectivity between the important industrial and commercial centres within the South Western Metropolitan Corridor. It will be constructed to freeway standard between Leach Highway and Kwinana Freeway at Mundijong Road. The Fremantle-Rockingham Highway will connect to the new Stock Road Tunnel;
- the Stock Road Tunnel will connect the Fremantle-Rockingham Highway with the Mitchell Freeway near the Stirling activity centre;
- the East-West City Link will provide improved east-west connectivity for cross-city trips by linking Canning Highway to the Narrows Interchange and Mounts Bay Road via the Riverside Bridge (or tunnel) and the East-West Tunnel; and
- Leach Highway will be upgraded to expressway standard between Tonkin Highway and Shelley Bridge. Orrong Road will be upgraded to expressway standard between Graham Farmer Freeway and Roe Highway.

To serve a population beyond 3.5 million:

- Mitchell Freeway will be upgraded to freeway standard between Yanchep and Indian Ocean Drive; and
- Whiteman-Yanchep Highway will be upgraded to freeway standard between Neerabup and the Mitchell Freeway in Eglinton.

Networks serving new urban areas and metropolitan centres

Major new urban areas include East Wanneroo and Alkimos to Two Rocks; Bullsbrook and the Ellenbrook / Swan Urban Growth Corridor; and Mundijong, Ravenswood Riverfront / Pinjarra. These new urban areas will be serviced by a network of arterials connecting with the planned freeway network.

- Demand generated by the East Wanneroo urban expansion will be serviced by the planned Whiteman-Yanchep Highway and a network of urban arterials. Two interchanges will be provided on Whiteman-Yanchep Highway between Gnangara and Neaves Roads to provide high-standard access to the area.
- The area from Alkimos to Two Rocks will be serviced by the Mitchell Freeway extension and Marmion Avenue, together with planned east-west arterials. The arterials include Lukin Drive, Romeo Road, Alkimos Drive, Pipidinny Road, Yanchep Beach Road, Toreopango Avenue, Reef Break Drive and Breakwater Drive, most of which will be constructed to 4-lane divided standard, connecting to Mitchell Freeway via interchanges.
- The Bullsbrook area, including the Ellenbrook / Swan Urban Growth Corridor, will be serviced by an upgraded Great Northern Highway, with links to Tonkin Highway (NorthLink) via Stock Road and the Neaves Road extension.
- Urban expansion in the Mundijong area will be serviced by the Tonkin Highway extension, as well as the upgrading of Thomas and Mundijong roads. Interchanges will be provided on Tonkin Highway at Thomas, Orton, Bishop and Mundijong roads to provide high-standard access to the area.
- The Ravenswood Riverfront / Pinjarra urban and industrial expansion area will be serviced by the Kwinana Freeway, Forrest Highway (which will be upgraded to freeway standard between Pinjarra Road and Greenlands Road), and the Tonkin Highway extension, including the Pinjarra Bypass. New and upgraded east-west arterials servicing the area include Mandjoorgoordap Drive, Lakes Road, Pinjarra Road and Greenlands Road.

3.3 ACTIVE TRANSPORT NETWORK

At a glance

CYCLING NETWORK

The current 172 km of off-road commuter and recreational cycleways will be extended to around 850 km.

Additional 185 km of off-road cycleways – by 2.7 million

Around 500 km additional off-road cycleways added – by 3.5 million

GREEN BRIDGES

Plan for new green bridges (cycling and pedestrian) to improve connectivity across rivers and lakes, reducing walking and cycling times.

- Three Points Bridge, connecting Chidley Point, Point Walter and Point Resolution;
- three bridges crossing the Swan River between Heirisson Island and Maylands;
- three bridges over the Canning River between Salter Point and Waterford; and
- two bridges across Lake Joondalup and Lake Goollelal in the northern suburbs

  – by 3.5 million

Perth has all the ingredients needed for a great cycling and walking city: a warm climate, flat topography and outstanding natural beauty.

As the city's population increases and more people live near activity centres, walking and cycling can play a big part in helping to reduce congestion, improve air quality and encourage more of us to live a healthy, active lifestyle.

There will also be more travel behaviour change programs in place to encourage walking and cycling.

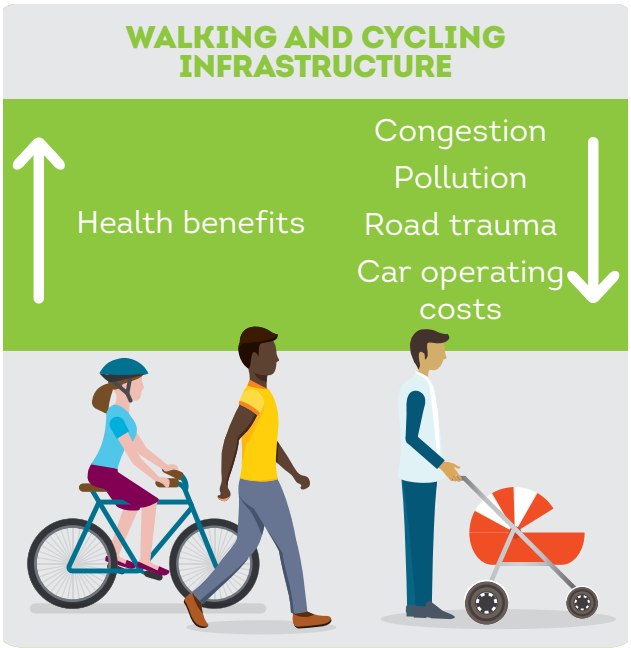


Figure 20: Benefits of walking and cycling

Around 400,000 car trips a day in Perth are less than one kilometre. Many of these trips could be taken on foot or by bicycle.

Walking

Walking will become increasingly important as the city expands and more people choose to live within walking distance of activity centres and major transport hubs. Walking will be a primary option to access public transport, local shops and local services.

Walking can be encouraged through the provision of safe, visible, well-signed, comfortable footpaths that have trees to provide shade and ramps to help with wheelchair and pram access at intersections.

Pedestrian crossings, islands and technologies to lengthen the crossing time for seniors, people with disabilities and others needing more time to cross the road, all help to provide a safer walking environment.

Creating walkable neighbourhoods is primarily a local government responsibility, so this plan focuses on the cycling network. However, most of the off-road cycleways proposed will be shared paths that also benefit pedestrians.

The State Government will continue to work with local governments to provide a seamless active transport network for pedestrians, cyclists and other non-motorised modes of transport.

Cycling

As Perth grows to a population of 3.5 million, there will be more emphasis on providing high quality, safe and comfortable cycling infrastructure, especially around activity centres.

Many new off-road shared paths have been planned as part of the cycling network. Bike Boulevards will provide a safer way for cyclists to travel on the roads through some of Perth's older suburbs.

High quality end-of-trip facilities, including secure bike storage areas, changing rooms and showers are needed to support walking and cycling to work and activity centres. Some businesses in the city are already starting to replace car bays with end-of-trip facilities.

By the time Perth's population reaches 3.5 million:

- the gaps in the current off-road cycle network will be filled;
- the off-road cycle network will be further expanded and will include additional river crossings; and
- end-of-trip facilities will be available at all major activity centres.

The State Government's primary focus is providing off-road shared paths that connect local communities, activity centres and places of work.

Suburban connections for access to local shops and schools is primarily the responsibility of local governments. The State will continue to support and work with local governments in the development of safer streets.

OFF-ROAD CYCLEWAYS

The existing off-road cycle network consists of about 172 km of cycleway and, by the time the population reaches 3.5 million, will expand to around 850 km.

The current recreational cycling network is excellent in places, but has some substandard and missing sections. It is planned to complete and expand the recreational network:

- on both sides of the Swan and Canning Rivers, using boardwalks and floating pontoons, where necessary, to take the cycleways around heritage areas and places of environmental significance;
- along the ocean beachfront from Two Rocks in the north to Wannanup in the South, avoiding the industrial areas around Kwinana and Henderson; and
- around four regional park and wetland sites in the metropolitan area.

Some recreational cyclists enjoy riding in pelotons (groups). Work will be undertaken to investigate how to accommodate pelotons more safely, for example by creating a cycling route in the Darling Scarp.

Figure 21: Artist rendering of cycle boardwalk

Source: Floating cycleway by Waterarchitect van Bueren ©

Cycling Network Planning Principles

1 **Provide cycling infrastructure in a grid matrix layout,** with off road cycleways spaced approximately 5km apart, strategic routes approximately 2.5 km apart and local routes approximately 1.5 km apart.

2 **Separate cyclists from motorised vehicles** - provide protected bike lanes or create bike boulevards on low volume, low speed (30km/h) local roads, one block back from the arterial road.

3 **Separate cyclists from pedestrians,** particularly on routes where cyclists are likely to be travelling long distances and/or at high speeds, and along scenic coastal and river routes.

Figure 22: Cycling Network Planning Principles

ON-ROAD CYCLING NETWORK

The on-road strategic links feed into the main commuter routes and local networks are continually evolving to meet local needs.

With more people living near activity centres and train stations as the population grows, the on-road strategic network will need to be strengthened to meet demand. Routes will be assessed on a case-by-case basis, with the cycling network developed as appropriate to the local road architecture. For example, Bike Boulevards will be created in older suburbs to provide safer streets for cyclists.

Local area traffic management treatments, such as speed humps, will continue to be used to slow traffic speeds and reduce traffic volumes to make local routes safer for cyclists and pedestrians.

CYCLING IN THE CITY CENTRE

There are some excellent off-road cycleways leading to the city's fringes, but many stop short of the city centre. This leaves cyclists unprotected as they negotiate their way to central city offices, shops and tourist attractions.

In cities such as Sydney, Melbourne and Brisbane, protected cycle lanes have been provided by removing some street parking and traffic lanes. A similar approach will be gradually implemented in the Perth CBD. The development of more private end-of-trip facilities for cyclists (including secure bike storage areas, changing rooms and showers) will be encouraged, and the potential for public end-of-trip facilities in the CBD will be investigated.

As travel to and around the CBD becomes less reliant on private cars, the city will become increasingly cycle and pedestrian-friendly, adding to the vibrancy of the city centre.

FEATURE PROJECT

BIKE BOULEVARDS

A Bike Boulevard is a local street where cars and bikes can interact in a low speed environment, making local streets safer, which will encourage children and families to cycle more. Bike Boulevards have wide cycleways marked to give bicycles priority – but local traffic can still use the road at low speed. Bike Boulevards provide a safe route for cyclists travelling in older suburbs where streets are usually built in a grid pattern.

Bike Boulevards generally run parallel to a main road that may be too narrow or have too many busy intersections to accommodate a separate bicycle lane. Bike Boulevard pilot projects are operating in a number of local government areas. With the expected increase in the popularity of electric bikes, Bike Boulevards will be one way of making cycling safer through the suburbs.

Figure 23: What is a Bike Boulevard?
Source: Bike Boulevard by Urban Circus

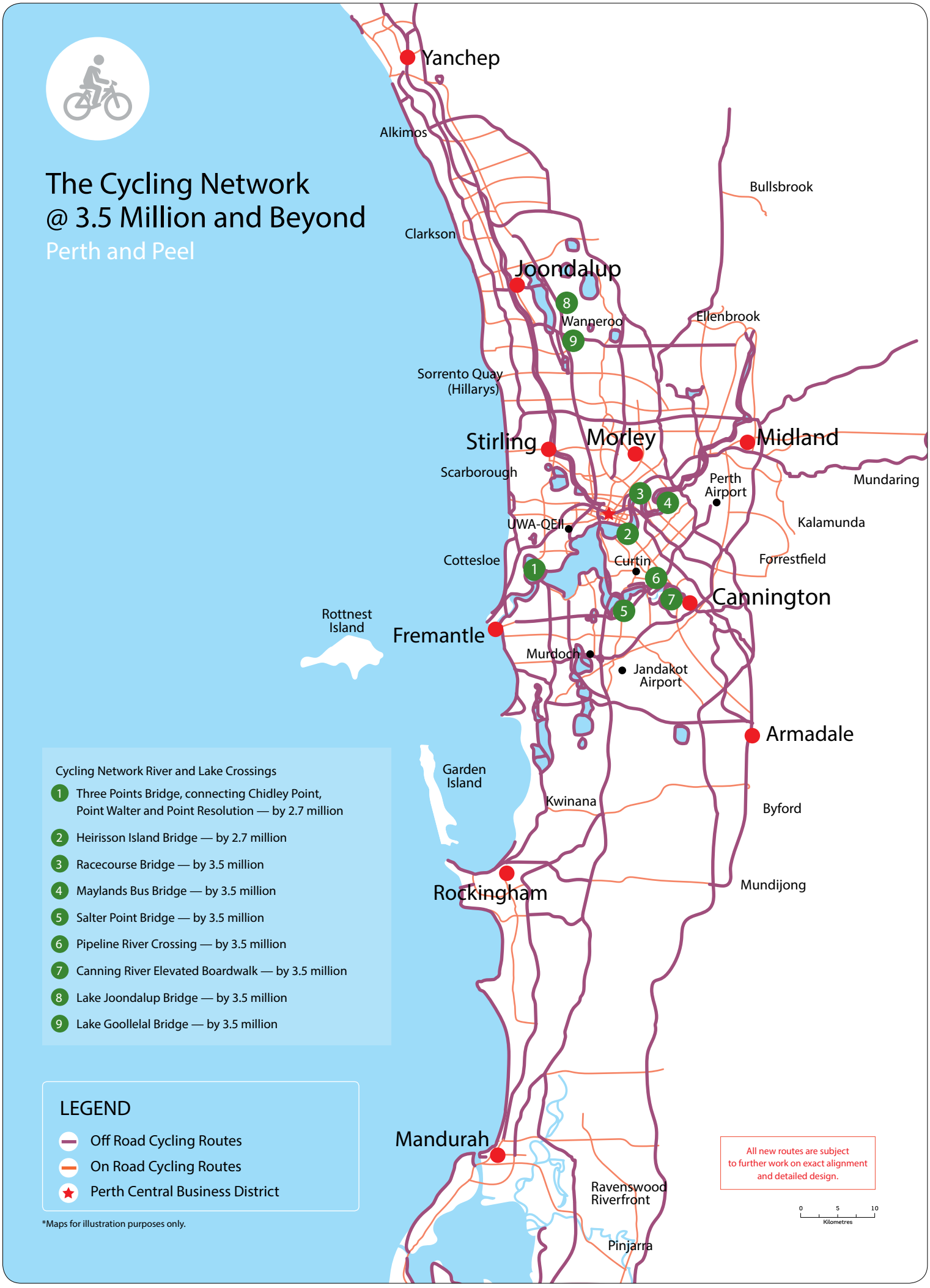


Figure 24: Map – The Cycling Network at 3.5 million people and beyond

NEW RIVER AND LAKE CROSSINGS

The Swan and Canning Rivers divide the city geographically and socially. With few river crossings, journeys to some activity centres are outside the range of most cyclists.

This plan proposes new green bridges that would accommodate active transport modes such as walking and cycling.

Lower Swan Connections

Three Points Bridge, connecting Chidley Point, Point Walter and Point Resolution, will provide a 40 minute cycle route from Perth to Fremantle, generating cycle tourism opportunities. This active transport bridge would be built sufficiently high so as not to impede yachts and boats.

Upper Swan Connections

Land use in East Perth and on the Burswood Peninsula will increase in both importance and density with trip attractors such as Riverside, the new Perth Stadium, Belmont Racecourse and the Crown Entertainment Complex generating some of the highest pedestrian and cycling demand of any area in Perth.

New river crossings will increase active transport in this area:

- *Heirisson Island Bridge*, parallel to the Causeway, provides a replacement off-road shared path when the Causeway is reconfigured to accommodate light rail;
- *Racecourse Bridge* links the Maylands Golf Course off-road shared path to Burswood Peninsula; and
- *Maylands Bus Bridge* links people from the south east corridor to ECU Mount Lawley and Morley activity centres.

These are in addition to the bridge currently under construction that will link pedestrians and cyclists from the city to the new Perth Stadium.

Additionally, the proposed Summers Street Bridge enables local traffic to access Burswood Peninsula from Plain Street and Summers Street. This bridge incorporates a shared path and improves access to the East Perth train station.

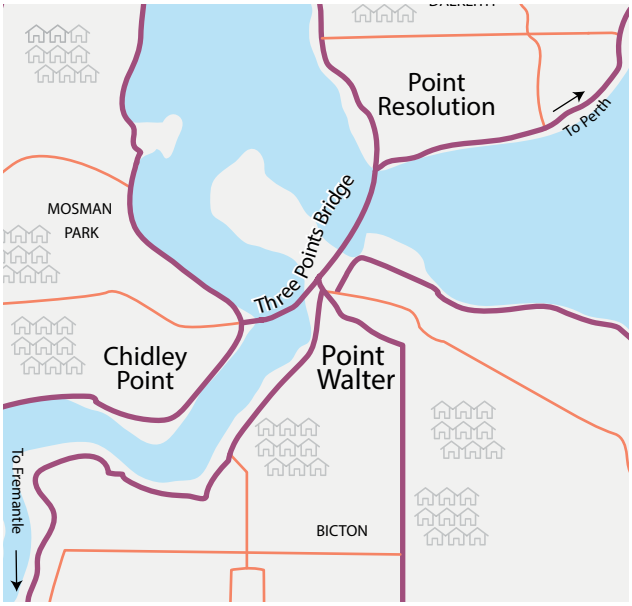


Figure 25: Three Points Bridge

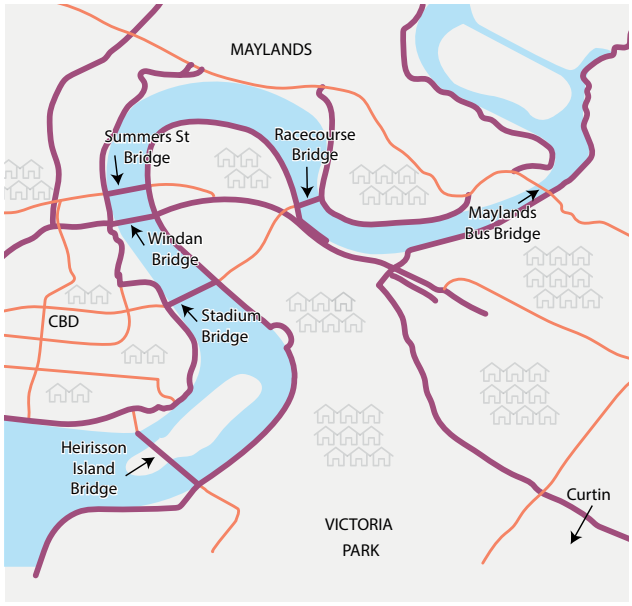


Figure 26: Upper Swan Connections

LEGEND

- Off Road Cycling Routes
- On Road Cycling Routes

The existing off-road commuter network consists of about 172 km of cycleway and, by the time the population reaches 3.5 million, will expand to around 850 km.

Upper Canning Connections

A number of important activity centres exist either side of the Canning River, including the Curtin-Bentley knowledge hub, Cannington activity centre and Canning Vale industrial area. The upper Canning crossings will enable better access between these areas and improve access to the network of recreational shared paths in the Canning River Regional Park:

- *Salter Point Bridge* linking Rossmoyne to Salter Point will take pressure from the Kwinana Freeway cycleway;
- *Pipeline River Crossing* will utilise the existing water/power corridor to provide a north-south link between Shelley and Curtin University; and
- *Canning River Elevated Boardwalk* linking Spencer Rd/Nicholson Road to the proposed Berwick Street strategic route.

Lake Crossings

Lake Joondalup and Lake Goollelal in the Yellagonga Regional Park separate Wanneroo residents from the Joondalup activity centre and restrict access to the Mitchell Freeway cycleway and train stations. The new crossings will improve access to these facilities, as well as the recreational shared paths within the Yellagonga Regional Park:

- *Lake Joondalup Green Bridge* linking cyclists and pedestrians directly to the town centre; and
- *Lake Goollelal Bridge* linking Darch with Kingsley and providing better access for cyclists and pedestrians to Greenwood Train Station.

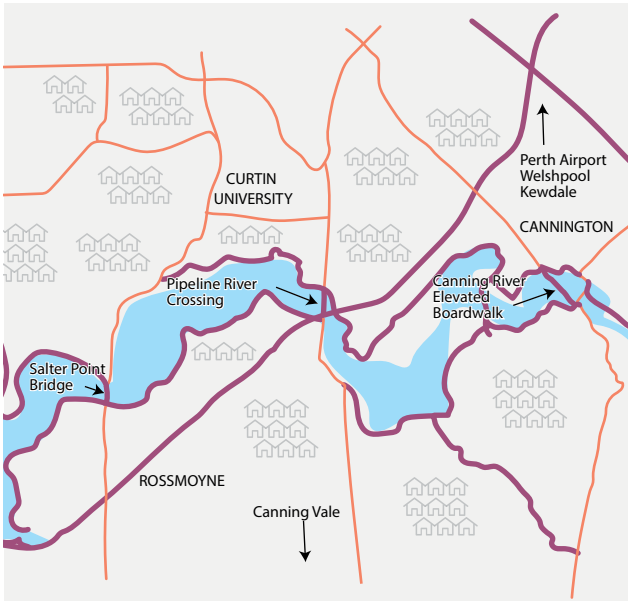


Figure 27: Upper Canning Connections

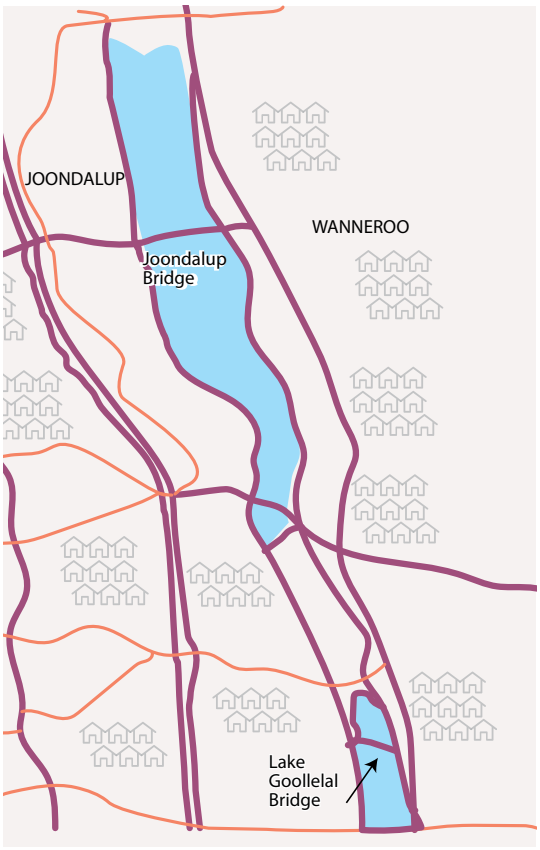


Figure 28: Lake Crossings

LEGEND

- Off Road Cycling Routes
- On Road Cycling Routes

3.4 FREIGHT NETWORK

At a glance

PERTH FREIGHT LINK

Constructed from the Great Northern Highway (Muchea) to Fremantle Port, including a tunnel between Winterfold Road (Hamilton Hill) and High Street (White Gum Valley).

NorthLink, Gateway, Roe 8, Fremantle Tunnel, and Fremantle Port Connect (Canning Highway to the Inner Harbour)
– by 2.7 million

ROWLEY ROAD, ANKETELL ROAD AND MUNDIJONG ROAD

Constructed to 4 lane divided standard, linking Tonkin Highway, Kwinana Freeway and the Fremantle-Rockingham Highway with the Western Trade Coast, including the future container port facility in the Port of Fremantle's Outer Harbour. Mundijong Road upgraded to freeway standard beyond a population of 3.5 million people.

Rowley, Anketell and Mundijong Roads
– by 3.5 million

FREIGHT RAIL UPGRADES

Duplicate the freight rail lines:
at Forrestfield/Kewdale
- by 2.7 million

and at Cockburn and Kwinana Triangles
- by 3.5 million

Construct a dedicated freight rail link over Swan River
- by 3.5 million

INTERMODAL TERMINALS

Develop intermodal terminals at Kewdale Terminal 2, Latitude 32 and South Bullsbrook
- by 3.5 million

SOUTHERN LINK ROAD

Connecting Mundijong Road with Brookton and Albany Highways
- beyond 3.5 million

LEVEL CROSSINGS

Remove level crossings in Canning Vale, Bibra Lake, Middle Swan and Midvale
- by 2.7 million

Freight Network Planning Principles

1. **Enable** metropolitan ports to achieve their optimum capacity
2. **Move** more of Perth's freight task by rail
3. **Expand** the metropolitan intermodal terminal system
4. **Strengthen** the high standard, high productivity road freight network to strengthen the economy
5. **Protect** transport infrastructure critical to economic prosperity

Figure 29: Freight Network Planning Principles

The Perth Freight Transport Network Plan comprehensively addresses Perth's future freight transport needs.

Significant expansion of the strategic road freight network will improve connectivity between the city's industrial areas and ports, and provide linkages out of the metropolitan area to serve demand from regional WA and interstate.

The noise and vibration associated with heavy vehicles is not compatible with residential development and so the plan aims to locate transit oriented developments (activity centres with passenger rail links and high density housing) away from strategic freight routes.

ROAD FREIGHT NETWORK

Within the metropolitan area, the primary road freight distribution network will include Tonkin Highway, Reid Highway, Roe Highway and the Kwinana Freeway. The planned improvement or construction of these roads are described in the Road Network section.

In addition to those improvements, by a population of 2.7 million:

- the Fremantle Tunnel (between Winterfold Road in Hamilton Hill and High Street in White Gum Valley) will link the end of Roe 8 with the intersection of Stirling Highway and High Street in Fremantle, while Fremantle Port Connect will complete the 'last mile' of the Perth Freight Link, extending from Canning Highway to Fremantle Port's Inner Harbour.

By a population of 3.5 million, access to the Outer Harbour will be enhanced by:

- Fremantle-Rockingham Highway that will connect with the Perth Freight Link and the new Stock Road tunnel; and
- The east-west routes of Rowley Road, Anketell Road and Mundijong Road, which will be built to a 4 lane divided standard, linking Tonkin Highway, Kwinana Freeway and Fremantle-Rockingham Highway with the Western Trade Coast.

To move freight to regional areas, by a population of 3.5 million:

- Perth-Adelaide National Highway will replace the section of Great Eastern Highway between Midland and Wundowie as the primary road freight link to the Eastern States; and
- NorthLink (extension of Tonkin Highway) will replace Great Northern Highway south of Muchea as the primary road freight route to the north west of the state.

Beyond a population of 3.5 million, the Southern Link Road, connecting Mundijong Road with Brookton and Albany Highways, will improve access to the Great Southern and Central Wheatbelt regions.

RAIL FREIGHT NETWORK

A number of enhancements will be made to the metropolitan freight rail network to accommodate the more than fourfold increase in international containers expected by mid-century.

By the time the population reaches 2.7 million, rail capacity will be increased by:

- duplicating the single-track sections at Forrestfield and Kewdale;
- identifying an additional rail option for the Kwinana Industrial Area to deal with capacity limits at the Kwinana Triangle; and
- removing the level crossings at Nicholson Road, Canning Vale; North Lake Road, Bibra Lake; Toodyay Road, Middle Swan; and Morrison Road, Midvale.

Freight rail alignments are being reviewed at Midland and Mundijong to improve urban outcomes.

By the time the population reaches 3.5 million, rail capacity will be further increased by:

- constructing a dedicated rail bridge in North Fremantle over the Swan River;
- providing transfer systems to support the development of future container port facilities in the Outer Harbour; and
- duplicating the track between Cockburn Triangle and the Latitude 32 Industry Zone, as well as between Latitude 32 and the Kwinana Triangle.

INTERMODAL TERMINALS

Fremantle Ports Inner and Outer Harbours will be connected by efficient road and rail links to a metropolitan intermodal freight terminal network, comprising:

- high capacity intermodal terminals in Kewdale and Forrestfield that serve the interstate and international rail freight markets, including a new open-access intermodal terminal facility at Kewdale Terminal 2;
- Latitude 32 Intermodal Logistics Centre, serving new container and general cargo port facilities in the Outer Harbour; and
- South Bullsbrook, serving the regions to the north and north-west of Perth.

Relevant elements of the State planning system are being reviewed to identify ways to better protect the freight network and manage its impacts on the community.

The metropolitan freight rail network will accomodate the more than fourfold increase in international containers expected by mid-century.

The Freight Network @ 3.5 Million and Beyond

Perth and Peel

Primary road freight routes

1. Perth Freight Link: connecting Muchea to Fremantle Port, comprising of NorthLink, Gateway, Roe 8, Fremantle Tunnel and Fremantle Port Connect (Canning Highway to the Fremantle Inner Harbour) - by 2.7 million
2. Fremantle-Rockingham Highway: construct to freeway standard between Leach Highway and Kwinana Freeway at Mundijong Road - by 3.5 million
3. Rowley Road, Anketell Road and Mundijong Road: construct to 4 lane divided standard - by 3.5 million
4. Southern Link Road: construct to connect Mundijong Road with Brookton and Albany Highways - beyond 3.5 million

Freight rail upgrades

5. Duplicate single-track sections in Forrestfield / Kewdale intermodal precinct - by 2.7 million
6. Additional rail access corridor to Kwinana Industrial Area to overcome capacity limits at Kwinana Triangle - by 2.7 million
7. Remove level crossings at Nicholson Road, Canning Vale; North Lake Road, Bibra Lake; Toodyay Road, Middle Swan; and Morrison Road, Midvale - by 2.7 million
8. Provide transfer system to container port facilities in the Fremantle Port Outer Harbour - by 3.5 million
9. Duplicate track Cockburn Triangle to Latitude 32 and Latitude 32 to Kwinana Triangle - by 3.5 million

Intermodal terminals

10. Kewdale Terminal 2 - by 2.7 million
11. Latitude 32 Intermodal Logistics Centre - by 3.5 million
12. South Bullsbrook - by 3.5 million

LEGEND

- Freight Rail
- Primary Freight Network @ 3.5million
- Primary Freight Network beyond 3.5million
- Secondary Freight Network @ 3.5 million
- Industrial Area
- Perth Central Business District

*Maps for illustration purposes only.

Figure 30: Map – The Freight Network at 3.5 million people and beyond

4

OPTIMISING THE SYSTEM

Transport infrastructure is expensive to build, maintain and operate efficiently. To get maximum value from it, we need to make it easy to understand and optimise its use so that we can move as many people as possible to where they want to go.

Transport @ 3.5 Million looks at how we will efficiently move people in and around Perth in the future by:

- improving network efficiency; and
- influencing travel behaviour.

Improving network efficiency

PUBLIC TRANSPORT NETWORK OPTIMISATION

The State Government has a plan for the future development of Perth's rail network, and it is just as important to have a plan for how to make the most effective and efficient use of it.

The Public Transport Authority will implement a Route Utilisation Strategy aimed at maximising the use of existing assets (including rail infrastructure, rolling stock and train control systems) and ensuring new initiatives are fully integrated with the existing network.

Over time, new higher capacity railcars, improved signalling and increased station capacity will help get the most out of rail corridors and valuable rail infrastructure. New technologies, such as improved signalling, will make it possible to reduce the headway between trains so they can safely operate closer together, enabling an increase in the frequency of services.

Where possible, high risk level crossings will be progressively replaced by bridges or underpasses to make travel safer and more efficient for all road and rail users.

Equipping Perth's bus fleet with Dynamic Stand Management and real-time tracking systems will enable buses to be allocated to stands on a variable or dynamic basis, maximising the utility of bus stand space and ensuring passengers are kept fully informed as to which stand their bus service will depart from.

Real-time tracking, which is currently being introduced, will facilitate the provision of traffic signal priority to buses, enabling greater timetable adherence and improving bus service reliability. It will also enable bus users to track the arrival time of their preferred bus service using smart phone apps.

MANAGED FREEWAYS

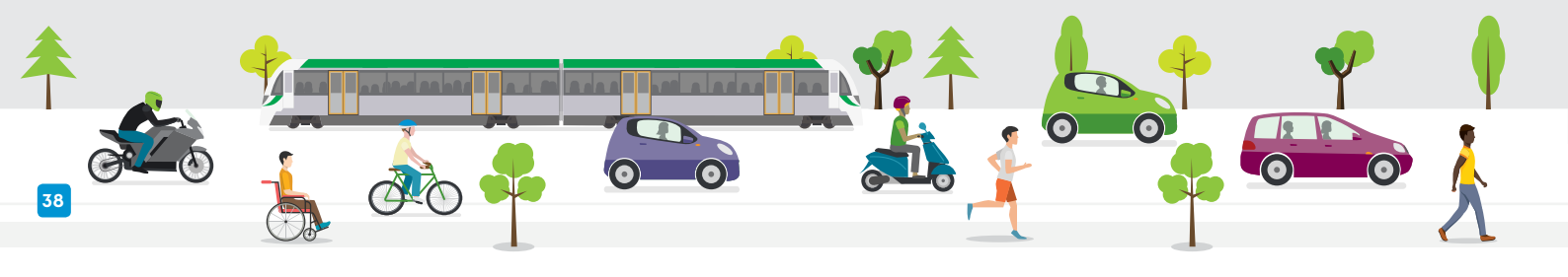
Managing traffic on our freeways is a key part of network efficiency.

The freeway network will be under increasing pressure as Perth's population grows. Sections of the network will need to run at high capacity to accommodate the number of vehicles predicted to use them.

Limited expansion is possible on the Kwinana and Mitchell Freeways between Roe and Reid Highways, and especially through the Perth CBD. Conventional widening will be undertaken where possible, interchanges will be upgraded and Managed Freeways will be introduced.

Main Roads' Managed Freeways strategy will ensure Perth has a productive, resilient freeway network that is capable of delivering maximum reliability, safety and sustainability benefits to the community.

The strategy will also provide improved travel information for road users. This will include real-time information on travel times, average speeds and road conditions, enabling road users to make better informed travel choices.



Managed Freeway tools include:

- variable speed limits and lane control signs being displayed from gantries indicating the speed limit for each lane on the freeway;
- closed circuit television and traffic detectors providing images and data to a control centre;
- electronic message signs providing warnings and advice;
- timing signs showing how long it will take to get to the next junctions; and
- ramp signalling that can control how many vehicles enter the freeway from particular junctions.

Managed Freeways help to keep traffic moving by controlling the speed of flow. Breakdowns can be quickly detected, emergency vehicles called, the lane closed, traffic diverted around the incident, the flow of traffic entering the freeway adjusted and motorists advised to seek alternative routes.

Where possible, laybys will be provided at regular intervals along the freeway and fitted with emergency phones so that motorists have a place of refuge if their car breaks down.

Other strategies, such as introducing High Occupancy Vehicle lanes (often referred to as 'car-pool lanes'), will be considered.

OTHER TECHNOLOGIES

Technology has opened new doors for monitoring vehicle movements. We can use this technology to better inform people's travel choices – often in real-time – and improve the efficiency of our transport system.

In-car navigation systems, mobile devices and detectors on roads and bridges can all transmit and receive data using wireless or bluetooth technologies. The data can include information about road conditions, weather, vehicle speeds, roadworks, accidents and other road activities.

The individual pieces of information build up a picture of what is happening on the transport network in real time. This information can be used to provide messages to travellers via the internet, mobile devices, in-car streaming and variable message road signs to help people have a more efficient journey. The technologies can be used to inform journeys made on foot, or by bike, public transport or car.

Collectively, these technologies are referred to as 'Intelligent Transport Systems' and will play an increasingly important role in managing our transport system.

Influencing travel choices

In general, the transport system is designed to have sufficient capacity to cater for the morning and afternoon peak periods. This is when the highest number of people are on the move, mainly travelling to and from work and school. At these times the transport system may be used to capacity, but at other times of the day the system may be underutilised.

By spreading out the times that we travel we can get better use from transport infrastructure, which means we could spend less time in traffic and get more value for money as we would not need to build new infrastructure so quickly.

Around the world, many tools have been used to influence or manage people's travel patterns and choices. Some of the tools provide incentives (such as cheaper transit fares at certain times of day or faster travel times for car-poolers), while others provide disincentives to drive (such as high parking fees or congestion charges).

These 'carrots' and 'sticks' work together to:

- reduce congestion;
- improve freight and business productivity;
- delay or avoid infrastructure investments; and
- provide social and environmental benefits.

Four tools have been selected for *Transport @ 3.5 Million*.

TRAVEL PLANS FOR NEW DEVELOPMENTS

A travel plan is a package of measures to encourage safe, healthy and sustainable travel options by people working for a specific organisation or at a particular site such as a large activity centre, shopping centre, large residential development or university.

These measures can include employers supporting car sharing, discounted public transport, cycle facilities or personalised journey planning.

All of these measures can contribute to significant reductions in single occupancy vehicle trips in peak periods.

Some developers already prepare travel plans voluntarily. As Perth grows towards 3.5 million people, travel plans will be increasingly implemented in new major commercial and residential developments in activity centres.

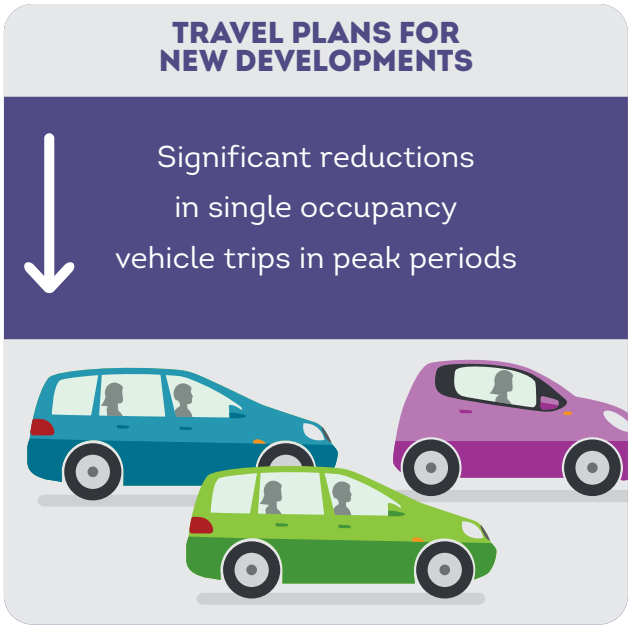
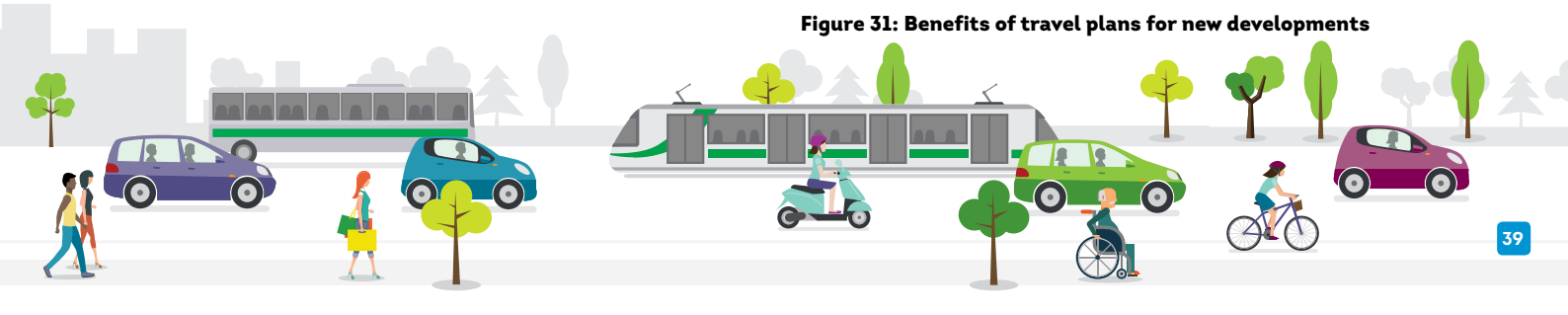


Figure 31: Benefits of travel plans for new developments



PARKING STRATEGIES

Effective parking strategies generally combine the use of long and short term parking charges or levies and may limit the number of parking spaces in a particular area (parking caps). These measures are designed to limit the use of private car trips to specific sites or areas.

If the need for car parks is reduced, this opens up the land for higher value uses such as transit oriented developments (where many people can live close to public transport links), public spaces and shared paths.

Parking strategies can reduce car travel to activity centres by up to 30 per cent when good transport alternatives are made available.

When the population reaches 3.5 million, parking strategies will have been introduced in activity centres and industrial areas (where there are high levels of density and employment) and be widely applied across Perth.

Local governments will be encouraged to implement strategies that develop active and public transport. For example, the existing Perth Parking Management Area supports the free CAT bus network in the Perth CBD.

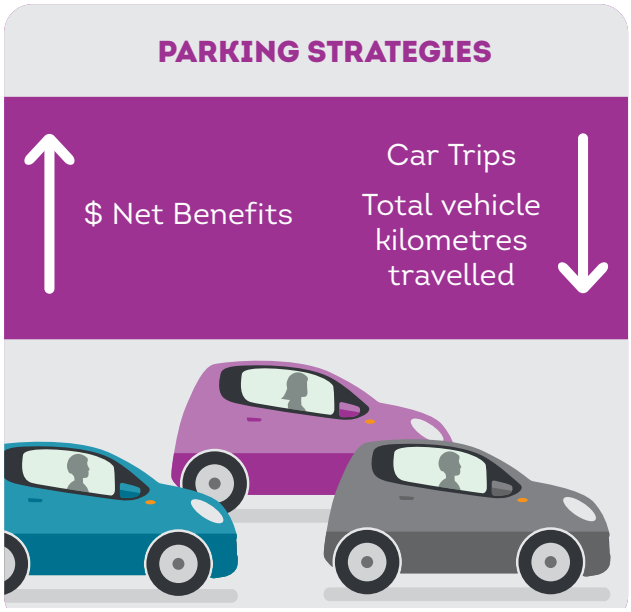


Figure 32: Benefits of parking strategies

TRANSPORT PRICING

Roads

The introduction of a Heavy Vehicle Charge on the Perth Freight Link route will enable Western Australia to realise significant economic reform of the freight industry by delivering the first ever revenue-generating dedicated freight route.

The development of the Perth Freight Link route will provide significant productivity gains for the freight and logistics industries. The heavy vehicle charge will recover a portion of the value from those gains to fund future state infrastructure needs.

The Australian Infrastructure Plan, released by Infrastructure Australia (IA) in February 2016, highlights that the current level of public sector expenditure, especially in the transport sector, may be unsustainable in the face of increasing fiscal pressures.

IA indicated that Australia needs to consider a broader system of transport pricing, both for roads and public transport, and recommended a national inquiry into road user charging reform.

In the event of such an inquiry, the State Government will engage with the Commonwealth and other States on this reform.

Public Transport

Introducing differential public transport fares for the peak period and non-peak times can shift travel patterns and 'spread the peak'.

As more people adjust their time of travel to take advantage of cheaper fares, this can result in less congestion, enable infrastructure to be used more efficiently, and defer or avoid the need for new infrastructure.

By the time Perth has 3.5 million people, a revenue-neutral time of day pricing scheme will be introduced, with non-peak fares being around 30 per cent lower than peak fares. Concessions will not be affected.

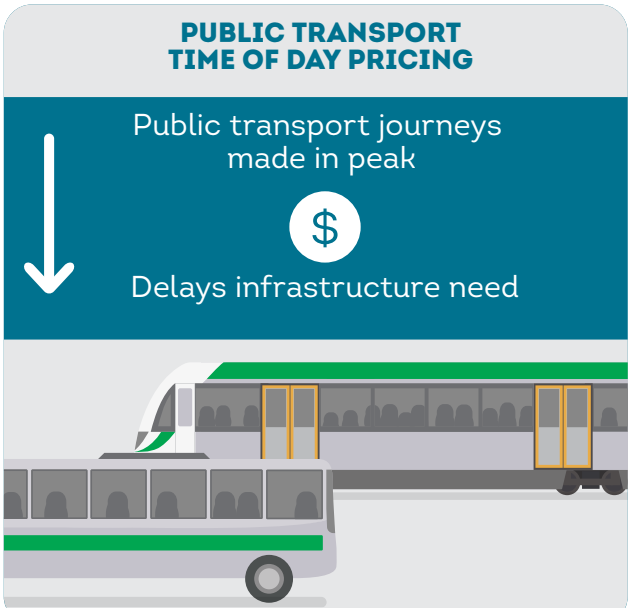


Figure 33: Benefits of public transport time of day pricing

TRAVEL BEHAVIOUR PROGRAMS

These programs use education, information and incentives to influence and assist people to voluntarily reduce their need to travel, particularly by car, and to increase walking, cycling and the use of public transport.

For example, the *Your Move* program implemented in the Cities of Cockburn and Wanneroo helps people to achieve their active transport and physical activity goals by providing tailored information and resources, as well as personalised phone coaching and feedback on progress. More people in these areas are now walking, cycling, using public transport and car-pooling.

Integrated travel behaviour programs will develop under *Transport @ 3.5 Million* to become:

- well-established across workplaces, households and schools in the metropolitan area;
- combined with all new significant public transport infrastructure projects or services, so people will be able to easily plan how to get the most from new transport developments; and
- targeted to congestion hotspots, activity centres, shopping centres and large infrastructure developments.

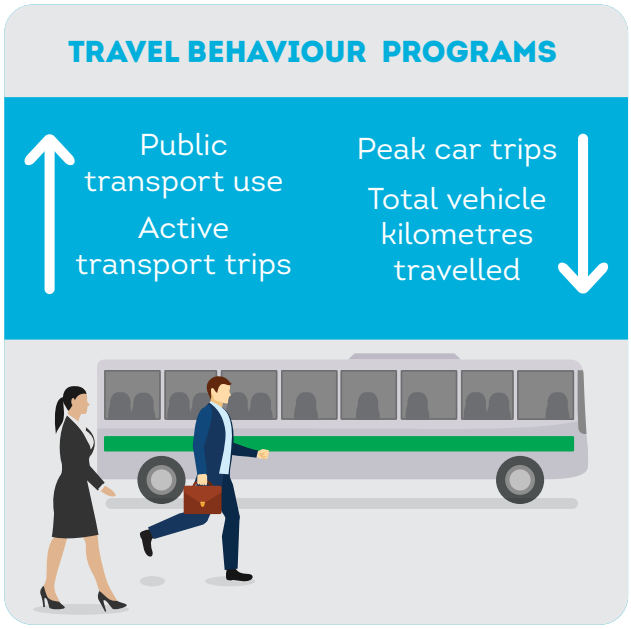


Figure 34: Benefits of travel behaviour programs

OTHER FACTORS INFLUENCING TRAVEL DEMAND

By integrating land use with transport, it is possible for more people to live and work closer to activity centres or along transport corridors where they can access public transport more easily, or simply walk or cycle to work.

Many other factors contribute to reducing congestion at peak times. For example:

- with improved technologies, more people are able to work from home for one or more days a week;
- more companies are providing flexible working hours or compressed working weeks, where employees work fewer but longer days or staggered shifts that spread the times of when people arrive or leave the worksite;
- school hours could be staggered with larger schools opting to have different start and finishing times for pre-primary students or those in specialist programs; and
- the use of real time travel information can help commuters to make informed choices about when they leave home to start their journey.

A range of emerging on-demand transport and related services are opening up new ways to travel and these opportunities will be investigated more closely:

- ride-sourcing services utilising app-based technology, providing safe, flexible and affordable personalised services to your door. These are currently being examined as part of an industry wide on-demand transport reform;
- car-sharing and bike-sharing schemes enabling people to have short term access to a car or bicycle for personal or business use;
- ride-sharing gives a modern twist to car-pooling, by using smart phone technology to match people travelling the same way;
- flexible transport solutions such as demand responsive transport, where dedicated vehicles are used to provide special services for people where demand is too low to support scheduled public transport services, or people with special needs; and
- unbundled parking in residential and commercial units where parking is rented or sold separately to the building space.

With so many changes in technology and society, there may be new ways of influencing travel demand in the future. While the top four tools outlined in *Transport @ 3.5 Million* will be the focus for coming years, new developments will be explored as they emerge.

5

FUTURE TRENDS

Predicting the future is not an exact science. There is considerable debate about the many ways in which different social and technological trends will change the ways we travel, and the way we plan and develop our transport network, in the future.

The future transport network set out in *Transport @ 3.5 Million* is based on extensive research, knowledge, experience and modelling. It takes into account many influencing factors, including future land use and employment distribution, changing demographics, social trends and expected advances in technology.

A key focus going forward will be to continuously identify and monitor influential trends and their underlying causes. *Transport @ 3.5 Million* will remain flexible and adaptive to respond effectively to the city's changing needs.

Here are some of the trends that may influence transport planning in the future.

Fully automated passenger vehicles are likely to impact on the way we travel.

Technological advances

There are many technologies that could influence how transport is managed in the future. The increasing role of the 'Internet of Things' and the introduction of fully automated passenger vehicles are likely to impact on the way we travel and the future shape of the transport network.

INTERNET OF THINGS

Millions of objects today contain sensors, unique identifiers and embedded microchips that enable them to communicate data to other objects through wireless technology. Together these objects form the 'Internet of Things' (IOT).

The advent of Cloud technology has meant that there is now a place where the large amounts of real time data from IOT objects can be stored, accessed and analysed to provide solutions that influence the way we live.

For example, the IOT can influence the transport system by providing real time data to communicate:

- Vehicle to Vehicle (V2V) – where a vehicle advises a vehicle behind of an upcoming traffic hazard;
- Vehicle to Infrastructure (V2I) – where vehicles communicate with traffic lights so they apply the most efficient light sequence to keep traffic flowing; and
- Vehicle to People (V2P) – via mobile devices and personal accessories so people know where a vehicle is on its journey to collect them or to make a delivery.

Already our mobile devices can alert us to the best time to leave for our next calendar appointment, based on time, distance and travel conditions. Many car drivers rely on GPS for directions, and for real-time information on traffic and roadworks.

Ultimately IOT technology could be extended to advise us of the best travel option having regard to transport conditions (on road, rail, and cycleways), our personal diary, budget, fitness, daily activity levels, and weather conditions. From this we may choose to walk, cycle, catch public transport or drive – or use the best combination of options.

AUTOMATED VEHICLES

The future of driverless vehicles has received considerable attention in recent years. Along with traditional car manufacturers, leaders in information technology, such as Google and Apple, have shown an interest in developing this technology. The Google Self Drive Project has clocked up over 1.6 million kilometres travelling around the United States.

In Australia, the first automated vehicle trials were held in Adelaide in November 2015. The Transport Portfolio is working closely with the RAC on the staged trial of a driverless, fully electric shuttle bus on Perth roads.

While the rise of driverless vehicles seems certain, the timing and impacts of this change are unknown.

What is clear is that the potential benefits of driverless vehicles will take time to materialise. Today's vehicles already contain some automated features. There are five internationally recognised levels of automated vehicle with the highest level having no driver and being fully 'autonomous'.

Figure 35: Automated shuttle bus trial

Source: RAC Western Australia

Many vehicles on the road today have Level 1 automation in the form of cruise control and some have Level 2 features that enable the vehicle to park automatically. Driverless trucks, operated from Perth, have been used on remote mine sites for years and in many countries driverless trains are used on rail systems.

The existing levels of automation provide benefits to the direct users, but the wider benefits of automation, such as reduced traffic and parking congestion, improved safety, independent mobility for non-drivers, energy conservation and reduced pollution, are unlikely to become significant until driverless vehicles outnumber human-operated ones.

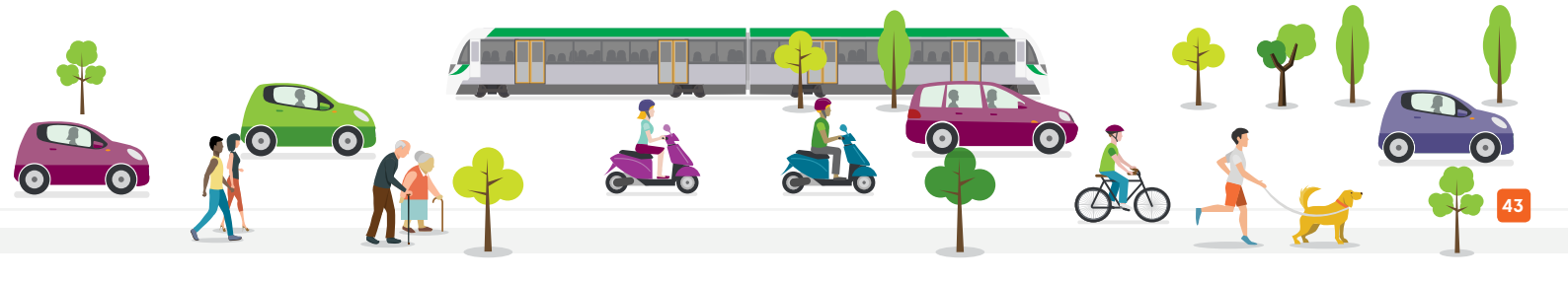
At present, we cannot reliably predict how long it will take for driverless vehicles to reach critical mass to achieve these benefits, or what path the transition from human-operated to fully automated vehicles will take.

The journey may begin with vehicles owned by businesses and government, shifting professional drivers (in the public transport, trucking and taxi sectors) into more technology-oriented roles. Alternatively, it could be led by private demand through affluent early-adopters and non-drivers.

LEVEL	DESCRIPTION	EXAMPLES	IMPLICATION
0	Warning but no automation	Lane departure warning, blind spot warning	The driver is in full control but supported by systems
1	Function specific automation	Electronic Stability Control (ESC), Adaptive Cruise Control (ACC), Auto Emergency Braking (AEB)	The driver is always in control but safety systems take some corrective action if needed
2	Combined function automation	ACC and lane keeping assistance, self-parking	The vehicle can operate without driver input in some conditions
3	Limited self-driving automation	In normal conditions the vehicle can operate autonomously, but hands back control to driver at short notice in some conditions	
4	Full self-driving automation	Vehicles operate without requiring driver input; vehicles may or may not have a driver present	

Figure 36: Levels of vehicle automation

Source: US National Highway Traffic Safety Administration (NHTSA)



TRANSITION CHALLENGES

Irrespective of the exact timing, the transition to driverless vehicles will present significant planning and policy challenges.

While driverless vehicles offer many potential benefits, they also present risks to be managed. The integration of driverless vehicles into the wider transport system has the potential to improve the system, but also has potentially adverse consequences.

Driverless vehicles can operate more closely together, reducing the amount of road space required per vehicle. However, the appeal of 'Personal Rapid Transit' pods could attract people away from public transport, reducing the net benefit of driverless vehicles and potentially resulting in increased congestion in the long run. To avoid this, travel demand strategies and investment in alternate modes (including walking, cycling and public transport) will need to ensure driverless vehicles complement, rather than simply compete with, other transport options.

Other transition challenges include:

- identifying and implementing necessary legislative changes to enable and, where necessary, regulate driverless vehicles;
- considering the impact on personal identification, when people may no longer require a driver's licence;
- identifying innovative transport infrastructure funding mechanisms and transport pricing reforms, so that there is an equitable way of paying for use of transport infrastructure in the future, if there is a reduction in vehicle numbers (and hence registration revenue), driver's licences, and fuel consumption (reducing fuel tax revenue); and
- understanding impacts on insurance costs and liability for accidents involving driverless vehicles.

ENERGY

The transport sector accounts for over 27 per cent of Australian net energy consumption, slightly more than the electricity supply sector. Road transport accounts for over 72 per cent of transport energy consumption.[6]

Since 2000, Australia's dependence on imported liquid fuel and oil for transport has grown from around 60 per cent to over 90 per cent of our transport fuel demand.[7]

While transport consumes a significant amount of energy, it may also form part of our future energy solution. Public and commercial transport vehicles are often testing grounds for new energy technology, such as Perth's hydrogen fuel cell bus trials. Perth's trains use regenerative braking to return energy to the electrified network.

Electric vehicles can be re-energised at charging stations around the city – these charging stations will increase in number as electric vehicles become more common. In the future, charging stations might be readily available in car parks, for convenient recharging.

A number of new technologies are being trialled around the world to make better use of transport infrastructure, including solar roadways and inductive roads and railways that charge electric vehicles as they travel.

If these technologies advance, in the future Perth's extensive transport infrastructure might be used to collect and distribute clean energy to vehicles, signals and lighting.

	2013–14		AVERAGE ANNUAL GROWTH	
	Peta-joules	SHARE (per cent)	2013–14 (per cent)	10 YEARS (per cent)
Transport	1 589.2	27.3	1.1	1.8
Electricity supply	1 575.6	27.0	-2.8	-0.9
Manufacturing	1 186.2	20.2	-6.9	0.2
Mining	531.1	9.1	6.6	6.9
Residential	449.0	7.7	-1.4	1.0
Commercial	315.8	5.4	2.8	1.9
Agriculture	99.7	1.7	0.3	-0.2
Construction	26.7	0.5	7.1	-0.5
Other	58.0	1.0	-13.9	-2.6
Total	5 831.1	100.0	-1.5	0.9

Figure 37: Australian energy consumption by industry

Source: Department of Industry and Science (2015) Australian Energy Statistics, Table E

	2013–14		AVERAGE ANNUAL GROWTH	
	Peta-joules	SHARE (per cent)	2013–14 (per cent)	10 YEARS (per cent)
Road	1 156.9	72.8	-0.1	1.3
Air	303.0	19.1	4.9	4.6
Rail	52.0	3.3	-0.1	4.4
Water	53.0	3.3	6.2	-2.5
Other	24.3	1.5	-3.4	-0.1
Total	1 589.2	100.0	1.1	1.8

Figure 38: Australian transport energy consumption by subsector

Source: Department of Industry and Science (2015) Australian Energy Statistics, Table F

6 Department of Industry and Science (2015) http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/aes/2015-australian-energy-statistics.pdf

7 NRMA (2014) Australia's Liquid Fuel Security Part 2 https://www.mynrma.com.au/media/Fuel_Security_Report_Pt2.pdf

Social trends

While technological trends have clear potential to change the way we travel in the future, it is also important to consider the underlying factors that influence travel behaviours and, in many cases, create the impetus for new technologies.

Since the beginning of the 21st century, there has been a notable decline in per capita travel by car across most Western countries, including Australia. This is in marked contrast to the continuous growth experienced during the mid-to-late 20th century, when car ownership became common and affordable.

Today, younger people are less likely to have a driver's licence and more likely to defer learning to drive. Walking, cycling and catching public transport have become more socially acceptable within cities like Perth. These modes are encouraged by governments not just for transport efficiency, but for their health and environmental benefits.

There could potentially be fewer cars in car parks, due to car-pooling, car-sharing, ride-sourcing, ride-splitting and other ride-sharing arrangements that are re-shaping the way we think about transport.

As electric vehicles become more popular, air quality will improve and the need for charging stations (potentially from renewable resources) will increase.

These changing community preferences hold potential transport network benefits for all users, including those who continue to travel by car. If these choices are supported by increased urban living and suitable transport infrastructure (including better walking and cycling paths, bike parking, and public transport options), then there is considerable potential to reduce traffic congestion, slow down road expansion and reduce transport costs.

The changing nature of work could increase opportunities for working from home, telecommuting, and staggered work hours.

Expensive office space may be increasingly used for meetings and sharing ideas, while the 'work' takes place at home or at less expensive office hubs in the suburbs, reducing the demand for longer trips on the transport system.

Routine office, hospitality and manufacturing tasks may be performed by robots or automated computer systems, with a growth in IT employment to maintain these new technologies.

The growth in prefabrication and 3D printing may see a decrease in on-site labour, but an increase in jobs and deliveries of raw materials to industrial locations.

It is likely that retail trading hours will be fully deregulated over time and this may result in a shift to later opening hours. This could have the consequential effect of spreading the peak period on the transport network, reducing peak congestion.

Continued growth in products and services delivered to the home by mobile technology is expected, including online shopping and education, and even virtual doctors.

All of these factors continue to influence how, when and where we travel. The transport network has a role in both responding to and shaping social trends to help create and maintain a vibrant, connected and productive city.

The Transport Portfolio will continuously monitor social, economic and technological trends to ensure the plans of today meet the needs of tomorrow. This will include ongoing stakeholder engagement with local governments, academia, industry and the community so that plans reflect the best knowledge of the day and keep pace with the needs of our growing population and advances in technology.

6

THE WAY FORWARD

Transport @ 3.5 Million sets the vision for a generational change to Perth's transport network. The transport initiatives described in this plan, and listed in Appendix 1, will keep our city vibrant, connected and productive.

Many of the projects proposed in the plan are new and in the conceptual stage. They will be subject to further investigations as to scope, engineering and design, cost estimation, funding options and timing.

This will occur as part of the Government's usual planning and investment decision making processes.

TIMING

Due to the long term outlook of the plan, it is too early to determine the exact timing and priority of most projects. The plan is a guide for the future network – how and when different elements are delivered will be determined over the next three decades.

A broad estimate of project timings is provided in Appendix 1.

By optimising our existing network and services, which has already benefitted from significant investment, some of the infrastructure projects will not be required until the population approaches 3.5 million. That is, they will need to be delivered between 2030 and 2050, assuming current population projections are met.

ECONOMIC APPRAISAL

Government funding is likely to remain constrained into the future and investments must be carefully prioritised.

The immediate costs of new transport infrastructure, while high, will be evaluated in the context of long term growth, wider economic benefits and the cost of doing nothing.

The infrastructure proposed in this plan is significant. Funding implementation of the plan will require the assistance of the Australian Government.

In addition to public funding, the State will continue to partner with private industry and explore innovative funding opportunities, such as value capture, to help deliver the network Perth needs to keep it vibrant, connected and productive.

New investment in transport infrastructure can lead to significant increases in surrounding residential and commercial property values. Assessing value capture opportunities in the early part of project planning and evaluation will become the norm for major projects in the future.

CONSULTATION

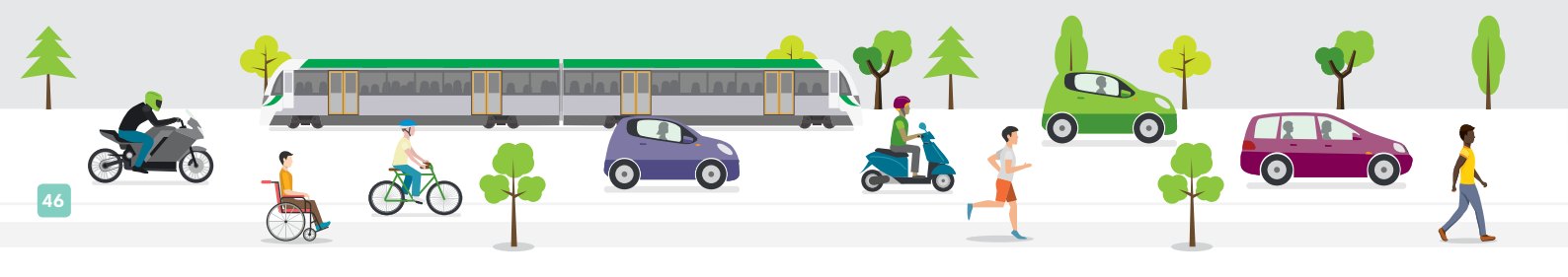
Transport @ 3.5 Million has been developed by the Transport Portfolio (Department of Transport, Public Transport Authority and Main Roads) in collaboration with the Departments of Planning, Treasury, and Premier and Cabinet. The Planning and Transport Research Centre of WA were independent advisors for the mass transit network.

The release of the plan provides opportunity for consultation with federal, state and local government bodies, business, industry, academia and the wider community.

There is not a single 'right way' to meet the travel demands of the future. This plan sets out what the Transport Portfolio considers to be the best option for future development and optimisation of the network, based on land use and employment targets, forecast travel demand and the objectives of the plan.

The plan will be reviewed based on feedback following a consultation period.

To have your say or for more information, visit www.transport.wa.gov.au/transportplan



MONITORING AND REVIEWING THE PLAN

Transport @ 3.5 Million is based on the land use targets established in *Perth and Peel @ 3.5 Million*. If those targets are not met, or change, the plan will need to adapt to accommodate this.

Similarly if technology changes more rapidly or in different ways than currently expected, changes to the plan may be necessary.

Influential trends will be monitored and the plan will be reviewed every five years to ensure it continues to meet the needs of Perth's growing population. The Transport Portfolio will also monitor delivery of the plan, ensuring it is implemented in a coordinated and integrated manner.

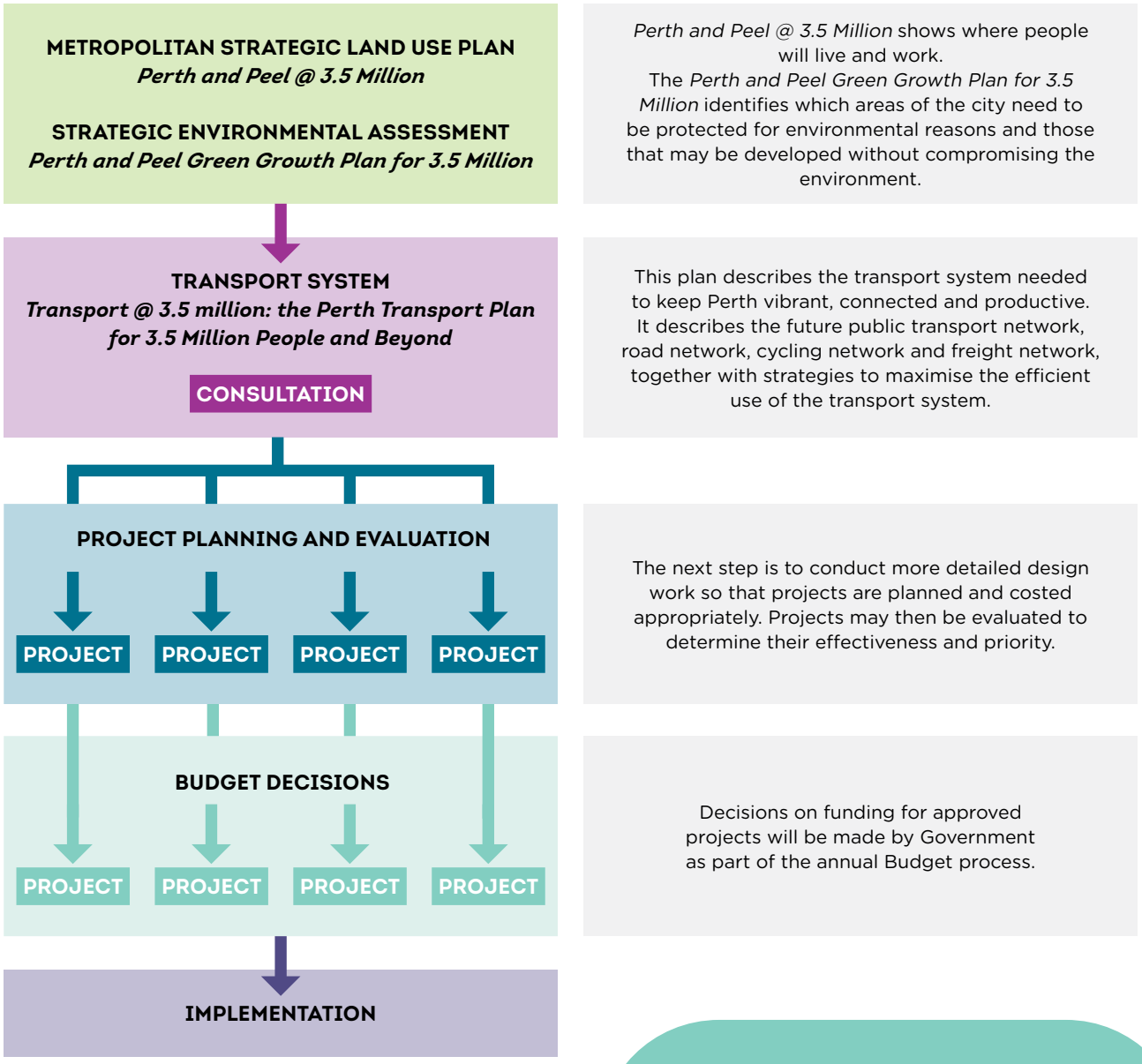
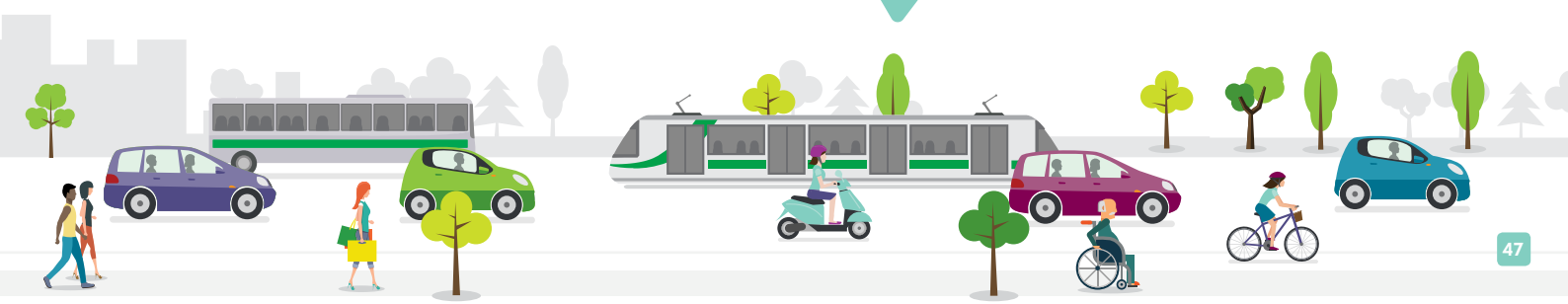


Figure 39: The Transport Planning Process

To have your say, visit
www.transport.wa.gov.au/transportplan



APPENDIX 1: ESTIMATED TIMELINES

A broad estimate of project timings is provided below. All projects are subject to further consultation and technical assessment.

ENHANCEMENT	BY 2.7 MILLION	BY 3.5 MILLION	BEYOND 3.5 MILLION
PUBLIC TRANSPORT NETWORK			
East Wanneroo Rail Link			
City to Marshall Road (via Morley)	✓		
Marshall Road to the Joondalup line		✓	
Ellenbrook spur			✓
Stirling-Murdoch Orbital Rail Link			
Stirling to UWA-QEII		✓	
UWA-QEII to Murdoch		✓	
Murdoch to Thornlie			✓
Stirling to Morley			✓
Extending radial rail lines			
Joondalup line extended to Yanchep	✓		
Midland line extended to Bellevue	✓		
Armadale line extended to Byford		✓	
Other rail links			
Forrestfield Airport Link	✓		
Cockburn Central to Thornlie	✓		
Forrestfield to Thornlie			✓
Southern Rail			✓
Subway-style inner city system			
Connecting Perth, East Perth, West Perth, Northbridge, Leederville and other inner city centres		✓ Partial	✓
Perth Light Rail			
UWA-QEII to Curtin-Bentley	✓		
Curtin-Bentley to Canning Bridge		✓	
Bus rapid transit (BRT) / Light rail transit (LRT)			
Ellenbrook to Bassendean Station, Midland and East Wanneroo Rail Link	✓		
Glendalough Station to Scarborough Beach	✓		
Canning Bridge to Booragoon			✓
Murdoch to Cockburn Coast via Fremantle			✓
Bus Bridge (Bus, cycling and walking)			
Maylands Bus Bridge		✓	

ENHANCEMENT	BY 2.7 MILLION	BY 3.5 MILLION	BEYOND 3.5 MILLION
ROAD NETWORK			
River Crossings			
East-West City Link (Riverside Bridge/Tunnel & East-West Tunnel)		✓	
Stock Road Tunnel		✓	
Freeways and Expressways			
All-lane running: implement on Mitchell and Kwinana Freeways	✓		
Reid and Roe Highways: upgrade to freeway standard	✓		
Mitchell Freeway: extend to Indian Ocean Drive and construct to freeway standard to Yanchep		✓	
Whiteman-Yanchep Highway: construct to link Tonkin Highway with Mitchell Freeway; freeway standard between Tonkin Highway and Neerabup		✓	
Fremantle-Rockingham Highway: construct to freeway standard between Leach Highway and Kwinana Freeway at Mundijong Road		✓	
Orrong Road and Leach Highway upgraded to expressway standard. Orrong Road between Graham Farmer Freeway and Roe Highway. Leach Highway between Tonkin Highway and Shelley Bridge		✓	
Mitchell Freeway: upgrade to freeway standard between Yanchep and Indian Ocean Drive			✓
Whiteman-Yanchep Highway: upgrade to freeway standard between Neerabup and Mitchell Freeway			✓
Mundijong Road between Kwinana Freeway and Tonkin Highway: upgrade to freeway standard			✓
Tonkin Highway			
Tonkin Highway: extend to Perth-Darwin National Highway in the north and Forrest Highway, Pinjarra in the south	✓ Partial	✓	
Tonkin Highway upgrade to freeway standard between the Perth-Darwin National Highway and Mundijong Road		✓	
Tonkin Highway far south: upgrade to freeway standard from Mundijong Road to Forrest Highway, Pinjarra			✓
CYCLING NETWORK			
Expand off-road network from 172 km to 850 km	✓ to 350 km	✓ to 850 km	
River and Lake Crossings			
Three Points Bridge, connecting Chidley Point, Point Walter and Point Resolution	✓		
Heirisson Island Bridge	✓		
Racecourse Bridge		✓	
Salter Point Bridge		✓	
Pipeline River Crossing		✓	
Canning River Elevated Boardwalk		✓	
Lake Joondalup Bridge		✓	
Lake Goollelal Bridge		✓	

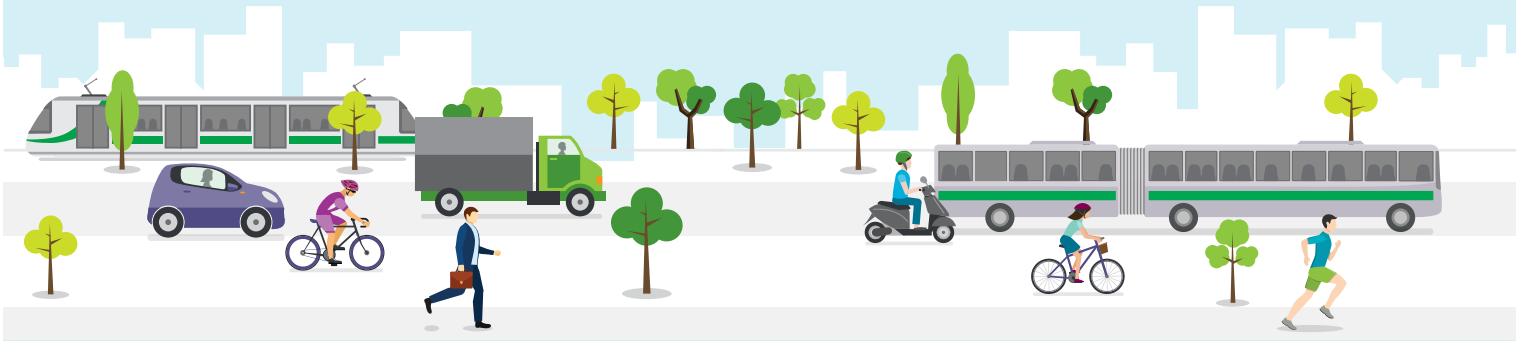
ENHANCEMENT	BY 2.7 MILLION	BY 3.5 MILLION	BEYOND 3.5 MILLION
FREIGHT NETWORK			
Strategic road freight routes			
Perth Freight Link connecting Muchea to Fremantle Ports, comprising of NorthLink, Gateway, Roe 8, Fremantle Tunnel and Fremantle Port Connect (Canning Highway to the Fremantle Inner Harbour)	✓		
Rowley Road, Anketell Road and Mundijong Road: construct to 4 lane divided standard, linking Tonkin Highway, Kwinana Freeway and the Fremantle-Rockingham Highway with the Western Trade Coast, including the future container port facility in the Fremantle Port Outer Harbour		✓	
Perth-Adelaide National Highway: construct between Roe Highway at Midland and Great Eastern Highway; freeway standard to Gidgegannup	✓ Partial	✓	
Southern Link Road connecting Mundijong Road with Brookton and Albany Highways			✓
Freight rail upgrades			
Duplicate single-track sections in Forrestfield / Kewdale	✓		
Identify an additional rail option for the Kwinana Industrial Area to deal with capacity limits at the Kwinana Triangle	✓		
Remove level crossings at Nicholson Road, Canning Vale; North Lake Road, Bibra Lake; Toodyay Road, Middle Swan; and Morrison Road, Midvale	✓		
Construct a dedicated freight link in North Fremantle over the Swan River		✓	
Provide transfer systems to support the future container port facilities in the Fremantle Port Outer Harbour		✓	
Duplicate track between Cockburn Triangle and Latitude 32 Industry Zone, and between Latitude 32 and the Kwinana Triangle		✓	
Intermodal terminals			
Kewdale Terminal 2	✓		
Latitude 32 Intermodal Logistics Centre (serving new container and general cargo port facilities in the Fremantle Port Outer Harbour)		✓	
South Bullsbrook		✓	
OPTIMISING THE SYSTEM			
Improving network efficiency			
Implement Rail Route Utilisation Strategy	✓		
Implement Dynamic Stand Management and Real Time Tracking of buses	✓		
Implement Managed Freeways Strategy	✓		
Influencing travel choices			
Perth Freight Link Heavy Vehicle Charge	✓		
Travel plans for major new commercial and residential developments		✓	
Parking strategies introduced in activity centres and industrial areas		✓	
Differential public transport fares (off-peak at least 30% lower than peak)		✓	
Expanded travel behaviour change programs for workplaces, households, schools, congestion hot spots and activity centres		✓	

APPENDIX 2: GLOSSARY

TERM	DESCRIPTION
Active transport	Non-motorised travel modes, such as walking and cycling
Activity centre	Community focal points. They comprise uses such as commercial, retail, higher-density housing, entertainment, tourism, civic/community, higher education and medical services. Activity centres vary in size and diversity and are designed to be well-serviced by public transport. In Perth the largest activity centre is the Perth CBD and there are ten strategic activity centres in Yanchep, Joondalup, Stirling, Morley, Midland, Cannington, Fremantle, Armadale, Rockingham and Mandurah. Unless specified otherwise, for the purposes of this report, 'activity centre' includes **specialised centres** and **strategic metropolitan activity centres.**
All lane running	On freeways maximum use is made of the freeway corridor by using emergency lanes for traffic. Special laybys are provided for breakdowns and road management procedures are put in place so that incidents can be monitored and controlled.
Bus Rapid Transit (BRT)	Bus Rapid Transit is a high speed bus service with limited stops that operates in its own lane, separated from other traffic by kerbing or barriers and with 'station-like' passenger stops.
Car sharing	Car sharing schemes provide members with short term access to vehicles for personal and business use. Car sharing provides the benefits of private car ownership without the operating costs and responsibilities.
CBD	Central Business District.
End of trip facilities	Facilities that support the use of active transport, e.g. bike storage facilities, changing rooms and showers.
Expressway	A divided highway with bridges and underpasses at all interchanges, but some access (eg. left in, left out) between those interchanges. Some parts of a highway may be constructed to expressway standard.
Freeway standard	A divided highway with no access for traffic between interchanges and with bridges or underpasses at all intersections. Some parts of a highway may be constructed to freeway standard.
Green bridges	Bridges that are used by pedestrians and cyclists only.
High frequency public transit corridor	Where bus services are available at a frequency of five minutes in peak times and 15 minutes out of the peak times.
High priority public transit corridor	On busy roads where **high frequency public transit** is facilitated through the use of traffic signalling priority, queue jumps at traffic lights or bus lanes.
Infill development	The redevelopment of existing urban areas at a higher density than currently exists.
Latitude 32 Industrial Zone	Covering 1,400 hectares, Latitude 32 is a key component of the Western Trade Coast. It is the proposed site for a major logistics centre and intermodal terminal to support future container and general cargo operations in the Fremantle Port Outer Harbour.
Light Rail Transit (LRT)	A road based rail system that may be physically separated from other traffic (with intermittent crossings for vehicles and pedestrians) or operate on surface streets with mixed traffic.
Modes of transport	Different types of transport, e.g. walking, cycling, public transport (bus, train, ferry) and car.
Motorised transport	Modes of transport that are motor-driven (such as buses, trains and cars).

TERM	DESCRIPTION
Non-motorised transport	Modes of transport that are primarily powered by humans, such as walking and cycling (see also **active transport**).
Orbital	A circular route designed to allow movement from one side of the city to the other, often without going through the city centre.
Peak period	The time of day when most people are moving. Usually occurs once in the morning and once in the afternoon when people are going to or from work or school.
Primary freight network	A system of roads designed to carry freight vehicles that connects large strategic industrial centres, including ports and airports, and major regional and interstate roads. Also called the strategic freight network. (Compare with **secondary freight network**).
Radial	A route that starts or finishes at the city centre.
Ride-sharing	Car-pooling with friends for convenience.
Ride-sourcing	Ride sourcing companies such as Uber and Lyft provide app-based, on-demand services that are similar to taxis.
Ride-splitting	Where customers share a '**ride-sourcing**' journey and split the fare.
Secondary freight network	A system of roads designed to carry freight vehicles connecting major industrial areas. Also called the major freight network. (Compare with **primary freight network**)
Specialised Centre	Places that have strong specialised roles based around major institutions such as major hospitals, universities or airports within the centre. Specialised centres include Murdoch, UWA–QEII, Curtin-Bentley, Perth Airport and Jandakot Airport.
Strategic Metropolitan Activity Centre	A major centre of activity. At a population of 3.5 million people, besides the Perth Capital City, there are ten Strategic Metropolitan Activity Centres identified in the metropolitan area: Yanchep, Joondalup, Stirling, Morley, Midland, Cannington, Fremantle, Armadale, Rockingham and Mandurah.
Transit	Moving people from one place to another by public transport.
Transit oriented development (TOD)	Moderate-to-high intensity commercial, mixed-use, community and residential development close to train stations and/or high-frequency bus routes that encourage public transport use over private vehicles.
Travel demand management	Measures designed to influence travel behaviour and improve system efficiency.
TravelSmart program	The ***TravelSmart*** and ***Your Move*** programs help households, workplaces and local government make better travel choices, helping to reduce congestion and environmental impacts.
Turn up and go	Where public transport services are so frequent that passengers do not need to refer to a timetable.
Very long term	When the population of Perth grows beyond 3.5 million people.
Western Trade Coast	A strategic industrial centre comprising the Australian Marine Complex at Henderson, Kwinana Industrial Area, **Latitude 32 Industrial Zone**, and the Rockingham Industry Zone, which includes East Rockingham.
Your Move program	The ***Your Move*** and ***TravelSmart*** programs help households, workplaces and local government make better travel choices, helping toreduce congestion and environmental impacts.

June 2016



Department of Transport
Public Transport Authority

mainroads
WESTERN AUSTRALIA

Cycling Network Plan

Transport @ 3.5 Million

July 2016

This page is intentionally blank

Table of Contents

1. Introduction

With its warm Mediterranean climate, flat topography and outstanding natural beauty, the Perth metropolitan region certainly has the right ingredients to become one of the world's great cycling cities. Cities with high levels of cycling enjoy various economic, environmental and social benefits. Not only can cycling play a pivotal role in reducing road congestion and improving air quality, it can also help facilitate new forms of industry (such as cycle-tourism) and encourage people to live more healthy and active lifestyles. Key to increasing cycling's mode share is providing routes that are not only safe and direct, but also offer an advantage over private vehicle usage in terms of convenience and travel times.

The outcomes of this project will be used to inform *Transport @ 3.5 Million*. A series of interconnected local routes, strategic routes, Principal Shared Paths (PSPs) and Recreational Shared Paths (RSPs) have been identified with the aim of providing high quality, ubiquitous links between Perth's various universities, schools, train stations, activity centres and tourist destinations. It is critical that such infrastructure provides a level of safety that makes it attractive to cyclists of all ages and experience levels, not just Lycra-clad fitness enthusiasts and CBD-commuters.

Given the long term nature of *Transport @ 3.5 Million*, a number of ambitious routes aimed at making cycling a realistic and appealing option for a high proportion of the population have been identified. These include new coastal routes, river crossings as well as separated cycling facilities to, from and across the Perth CBD. It is envisaged that these ideas will form a catalyst for future planning and investment in cycling infrastructure, thus enabling Perth to enjoy the benefits of being a city with high cycling mode share.

Figure 1: With strong leadership and increased investment, Perth can transform into one of the world's great cycling cities over the next 35 years

2. Methodology

2.1 Mapping of existing and proposed activity centres

A key objective of the Western Australian Planning Commission's *Perth and Peel @ 3.5 Million* planning framework is to increase Perth's sub-regional employment self-sufficiency (i.e. improving a person's ability to both live and work within an individual sub-region). It is expected that better integrating land use and transport around activity centres will minimise the need for people to commute long distances to school or work - ultimately relieving pressure on the transport network.

With this in mind, the *Transport @ 3.5 Million* bike network has placed a strong emphasis on better connecting Perth's various activity centres. Before commencing the route-identification process, a review of the draft *Perth and Peel @ 3.5 Million* strategic land use planning documents was undertaken. Contained within these documents were details of Perth's existing and future activity centres. These included:

- → Strategic Metropolitan Centres e.g. Fremantle, Morley, Joondalup, etc.
- → Secondary Centres e.g. Booragoon, Karrinyup, Mirrabooka, etc.
- → Specialised Centres e.g. UWA/QEII, Bentley/Curtin, Perth Airport, etc.
- → District Centres e.g. Dianella, Kardinya, Mount Lawley, etc.

Figure 2: Before identifying new cycling routes, a mapping exercise was undertaken of Perth existing and future activity centres.[1]

[1] Source: Google Earth

Providing high quality links to Perth's train stations was also a key priority of this project. Allowing people to cycle safely to and from train stations will help people overcome "first-mile" or "last-mile" problems. Such an initiative would also increase the coverage of the public transport system, thus relieving pressure on the already congested road network.

2.2 Review of local government bike plans and other literature

Before undertaking the route identification process, a number of Perth's local government bike plans were reviewed. Although a significant number of the routes contained within these plans were adopted, it was recognised that, in some cases, routes may have been overlooked by local authorities due to their large funding requirements, short implementation timeframes or coordination difficulties with neighbouring councils.

A concerted effort was also made to address the concerns outlined in the Auditor General's report into *Safe and Viable Cycling in the Perth Metropolitan Area*. Some key findings raised pertaining to the objectives of this project included:

- *Sections of the arterial cycle network along major transport routes within 15 km of the Perth CBD are incomplete. Over the last 30 years state transport agencies have constructed approximately 172 km of the arterial PSP cycle network, of which 93 km is within the 15 km radius. The WABN Plan outlines 185 km of additional routes. Critically, gaps tend to be on priority routes along railway lines and freeways. Past planning has resulted in PSP routes to the CBD but few dedicated, safe cycle paths through or within the city environment.*
- *Past planning and development has resulted in five PSP routes that lead to the outskirts of the CBD but few dedicated cycle paths through or within the city. DoT and respondents to our survey identified the CBD as a significant safety risk for cyclists as they must cycle on the road. The minimal infrastructure and high vehicle and pedestrian traffic make the environment unsafe and inconvenient for cycling.*
- *Local cycling routes to connect with the PSP network, community facilities and employment centres have historically not been well planned, and vary in design and construction. The result is an inconsistent and unconnected local cycle network which lacks integration into the broader transport system.*

2.3 Utilisation of GPS travel data

The GPS mapping tool, 'Strava Labs', was employed to better understand which parts of Perth's cycling network are most heavily utilised. The following trends/generalisations were noted:

- Separated and/or protected cycling facilities receive significantly higher patronage compared to unprotected cycle lanes or sealed shoulders. The five radial PSPs (although incomplete) are all well utilised. Where gaps in these routes exist, cyclists tend to use quiet streets before re-joining the shared path facilities.

- → Although cyclists are hesitant to use busy roads which lack dedicated cycling facilities, keen/confident cyclists will still use them if there are no direct alternatives available.
- → There is a high volume of cyclists riding along the river and coast.
- → There is a high volume of cyclists riding up and down the Darling Scarp.
- → Disproportionately high numbers of cyclists ride along the Perth and Fremantle corridor (in comparison to other activity centres located a similar distance from Perth's CBD).
- → The central northern corridor appears to be the most underserviced in terms of cycling infrastructure.

Figure 3 provides an excerpt from Strava Labs. Despite the usefulness of this information, it was recognised that GPS travel data is likely to be most representative of people who cycle frequently or for fitness purposes.

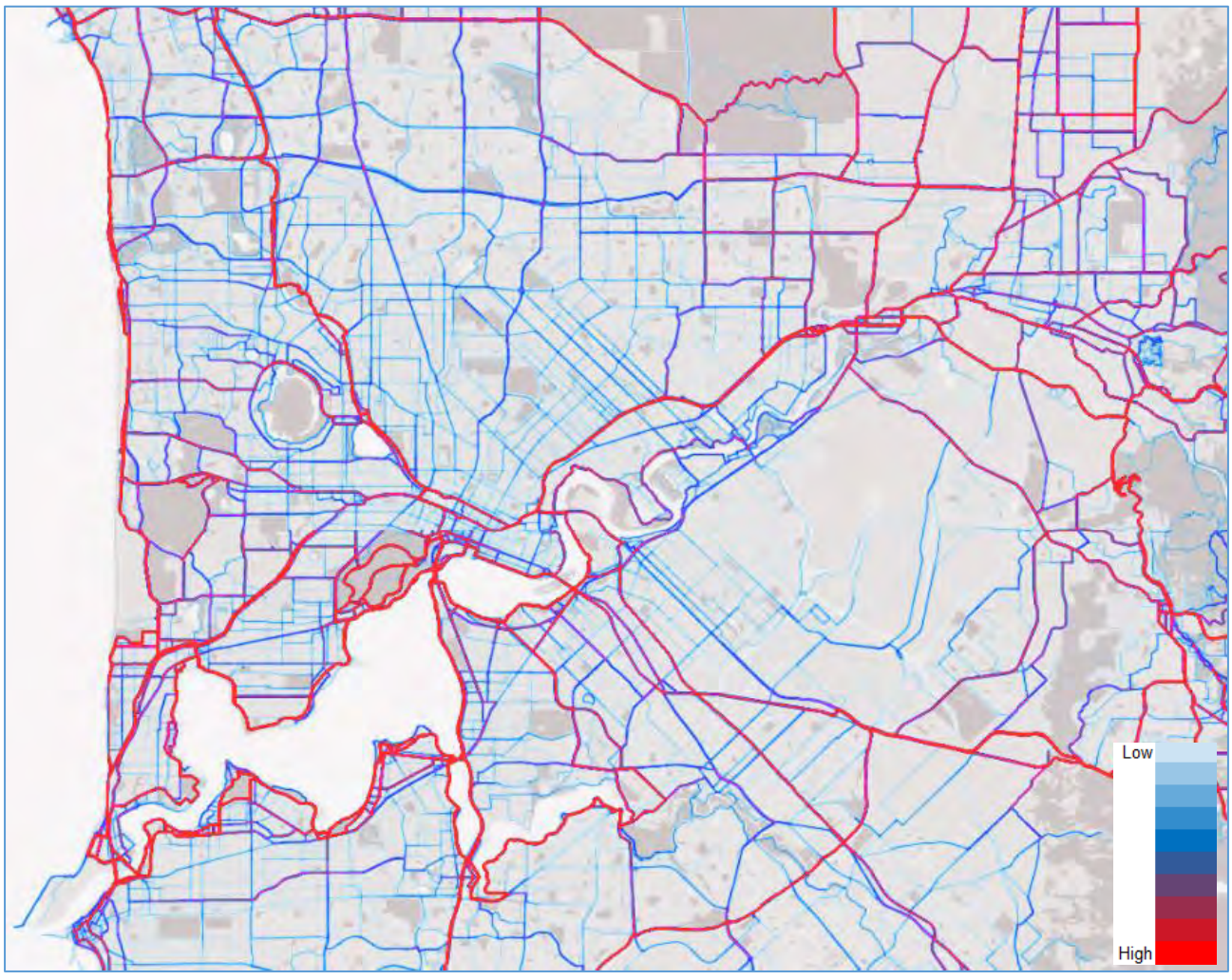


Figure 3: Tools such a Strava Labs were critical in understanding the demand side of Perth's existing network[2]

[2] Source: Strava Labs

2.4 Consultation with key stakeholders

Consultation was undertaken with representatives from within the Transport Portfolio (Department of Transport, Main Roads WA and Public Transport Authority). Limited discussions were also undertaken with transport planners from the Cities of Perth and Fremantle. In addition, a presentation was given to the Western Australian Bicycle Network Plan Implementation Reference Group (IRG) who were in turn given the opportunity to provide feedback on the *Transport @ 3.5 Million* bike network. Key themes from the feedback included:

- → *"Increasing route density and creating a finer-grained network will help to make riding a bike for transport more convenient and better connected. Expansion of the local network in particular will help to fill in the gaps, making it safer and easier to ride from door-to-door."*
- → *"New river crossings have the potential to significantly impact behaviour and movement patterns. The crossings between Point Walter, Mosman Park and Point Resolution in particular would radically improve connectivity and substantially shorten journey time between Fremantle and Perth, making travelling by bike a more viable option for more people."*

2.5 The development of e-bike technology

Up until recently, cycling has relied solely on human power. This has limited the distance and type of terrain most people are happy to make on bicycle. The emergence of electric bicycles (e-bikes) and the harmonisation of e-bike power ratios across Australia in 2015 is a game changer that will result in significant increases in cycling for transport and recreation in the future years. The average person would view the achievable maximum cycling distance for a standard bike being in the region of 10km to 15km. With e-bikes an average power assisted speed of 25km/h is easily achievable, which extends the maximum achievable riding distance to around 25km. With this distance in mind, an e-bike priced at $2,000 to $4,000 becomes a real option to replace the second car for many people, with the bike essentially paying for itself within one year when taking in the car purchase and running costs. Even compared to public transport there are significant cost savings and the e-bike has strong potential to reduce the pressure on public transport, particularly for trips into the Perth CBD from the inner and middle suburbs, trips to other strategic activity centres and trips to universities.

Highlighting the potential for e-bikes in Perth are the results of a trial run by the RAC in late 2015. The trial involved 40 employees from 4 workplaces being provided with an e-bike for a 10 week period. Before the trial, 83% of the participants owned a bike, but less than half used it at least once a week. Before the trial, 61% of participants travelled to work by car, but during the trial this was reduced to 32%, with 55% of commuting trips being made solely by e-bike. Trials such as this demonstrate the strong potential for e-bikes to assist in managing congestion, while also having significant health and environmental benefits.

The *Transport @ 3.5 Million* bike network capitalises on e-bike potential, while also recognising that human powered cycling will remain popular. This approach covers a wide cross section of the community and provides connections to community facilities and employment hubs.

2.6 Development of route hierarchy

The route hierarchy shown in the table below was adopted for the *Transport @ 3.5 Million* bike network. Although the proposed network will officially consist of Principal Shared Paths (PSPs), Recreational Shared Paths (RSPs), strategic routes and local routes, it is recognised that all roads (excluding controlled access highways) will continue to play a critical role in Perth and Peel's cycling network. A summary of each of the routes within hierarchy is given below.

	PSPs	Strategic routes	Local routes	RSPs
Colour	Blue	Pink	Red	Light Blue
Objective	To provide fast, direct commuting routes parallel to high-speed corridors such as freeways and railway lines.	To provide safe and direct connections between various strategic, secondary, district and specialised activity centres, as well as train stations.	To collect cycling traffic from local roads within suburbs and distribute it to the Strategic and PSP networks. To provide safe a direction connections to local destinations such as schools, shops and parks.	To provide recreational cycling facilities around Perth's various natural features including the Indian Ocean, the Swan-Canning River System, various lake systems and remnant bushland.
Analogous to	Freeways	Arterial Roads	Collector Roads	Tourist Routes
Density	Approx. 5km x 5km	Approx. 2.5km x 2.5km	Approx. 1.5km x 1.5km	N/A
Built Form	Shared paths of PSP standard. Wherever possible, grade separation should be provided at intersecting roads/railways.	- Shared paths of PSP standard where room permits (grade separation in not necessary). - Separated bi-directional cycle lanes, or - Bicycle boulevards	- On-road cycle lanes, - Bicycle boulevards, or - Designated quiet suburban streets, communicated using sharrows or appropriate signage.	Shared paths of PSP standard.

Figure 4: Summary of route hierarchy

The above hierarchy does not preclude the opportunity for Local Governments to identify and develop additional "community routes". Such routes may serve a less formal purpose but could be used meet other community-based objectives set out in local bike plans.

2.6.1 Principal Shared Paths

PSPs will continue to form the backbone of Perth's cycling network. Considered as "freeways for bikes" these routes serve high order, interregional movement purposes. They should be of high standard, with minimal horizontal or vertical curvature. In terms of their built form, PSPs should ideally be of at least 3.5m in width and grade separated at all intersecting roads/railways. Wherever possible, separation should be provided between pedestrians and cyclists.

Figure 5: PSPs will continue to form the backbone of Perth's cycling network

2.6.2 Strategic Routes

Sitting below the PSPs in the route hierarchy are Strategic Routes. The aim of these routes is to provide links between Perth's various strategic, secondary, district and specialised activity centres, as well as train stations. Strategic Routes should be considered as "arterial roads for bikes" allowing safe and direct access to, from and through activity centres. In terms of their built form, it is critical that strategic routes are attractive to all cyclists regardless of their age, confidence or experience level. They can consist of shared paths of PSP standard, separated bi-directional bike lanes or Bike Boulevards. Unprotected bike lanes or sealed shoulders are considered inadequate for strategic routes.

Figure 6: It is imperative that strategic routes are attractive to all types of cyclist

In terms of route selection, the philosophy behind strategic routes differs, in general, between newer suburbs and older suburbs. In older, more established suburbs (pre-1965), arterial roads tend have narrow reservations and are intersected by numerous side roads and driveways. They therefore tend to be unsuitable for separated or bi-directional facilities. Fortunately, older suburbs are normally laid out in a grid-like pattern which makes it easier to implement Bike Boulevards on adjacent streets.

Figure 7: Stirling Highway, with its narrow road reservation and numerous intersecting side roads and driveways is not well-suited to a strategic cycling route.[3]

In newer (post-1965) suburbs, quiet suburban roads are normally of curvilinear nature and often terminate in cul-de-sacs. They are therefore usually unsuitable for strategic cycling routes. However, in these areas arterial roads (in the form of Local Distributors) tend to be reasonably direct and nearly always have sufficient road space available to provide separated cycling facilities that are attractive to all cyclists.

---

3 Source: Google Earth

Figure 8: Hepburn Avenue has plenty within its road reservation to provide a PSP standard facility[4]

2.6.3 Local Routes

Sitting below strategic routes in the route hierarchy are local routes. The purpose of local routes is to collect cycling traffic from local roads and distribute it to the Strategic and PSP networks. These routes may consist of on-road cycle lanes, Bike Boulevards, greenways or designated quiet suburban streets (communicated using sharrows and appropriate traffic calming treatments). However where possible, and particularly in greenfields situations, local routes should provide physical separation from motorised traffic.

Figure 9: The "8 to 80 rule" should be applied when identifying the alignment and built form of local routes (i.e. the route should be safe enough for use by an 8 year old or an 80 year old)

2.6.4 Recreational Shared Paths

Although not typically used for commuting purposes, RSPs do, and will continue to form an integral part of Perth's cycling network. Going forward it is important that RSPs are built to a standard that facilitates trip generation amongst cautious, novice and inexperienced cyclists. In areas of high pedestrian activity it is important that separation is provided between cyclists and pedestrians. With appropriate measures in place, high quality RSPs may help facilitate cycle tourism, especially on routes that hug the river and ocean.

4 Source: Google Earth


Figure 10: In areas of high pedestrian activity it is critical to provide separation between cyclists and pedestrians

3. The Way Forward

3.1 Completing/expanding the PSP Network

The PSP network forms, and will continue to form, the backbone of Perth's cycling network. Between now and 2031 it is important that gaps present within the existing PSP network are completed. These include:

- → Fremantle Railway PSP
  - Grant Street – Fremantle Station

- → Midland Railway PSP
  - Lord Street – Morrison Road

- → Armadale Railway PSP
  - Great Eastern Highway – Welshpool Station
  - Lacey Street – Ladywell Street
  - Kelvin Road – Albany Highway
  - Dorothy Street – Armadale Station

- → Mitchell Freeway PSP
  - Scarborough Beach Road – Hutton Street
  - Civic Place – Erindale Road
  - Upgrade the cycling infrastructure between Reid Highway and Ocean Reef Road to PSP Standard
  - Burns Beach Road – Hester Avenue (as part of the Mitchell Freeway extension)

- → Kwinana Freeway PSP
  - Cranford Avenue
  - Upgrade the existing PSP from Thelma Street to the Mount Henry Bridge

- → Roe Highway PSP
  - Kwinana Freeway – Stock Road (as part of Perth Freight Link)
  - Berkshire Road – Great Eastern Highway
  - Morrison Road – Great Northern Highway

- → Reid Highway PSP
  - Marmion Avenue – Everingham Street
  - Camboon Road – The Swan River
  - Wanneroo Road – Mirrabooka Avenue
- → Tonkin Highway PSP
  - Collier Road – Ellenbrook (as part of Northlink WA)
  - Dunstone Road – Railway Parade
  - Mills Road West – Hale Road
- → Other
  - Armadale Road (between Tapper Road and Anstey Road)
  - Stock Road (between Roe Highway and Rockingham)
  - Thomas Street (between Wellington Street and University of Western Australia)
  - Upgrading the South Fremantle recreational shared path to PSP-standard before linking back to Stock Road via the freight rail corridor
  - A route linking Rockingham and/or Warnbro to the Kwinana Freeway PSP (perhaps using Mandurah Railway reservation or Kulja Road / Safety Bay Road).

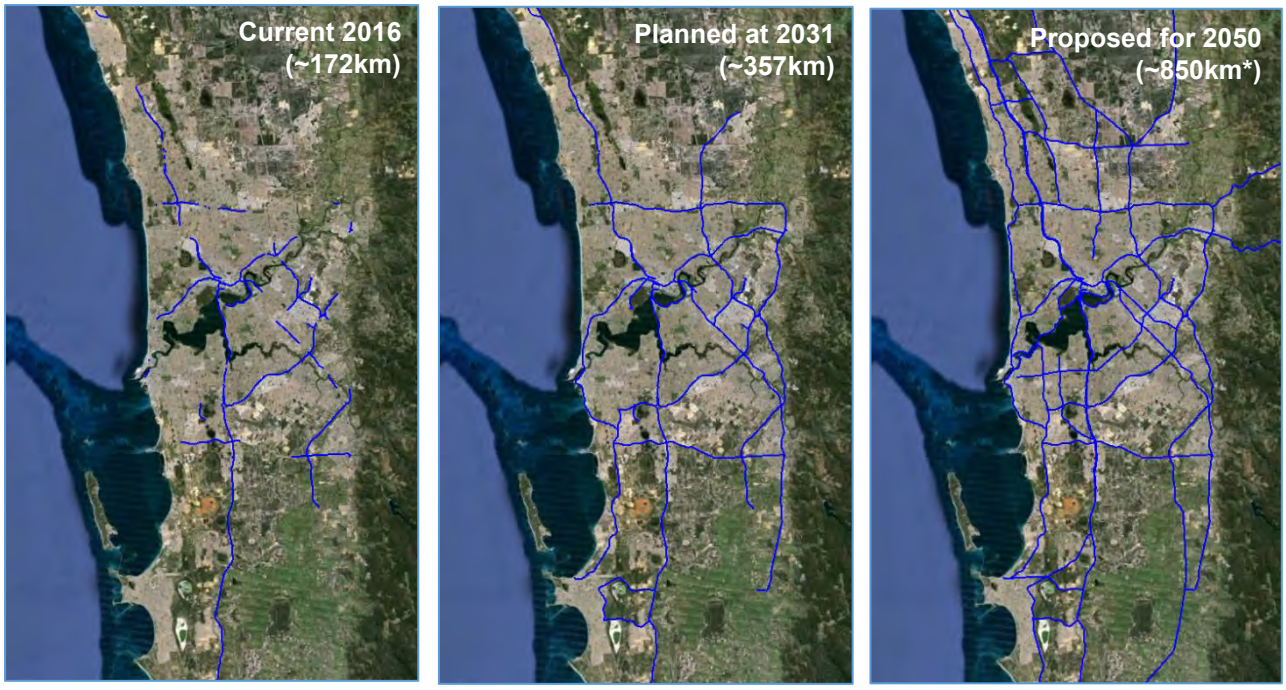


Figure 11: Principal Shared Path network – current; @ 2031 and @ 2050.

*Note: The plan identifies approximately 30km of existing RSPs that require upgrading (and re-classification) to PSP.

Upon completion of these routes, it is important that the PSP network continues its expansion. It is recommended that PSP standard cycling facilities are constructed within the following corridors between 2031 and 2050:

- Wanneroo Road (north of Reid Highway)
- Alexander Drive (north of ECU Mount Lawley)
- Marmion Avenue (between Karrinyup Road and Yanchep)
- Leach Highway (between Fremantle and the Consolidated Airport Terminal)
- North Lake Road (between Cockburn Central and Attadale)
- A link between Currambine, Joondalup and Wanneroo (including a bridge across Lake Joondalup)

In addition, the following PSP projects have been identified for construction between 2031 and 2050:

- The duplication the Kwinana Freeway and Mitchell Freeway PSPs between Joondalup and Cockburn Central, as well as the Fremantle PSP between Perth and Subiaco.
- Upgrading the West Coast Highway RSP (between Grant Street and Karrinyup Road) to PSP standard before linking into the Marmion Avenue PSP (proposed above).
- The provision of an alternative route between Perth and Fremantle / North Fremantle following the Swan River (refer to Section 3.7.1 on the “Three Points Bridge”).

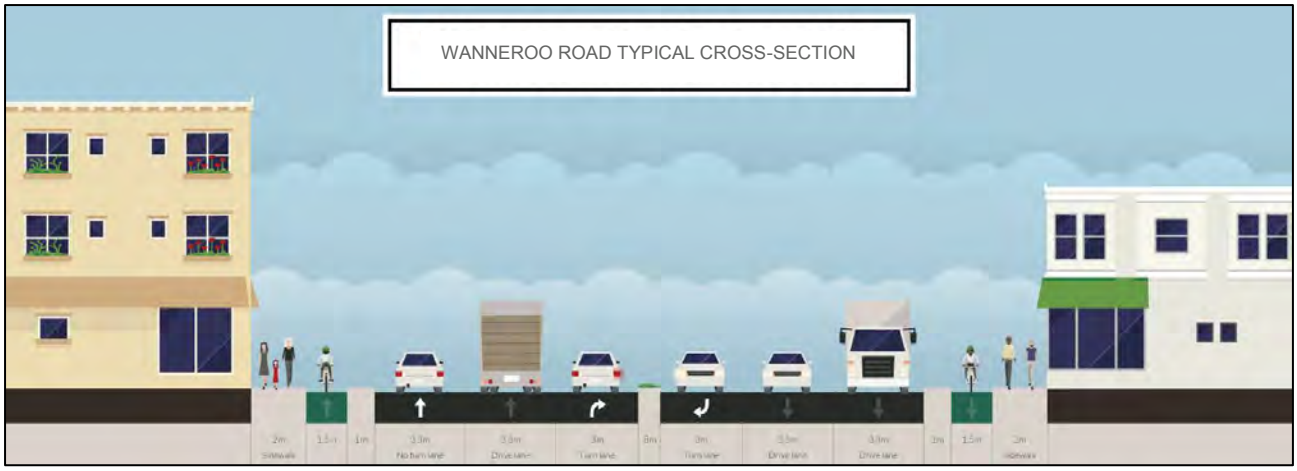


Figure 12: The above cross-section illustrates what could be achieved on Wanneroo Road in particularly space-constrained areas

3.2 Completing/expanding the RSP Network

The RSP network, although excellent in places, contains many substandard and missing sections. This can result in a somewhat disjointed and frustrating experience for people attempting to walk, run or cycling along Perth's various natural landforms. The following improvements are recommended to help facilitate an increase in the number of people cycling for recreational purposes, as well as cycle-tourism:

- → The provision of a connected series of paths along both sides of the Swan and Canning Rivers stretching from Fremantle in the west to Brigadoon and Gosnells in the east. Where reserves are not present along the river foreshore (Freshwater Bay, Salter Point, Bull Creek, etc.) or there are environmental/heritage constraints, consideration should be given to the provision of innovative treatments such as boardwalks or floating pontoons.
- → The provision of a connected series path along the Indian Ocean beachfront extending from Two Rocks in the north to Wannanup in the south (excluding industrial/port areas such as Kwinana and Henderson). Where there are high numbers of pedestrians, pedestrian/cyclist separation should be provided e.g. Cottesloe, Scarborough, North Beach, Rockingham, etc.
- → A connected series of paths joining together the following regional parks and wetlands:
  - Lake Monger, Herdsman Lake and Jackadder Lake.
  - Yellagonga Regional Park (Lake Joondalup, Beenup Swamp, Waluburnup Swamp and Lake Goollelal).
  - Beeliar wetlands – western chain.
  - Beeliar wetlands – eastern chain.

Figure 13: In order to provide continuous cycling routes along both sides of the Swan/Canning river system, boardwalks or floating pontoons may need to be employed to limit environmental impacts or in areas where there is insufficient space in existing reservations[5]

3.3 Laying the foundations of a strategic network

The evolution of Perth's cycling network has generally followed a "lowest hanging fruit" philosophy. Separated bike paths of considerable length have been constructed parallel to many of Perth's freeways and railway lines, as well as at a range of river and beachfront locations. Although this has been useful for people commuting to and from the CBD, or for the recreational purposes, many trips that people make on a daily basis remain difficult by bike. As Perth's population grows, it is imperative that activity centres such as shopping centres, universities and industrial areas become serviced by safe, direct and legible cycling facilities.

As discussed in Section 2.6.2, the alignments proposed for Perth's strategic routes have been assessed on a case-by-case basis. Depending on space and street-patterns, which are normally determined by the era in which a suburb was first developed, strategic routes shall be located within arterial road corridors or on quiet parallel streets that are generally wider than required for motorised traffic.

[5] Images courtesy of http://www.bartvanbueren.com/ and http://nicolonelytraveler.blogspot.com.au

Figure 14: As Perth's population grows, it is imperative that activity centres such as shopping districts, universities and industrial areas are linked together will high quality, separated cycling facilities

3.4 Laying the foundations of a local network

It is critical that cyclists of all ages and capabilities are provided with safe means to access to local destinations such as schools, shops, parks, etc. A network of local routes (comprising of shared paths or low speed, 30km/hr streets) will enable this. It is important that these routes are located roughly halfway between strategic routes, thus increasing the density of the overall cycling network to approximately 1km x 1km. Bike Boulevard projects (being trialled in 2016) are aimed at changing the public's perception about appropriate vehicle speeds in suburban environments. By the time the population reaches 3.5 million, Perth will be home to a comprehensive network of Bike Boulevards – suburban streets retrofitted with LATM treatments encouraging lower vehicle speeds/traffic volumes which enable more pleasant pedestrian, cycling and family environments.

Figure 15: Local routes will provide access from people's suburbs to destinations such as local shops, schools or parks. Similarly, they will people with a safe, efficient means to access higher order cycling facilities such as Strategic Routes and PSPs

3.5 Providing a network of protected bike lanes across Perth's CBD

In order for Perth to realise its potential as great cycling city, significant investment is required to make the CBD's streets both safe and attractive for cyclists. Despite having a number of excellent shared paths leading to and from the city's fringes, the Perth CBD's roads are not considered safe by most cyclists as they are typically shared with relatively high volumes of motorised vehicles.

Perth will need to implement a comprehensive network of protected cycle lanes allowing safe, legible access to office buildings, shops and tourist attractions. In order to achieve this, on-street parking and/or traffic lanes will likely require removal. Policies such as these have been implemented successfully in Sydney, Brisbane and Melbourne over the course of the past decade. Over time, the inner core of the Perth CBD will evolve to one that is less reliant on car-based transport. With a reduced number of high volume private and public car parks, and business changing to ones that are more reliant on walking and cycling, customers will assist in facilitating more cycle-friendly streets and a more vibrant city centre.

Figure 16: Cycling facilities in the CBD should set a vision that spreads out through our suburbs[6]

3.6 Providing a Darling Scarp training circuit

The current and future on-road and shared path network is critical to recreational cycling in Western Australia, providing a significant resource for leisure and training rides. Cycling is one of the most popular forms of recreation in the state, ranking third for males and fifth for females. There are two broad types of recreational cyclists in Western Australia - leisure cyclists and sports cyclists. To date the vast majority of infrastructure investment for cycling has focused on commuter and recreational cyclists, which has resulted in significant growth in cycling participation for recreation and transport purposes.

Going beyond what has been provided and what is planned, there is a need to provide options for recreational training cycling routes appropriate to the needs and aspirations of sports cyclists to provide safe and high quality riding experiences. By reviewing common cycling route data, particular areas become prominent as training routes for cyclists. One such area is the 'hills' east of Perth's metropolitan area,

6 Images courtesy of Russell Greig

which numerous cyclists currently use as a circuit. There is an opportunity to review this area to understand how it can be developed to cater for the ever increasing number of cyclists using it. Solutions could include shoulder widening, additional shared or bike only paths, additional signage, or a mix of measures. A detailed assessment is required in partnership with cycling bodies and groups to ascertain appropriate and safe solutions.

3.7 Planning for new river crossings

In the medium-to-long term a detailed planning study will be undertaken investigating the feasibility of new active-transport links across the Swan and Canning Rivers. At present, the Swan-Canning river system generates a large geographic north-south divide of the Perth metropolitan area. Due to a lack of crossings, trips to a number of activity centres are considered too distant to be made by bicycle - despite being located only a short distance away “as the crow flies”. The provision of new pedestrian and cycling (or pedestrian, cycling and public transit) river crossings has the potential to radically increase cycling’s mode share, thereby reducing congestion on the road network as well as inner sections of the public transport system. Due to their less-cumbersome structural requirements, active transport bridges are unlikely to necessitate the funding requirements of traffic bridges of similar size or span. And because such bridges would generate close-to-zero noise or air pollution, river crossings designed for just walking and cycling would be unlikely to face to the same level of public opposition that may otherwise be expected in the case of new traffic bridges. If built, river crossings such as these should seize on the opportunity to become iconic landmark structures, further enhancing Perth’s tourism potential.

3.7.1 Three Points Bridge (Chidley Point – Point Walter – Point Resolution)

A bridge joining Point Walter to Point Resolution has been mooted as early as the 1920s. A bridge linking all three points together would provide an array of route-choices for cyclists and pedestrians. In addition to providing the only river crossing between Perth and Fremantle (a distance of over 12km), the bridge would provide an opportunity for the construction of a PSP following the Swan River all the way from Perth to Fremantle. Such a route would relieve pressure on the Fremantle railway PSP and could also generate significant cycle tourism opportunities. The “Three Points Bridge” would make both the CBD and the UWA-QEII knowledge hub far more accessible for cyclists travelling to/from the southern and western suburbs. A bridge spanning this part of the river would need to be of sufficient height to allow sailing boats to continue operating in this part of the river.

Figure 17: Figure 17: The Three Points Bridge would make riding between Perth and Fremantle (as well as a range of other key destinations) compelling. Assuming an average speed of 25km/hr, one could cycle from Elizabeth Quay to Fremantle in just 40mins. Artist's impressions shown of a possible design.

3.7.2 Upper Swan Connections

As Perth's population grows, it is expected that land use in East Perth and on the Burwood Peninsular will increase in both importance and density. Located on the CBD's eastern fringe it is feasible that trip attractors such as Riverside, the new Perth Stadium, Belmont Racecourse and Crown Entertainment Complex will generate high pedestrian and cycling demand. The following river crossings have been identified as having the potential to dramatically increase cycling's mode share to and from the aforementioned destinations:

1. Riverside Drive Traffic Bridge (connecting Canning Hwy at Berwick Street to Riverside Drive at Plain Street). Potential for additional pedestrian/cycling connection between Victoria Park and East Perth.
2. Heirisson Island Bridge (replaces the existing narrow shared path on the Causeway bridges).
3. Stadium Bridge (project already committed, construction commencing later in 2016).
4. Summers Street Bridge (long-term transport project enabling local traffic to access Burswood Peninsular via Bulwer Street and Summers Street). Improves access to the East Perth train station from the Burswood Peninsular.
5. Racecourse Bridge (active transport bridge linking the proposed Maylands Golf Course RSP to the Burswood Peninsular). When coupled with the Stadium Bridge, this route would provide a significant shortcut between Maylands and the CBD.
6. Belmont – Maylands Bridge. Identified as part of a long-term BRT project linking Perth's south-eastern corridor to the ECU Mount Lawley and Morley activity centres.

Figure 18: Additional active-transport river crossings would assist in providing increased accessibility to and from the various urban renewal projects taking place on the Perth CBD's eastern doorstep[7]

3.7.3 Upper Canning Connections

Like the Swan River, the Canning River (and its lack of crossings) represents a major physical barrier preventing people from making short-to-medium trips by bicycle. A number of important activity centres exist in this region of Perth including the Murdoch and Curtin/Bentley knowledge hubs, Cannington Town Centre (including Carousel Shopping Centre) and the Canning Vale industrial area. The three active transport river crossings proposed below would enable better access to/from these activity centres as well as improved access to the network of recreational shared paths contained with Canning River Regional Park.

---

[7] Images courtesy of http://www.perthstadium.com.au/transport/swan-river-pedestrian-bridge and http://www.sculptureontheswan.com.au/media/9994/heirisson_island_media_statement_high_res.pdf

1. Salter Point Bridge (linking the Rossmoyne foreshore to the Salter Point – Curtin Strategic Route). Provides an alternative north-south route between Curtin and Cockburn Central, relieving pressure on the Kwinana Freeway PSP.
2. Pipeline River Crossing. The proposed crossing utilises the existing water/power corridor to provide a direct north-south link between Canning Vale and Curtin University. It is likely such a connection could be added when the existing pipeline structure has reach the end of its life. Further investigation may reveal the potential for a cycling facility to be retrofitted to the pipeline structure itself.
3. Canning River Elevated Boardwalk (providing a link between Spencer St/Nicholson Road and the proposed Berwick Street strategic route).

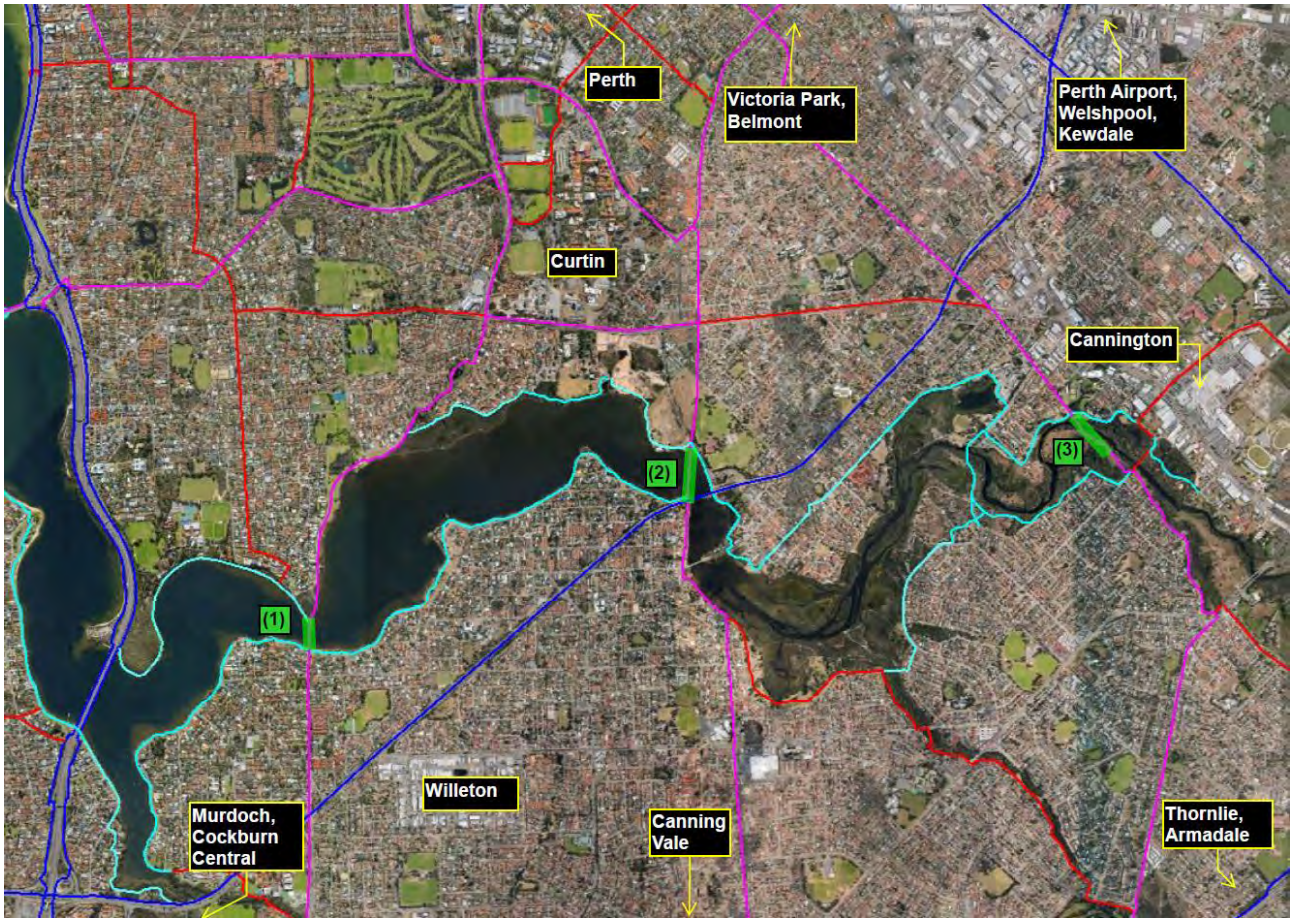


Figure 19: Additional active transport river crossings across the Canning River would make cycling far more viable for people commuting to/from large employment areas such as Curtin, Murdoch, Canning Vale and Cannington

3.7.4 Lakeside Connections

In a similar way to how the Swan and Canning Rivers dissect Perth along an east-west axis, the Yellagonga Regional Park dissects Perth's northern suburbs along a north-south axis. At present, access to the Mitchell Freeway PSP and several important train stations is severely restricted for those cyclists approaching from suburbs located to the east of the wetlands. The active transport crossings proposed below are aimed at enabling better access to/from these activity centres as well as improved access to recreational shared paths contained within the Yellagonga Regional Park.

1. Lake Joondalup Bridge (North): Links directly with the Joondalup town centre (Shenton Avenue).

   OR, possibly

2. Lake Joondalup Bridge (South): Links directly with Wanneroo town Centre (Church St). Western approach will be located closer to ECU Joondalup. Proposed bridge is located closer to halfway between Ocean Reef Road and Burns Beach Road.
3. Lake Goollelal Bridge: Links the suburbs of Darch and Landsdale with the Kingsley shared path, providing better access to the Greenwood Train Station.

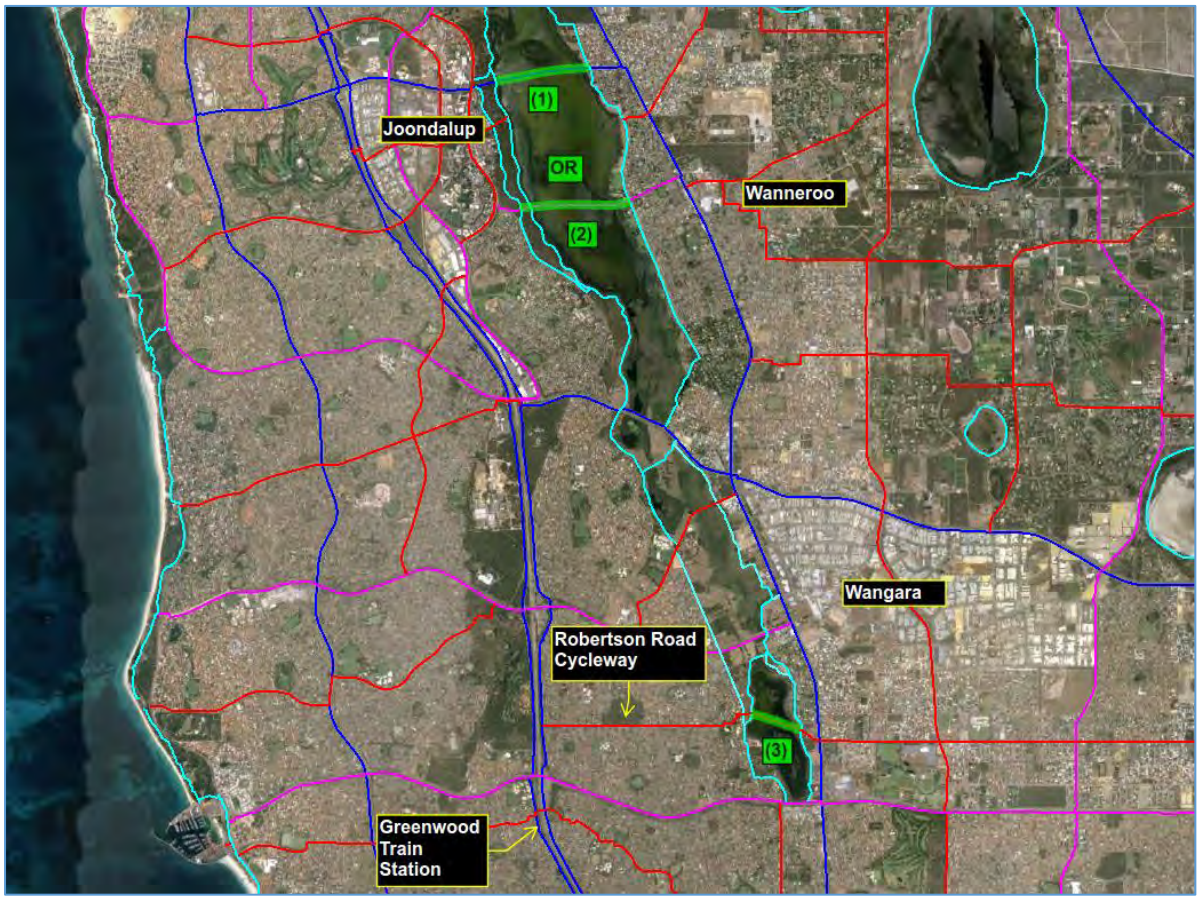


Figure 20: The provision of bridges across Lake Joondalup and Lake Goollelal would improve cycling accessibility to and from the suburbs located east of Yellagonga Regional Park

4. Case Studies

4.1 ECU Mount Lawley

Edith Cowan University (ECU) Mount Lawley has been identified as having the potential to become the "cycling gateway" to Perth's north-eastern suburbs. Like spokes radiating from a wheel, it is envisaged that the ECU Mount Lawley precinct will be serviced by a number of high quality strategic routes linking the following areas:

- Morley (via a series of bicycle boulevards on streets including Hamer Parade, College Street, St Peter's Place, Dennis Street and Catharine Street).
- Mirrabooka (via a series of bicycle boulevards on streets including Bradford Street, Bourke Street and Ranger Road, then bi-directional cycle lanes on Hayes Avenue, Dianella Drive, Yirrigan Drive and Northwood Drive).
- Belmont (via a bicycle boulevard on Fourth Avenue before linking to the Maylands Peninsular RSP and the proposed Maylands - Belmont active transport/BRT bridge).
- Glendalough (via a series of bicycle boulevards on streets including Green Street, Scarborough Beach Road, Ellesmere Street, Carrington Street, Elma Street and Carnarvon Crescent).

Figure 21: It is envisaged that ECU Mount Lawley should become the "cycling gateway" to Perth's north-eastern suburbs[8]

[8] Source: Google Earth

ECU Mount Lawley will also be serviced by the proposed Alexander Drive PSP.

In order to link ECU Mount Lawley to the Perth CBD the following alignment has been selected:

- → King Street, Perth (contraflow cycle lane / low speed environment)
- → Lake Street, Northbridge (bicycle boulevard / bi-directional cycle lane)
- → Hyde Park (shared path, potentially elevated to avoid conflict with pedestrians)
- → Norfolk Street, North Perth (bicycle boulevard)
- → Learoyd Street, Mount Lawley (bicycle boulevard)

Figure 22: A high standard cycling facility linking the CBD to ECU Mount Lawley (via Hyde Park) is considered the first step to improving cycling access to Perth's central north-eastern corridor[9]

Given that such a route be likely to well utilised, it is important that cyclists are given priority at minor intersecting roads and that signals are provided a major intersecting roads.

9 Source: Google Earth

4.2 Yokine – Claisebrook Greenway

A route linking Wanneroo Road (near the Dog Swamp shopping centre) to the Midland and Armadale PSPs (near the Claisebrook train station) has been identified as an important link for Perth's cycling network. Such a route would provide a safe cycling route through some of Perth's most congested suburbs and could be used as an opportunity to demonstrate a range of innovative cycling treatments. This route would serve a high quality interim measure before dedicated cycling facilities can be added to London Street and Loftus Street. The proposed route consists of the following alignments and treatments:

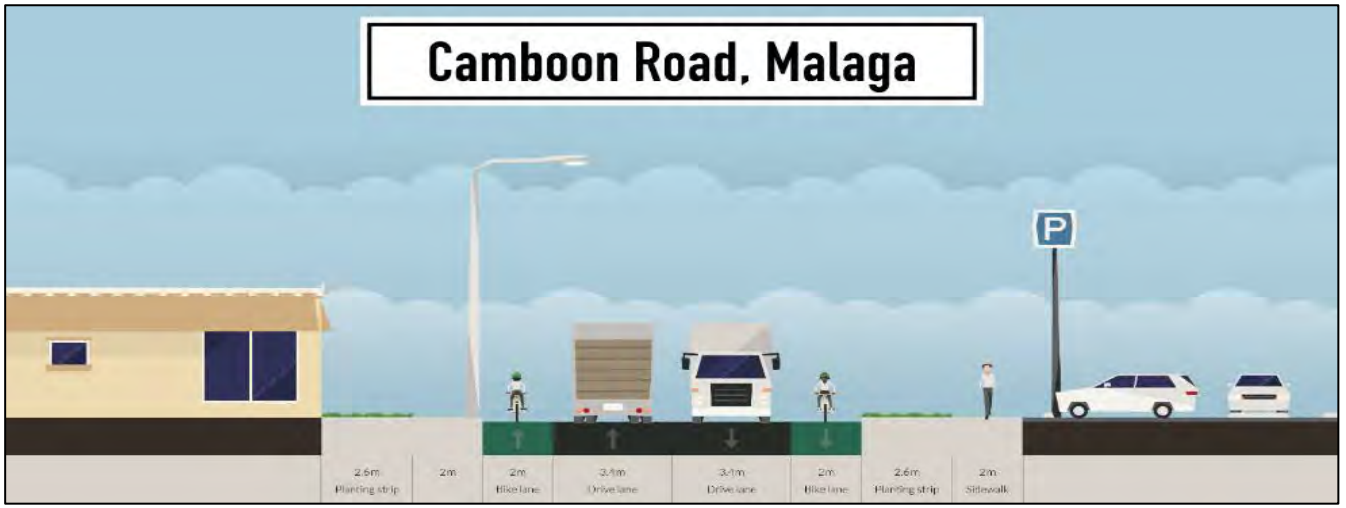
- → Eton, Pennant and Kardina Streets, North Perth: Bike Boulevards
- → Charles Veryard Reserve, Beatty Park Reserve, Dorrien Gardens, Robertson Park and Stuart Saint Reserve: A series of connected shared paths (most already existing, may need to upgrade crossing facilities)
- → Forbes Road: Bi-directional cycle lane (resume on-street parking on one side of the road)
- → Little Parry Street: *Woonerf* (Living Street) communicated with sharrows and LATM treatments
- → Parry Street: Bi-directional cycle lane, linking into the eastern ramp/overpass at Claisebrook station as well as the Midland/Armadale PSPs

Figure 23: The proposed Yokine – Claisebrook Greenway will employ a variety of innovative cycling treatments to better cater for cyclists in some of Perth's most densely populated suburbs[10]

10 Source: Google Earth

4.3 Malaga Industrial Estate

Malaga, like most of Perth's other industrial areas, is not a particularly safe or attractive cycling environment. Although the Reid and Tonkin Highway PSPs will (when completed) flank the southern and eastern sides of the industrial area, there exists minimal cycling facilities within the estate itself. It is recommended that a before and after study of Malaga be undertaken in order to demonstrate that is possible to increase cycling's mode share in industrial areas. The cross-sections below illustrate indicative treatments that could be employed to encourage people to cycle to and from industrial areas such as Malaga.



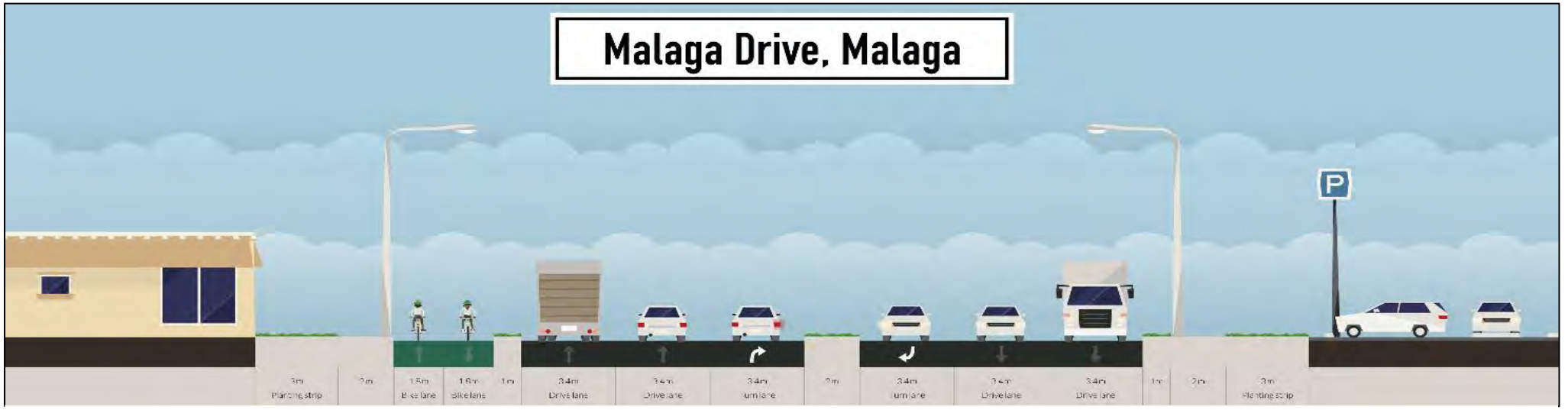


Figure 24: Indicative cross-sections of how to best cater for cyclists in industrial areas

5. Where to From Here?

The *Transport @ 3.5 Million* Cycling Network Plan will shape development of our future network and guide the Local Bike Routes Review, which forms a priority action from the *Western Australian Bicycle Network Plan 2014-2031*. Moving forward, the Transport Portfolio will engage will Local Governments in Perth and Peel to refine the plan, review the options for PSP and RSP management/responsibility, develop the final category of local access routes and arrive at formal agreements for the routes. This approach will provide Perth and Peel with a bike network that will be nation leading with benefits for many generations to come.

Department of Transport
Public Transport Authority

mainroads
WESTERN AUSTRALIA

Perth Freight Transport Network Plan

Transport @ 3.5 Million

July 2016

Layout: How to Read This Document

The Perth Freight Transport Network Plan comprises two sections as outlined below:

Part 1: Context

Introduction:
Shaping Perth's Future

Outlines the need for the Perth Freight Transport Network Plan and describes the context for and scope of the Plan

Part 2: Strategic Priorities

Moving Perth's Freight Task: Five Priorities for Action

Articulates the Western Australia Government's strategic priorities to manage future freight growth and address its impacts on the network over the next two decades and beyond:

1. A Generational Step-Up in Metropolitan Port Capacity

2. Moving More of Perth's Freight Task by Rail

Map 1: Metropolitan Rail Freight Network Constraints and Capacity Utilisation

Map 2: Metropolitan Rail Freight Network Capacity Utilisation with and without Upgrades

3. Expanding the Metropolitan Intermodal Terminal System

Map 3: Metropolitan Intermodal Terminal Network

4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy

Map 4: Metropolitan Principal Road Freight Network

Map 5: Metropolitan Restricted Access Vehicle Regime Upgrades

Map 6: Metropolitan Principal Road Freight Network Strategic Investment Priorities by 2.7m

Map 7: Metropolitan Principal Road Freight Network Strategic Investment Priorities by 3.5m

5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Map 8: Interfaces Between Freight Rail and Urban Development

Glossary of Terms

Image courtesy of LandCorp

Contents

PART 1:
CONTEXT

Image courtesy of Fremantle Port Authority

Introduction: Shaping Perth's Future

The Importance of Perth's Freight Transport Network

The day-to-day functioning of Perth, and the State's economy, is highly dependent on the effectiveness of the metropolitan freight transport network.

Freight transport costs flow directly on to the cost of everyday goods and services purchased by Western Australian communities and businesses. Efficient freight transport enables businesses across many sectors to consolidate warehousing facilities, reduce inventory costs, increase geographical market reach and create higher-value services and products that bring about major productivity improvements that support the broader economy.

The location of freight corridors and centres, and the manner in which goods move between them, can also have a significant impact on the amenity of local communities.

An effective metropolitan freight network underpins the capability to move goods efficiently and sustainably into, around and out of the State thereby making a substantial contribution to the overall prosperity and liveability of Western Australia.

For these reasons, it is in the interest of all Western Australians to ensure that Perth has an effective freight network that can continue to meet the growing freight task into the future.

The Role of the Freight Network in Western Australia's Economy

- **Links metropolitan and regional goods with domestic and international markets** - An effective metropolitan freight network connects businesses to marketplaces across the State as well as interstate and overseas, generating wealth for Western Australia and attracting both investment and jobs
- **Reduces costs and underpins productivity** - Transport costs flow directly onto the costs of everyday goods in supermarket and retail stores and affect the competiveness of businesses. Savings from lower transaction costs, due to efficient freight networks, translate into lower cost goods which, in turn, flow through to productivity gains across the economy and can be a major contributor to economic growth and higher living standards over time
- **Supports the efficient operation of the transport, warehousing and logistics sector** - The transport and logistics sector is an indispensable part of the Western Australian economy and one of the State's largest employers. More importantly, the sector provides the goods, equipment and services that support other key industries across the economy, especially the retail, manufacturing, mining, oil and gas, and agriculture sectors

The Need for a Freight Transport Network Plan for Perth

As Western Australia's main international and interstate gateway, the State's growth pressures are particularly evident in Perth.

As Perth's population and economy continue to grow, so too does the size of its freight task, placing added pressures on existing transport infrastructure. A key role for the Government is to manage these pressures by providing clear strategic direction about how it will ensure an effective freight transport network to better manage Perth's substantial freight task.

To gain the full advantage of the economic and social benefits associated with the provision of transport infrastructure and services, current and future freight transport needs must be identified and a plan that determines Perth's freight transport priorities developed.

In this context, the Perth Freight Transport Network Plan outlines the Western Australian Government's vision and strategic priorities to integrate and develop Perth's freight network over the next two decades and beyond.

Plan Scoping Principles

The Perth Freight Transport Network Plan identifies the principal roads, railways, port and intermodal precincts which form the strategic components of Perth's freight transport network and to which other freight corridors and freight centres, including local government roads, connect.

The Plan provides guidance and a coordinated approach to the ongoing integration and development of the future freight transport network for metropolitan Perth over the next two decades and beyond.

Key Scoping Principles

- Focusing on freight transport demands and priorities within the Perth and Peel regions, and with clear recognition of the significant public and private passenger transport demands on the network
- Covering the State Government's major freight roads (State Roads), State-owned rail lines (privately operated by Brookfield Rail under lease arrangements) and metropolitan ports (port authority facilities) and major freight and logistics related land uses including intermodal terminals
- Providing clear direction about the major capital investment priorities required to develop Perth's freight network over the next two decades and beyond thereby ensuring robust and transparent investment in network assets
- Articulating the Western Australian Government's main roles in the development of the metropolitan freight transport network: planning and protecting the network, managing the network, building and maintaining the road network, and facilitating and selectively investing in strategic rail, intermodal terminal and port projects

Supermarket Aisle

Context – Integrated Transport, Integrated Land Use, Strong Partnerships

Integrated Transport Planning

The Perth Freight Transport Network Plan complements the Western Australian Regional Freight Transport Network Plan, released by the State Government in 2013, which sets out the strategic planning, policy and infrastructure investments for Western Australia's regional freight transport network over the next two decades. Together the plans form a long term freight infrastructure blueprint for the development of the State's freight roads, freight rail lines and ports for metropolitan and regional Western Australia.

Integrated Land Use Planning

Development of the Perth Freight Transport Network Plan has been coordinated with the State Government's spatial framework for the metropolitan area, Perth and Peel@3.5million.

The Plan also draws on a range of other policies and planning frameworks for strategic direction including:

- The long term State land use planning priorities articulated in the State Planning Strategy
- The Perth and Peel@3.5million report and associated planning frameworks for the Central, North-West, North-East and South Metropolitan Peel sub-regions
- State planning policies, guidelines and region schemes developed by the Western Australian Planning Commission, particularly the Metropolitan Region Scheme and Peel Region Scheme
- The extensive body of Local Government planning schemes including industrial structure plans

A Partnership Approach

Partnerships across government and industry are vital to ensure both an integrated approach to freight network planning, investment and management and to optimise the allocation of resources to improve the efficiency and capacity of the network.

Funding partnerships with the Commonwealth Government are particularly essential for the delivery of a number of freight transport projects articulated in the Plan. The Plan considers relevant Commonwealth Government freight policies and programs to ensure that State freight transport network projects support the development and performance of the National Land Transport Network.

The National Land Transport Network is an integrated network of land transport linkages of strategic national importance, which is funded by Commonwealth, State and Territory Governments. This network is based on national and inter-regional transport corridors including connections through urban areas, links to ports and airports, rail, road and intermodal connections that together are of critical importance to national and regional economic growth, development and connectivity.

Local Government also has a particularly important role in managing the operation of the transport network through its responsibilities for local area planning and the local road network which provides many of the important connections into the freight transport network.

The Western Australian Government recognises that Local Governments have, or are preparing, transport and strategic land use plans that address local freight transport issues, and will work with councils in the development and implementation of these plans, particularly in relation to the delivery of the Perth Freight Transport Network Plan.

The Western Australian Government recognises the importance of strong partnerships with private sector participants in the freight and logistics sector – the businesses that move freight – to ensure its initiatives are relevant, practical and founded on an accurate understanding of key supply chains.

Maintaining existing partnerships between the Government and industry, as well as enabling the creation of new commercial relationships, is pivotal to the Plan. The Plan reflects the Western Australian Government's long standing practice of partnering with the private sector to deliver major infrastructure, particularly in relation to port and rail development. It will selectively explore opportunities to partner with the private sector to deliver key projects articulated in the Perth Freight Transport Network Plan on a case-by-case basis with the aim of maximising value for money outcomes for the State.

Image courtesy of Fremantle Port Authority

Fruit crops near Carnarvon, Western Australia.

Managing Perth's Future Freight Task - Five Priorities for Action

The metropolitan freight task will increase significantly in the future. This growth will place pressure on the transport network and presents a major challenge if Perth is to maintain a strong and competitive economy as well as uphold the quality of life aspirations that its community values.

Within this context, the Perth Freight Transport Network Plan sets out five strategic priorities the Government of Western Australia will focus on to improve freight efficiency, maximise productivity and better connect Western Australia and its businesses with local, national and international markets over the next two decades and beyond.

1. A Generational Step-Up in Metropolitan Port Capacity

Growth in the international container task, the most rapidly growing and valuable of port trades, will drive the need for a significant increase in metropolitan port capacity in the long term.

The ability of the port of Fremantle's Inner Harbour to handle future growth in the container task will necessitate expanding capacity and improving efficiency to ensure that the port can continue to accommodate growing trade volumes and changing shipping requirements. The development of new container port facilities to service container demand will also be required.

The Western Australian Government has announced the divestment, through long term lease, of the assets and operations of the port of Fremantle. The future development of container facilities in the Outer Harbour in Cockburn Sound will be considered as part of the divestment process.

These major greenfield port facilities will be of strategic importance to the State presenting a unique opportunity to ensure the long term competitiveness of the international container supply chain by synchronising the planning of the new port facility, the land transport corridor and nearby industrial lands to release synergistic land uses. This integrated land use and transport planning approach is vital within the metropolitan area given that land for freight and logistics purposes is becoming increasingly limited.

2. Moving More of Perth's Freight Task by Rail

As Perth grows the amount of freight to be transported and the increasing distances involved in its distribution will place significant pressure on road transport infrastructure, congestion and road safety. It will be necessary to ensure that an appropriate balance is struck between freight efficiency and the potential amenity and safety impacts associated with these movements.

Most of the freight moved within the metropolitan area is by road transport because of the relatively short distances involved and the relatively small and fragmented nature of the freight movements, together with the flexibility of door-to-door pick-up and delivery. Although rail has been historically the most efficient modal choice for moving bulk product and containers over long distances, it is also increasingly being recognised as an alternative for shorter-haul container freight movement with benefits such as reducing congestion, improving amenity and enhancing road safety.

The Government sees a growing role for rail in providing a viable alternative to road transport for suitable freight tasks in strategic corridors, thereby relieving pressure on the road network. The Perth Freight Transport Network Plan sets out the future infrastructure upgrades and operational approaches needed to achieve a better balance between metropolitan road and rail freight transport and ensure a strong future for rail over the next two decades and beyond.

Image courtesy of Fremantle Port Authority

3. Expanding the Metropolitan Intermodal Terminal System

Intermodal terminals play an important role in facilitating efficient movement of freight and in helping to achieve broader government objectives such as encouraging greater use of rail for freight transport. The Western Australian Government is committing, through the Perth Freight Transport Network Plan, to take a lead role in shaping the metropolitan freight network by actively planning for the development and growth of a select number of high capacity intermodal terminals strategically located across the metropolitan area.

In terms of interstate gateways to support domestic trade, emphasis is on facilitating the expansion of existing interstate intermodal terminal capacity within the Kewdale and Forrestfield precincts to meet growth in the interstate rail task. In terms of international gateways to support international trade, emphasis is on planning for additional intermodal facilities to accommodate growth in the international container market.

This underlying strategy will mitigate the impacts of freight activity on the community and the environment by relieving congestion pressures on the road transport network. It will also support the use of high productivity vehicles between intermodal precincts on a designated road freight network, and as volumes grow, also support growth in metropolitan rail freight, contributing to further overall reductions in fuel use and emissions per unit of freight moved.

4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy

Due to its geographic isolation, primary economy and vast distances, Perth depends heavily on the efficient movement of freight in and around the city. To achieve this outcome, the Perth Freight Transport Network Plan focuses more concentrated patterns of freight movements on higher capacity routes, carried by larger vehicles, while acknowledging the important role played by light commercial vehicles and the large number of trips made by these vehicles.

Although there are points in the network where congestion creates inefficiencies for freight, which will require investment to rectify, there is significant potential to improve the productivity of the network through policy, regulatory or technological interventions. For example, Western Australia has led the way with the introduction of larger combination trucks on the road network over the last few decades. These vehicles are safer and perform better environmentally than smaller semi-trailers and, at the same time deliver major productivity benefits for operators and customers.

Most of Perth's freight task is carried on the road network. This will continue to be the case as the majority of freight movements, particularly in urban areas, cannot be readily serviced by rail. In addition to measures to improve access to the network for high productivity freight vehicles, a number of road network enhancements are necessary to maintain freight efficiency in the face of growth from general traffic as well as the freight task.

The Government has identified the Perth Freight Link project as a priority. Once completed it will deliver transport improvements and enduring productivity benefits.

A key element of the Perth Freight Transport Network Plan is to look beyond these projects to identify significant road freight network development priorities over the next two decades and beyond. This includes a comprehensive road freight grid to service transformational industrial land and port development along Perth's south-west coastline including the future container port facilities in the Outer Harbour and the upgrade and southern extension of Tonkin Highway to create a heavy vehicle outer bypass of the city in the longer term.

5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

In developing the Perth Freight Transport Network Plan, the Western Australian Government has given priority to planning for future freight growth. While this planning aims to ensure the efficient movement of freight, it must take into account environmental and social impacts on Perth's communities.

A critical focus of the Perth Freight Transport Network Plan is to identify key measures to minimise the impact of heavy freight movements on communities and to integrate land use and transport solutions to minimise incompatible development and encroachment on freight corridors and activity centres as the freight task grows.

For these reasons, the Government, through the Western Australian Planning Commission, will review the planning provisions affecting the freight network and make improvements to the State's planning system to ensure that land use and development decisions are consistent with the objectives of the Perth Freight Transport Network Plan.

Modern warehouse with forklift truck loader.

PART 2:

STRATEGIC PRIORITIES

PRIORITY 1

Five Priorities for Action

1. **A Generational Step-Up in Metropolitan Port Capacity**
2. Moving More of Perth's Freight Task by Rail
3. Expanding the Metropolitan Intermodal Terminal System
4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy
5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Image courtesy of Fremantle Port Authority

PRIORITY 1

A Generational Step-Up in Metropolitan Port Capacity

Developing effective and sustainable port growth plans

Highlights

The Perth Freight Transport Network Plan brings together the Government of Western Australia's metropolitan port planning, policy and infrastructure investments to enable efficient operations and growth at Perth's Inner and Outer Harbours over the next two decades and beyond.

A critical focus of the Perth Freight Transport Network Plan is the need for an efficient Inner Harbour over the long term.

The Plan also provides for a future container and general cargo port development in the Outer Harbour in Cockburn Sound.

The future container and general cargo port development in the Outer Harbour will operate in an industrial environment, where major industrial developments will interface with the new port and its principal access corridors. This important planning principle will be reflected in the land use planning supporting the future port development.

Perth Freight Link and the Rowley Road Transport Corridor will be the State's principal road and rail access routes supporting the container port facilities and an integral part of the Government's vision for the development of the metropolitan freight transport network.

The Latitude 32 Industry Zone represents one of Western Australia's largest industrial developments. The Industry Zone presents a strategic opportunity to synchronise port and industrial development and release synergistic land uses which will become increasingly important within the metropolitan area as land for freight and logistics purposes is limited.

Key Supporting Actions

Enabling the Inner Harbour to Reach its Optimum Operating Capacity

- The divestment of the assets and operations of the port of Fremantle through a long term lease
- Roe 8 and the Fremantle Tunnel will ensure long term access to both the current and future planned container terminals. Roe 8 will serve the Inner Harbour, the existing Kwinana Industrial Area and the future Outer Harbour container terminal
- North Quay to operate over the longer term at its optimum operating capacity with additional trade being handled by new container and general cargo port facilities in the Outer Harbour

Facilitating Development of Bulk Terminal Capacity in the Outer Harbour

- Inclusion of the Kwinana Bulk Terminal and the Kwinana Bulk Jetty in the port divestment to broaden the size and appeal of the transaction to investors

Planning Future Port Facilities in the Outer Harbour

- Container and general cargo port development in the Outer Harbour (Cockburn Sound) to be serviced by the Rowley Road Transport Corridor and integrated with an intermodal logistics centre at Latitude 32 Industry Zone

A Growing City Dependent on International Trade

Overview

The State's metropolitan port is owned by the Government of Western Australia and is currently managed by the Fremantle Port Authority. Covering approximately 220 hectares of land and 38,300 hectares of water, Fremantle Port Authority's area of responsibility is extensive. It operates from two geographic locations: the Inner Harbour at the mouth of the Swan River in Fremantle and the Outer Harbour, approximately 20 kilometres to the south at Kwinana.

The Inner Harbour handles almost all the container trade for Western Australia. It also provides facilities for motor vehicle imports, other general cargo trades, cruise ships and visiting naval vessels. The Outer Harbour is one of Australia's major bulk cargo ports handling grain, petroleum, liquid petroleum gas, alumina, mineral sands, fertilisers, sulphur, iron ore and other bulk commodities.

Most of the container trade associated with the Inner Harbour has an origin or destination in the metropolitan area whilst most of the bulk trade associated with the Outer Harbour has an origin or a destination in the State's regions.

The port of Fremantle is vitally important transport infrastructure, supporting investment, economic growth and contributing to the local, State and national economy. Together, the Inner and Outer Harbours currently handle around 72.5 per cent of Western Australia's seaborne imports and around 10.6 per cent of seaborne exports by value. These trades currently amount to 35.8 million mass tonnes per annum and are valued at more than $28 billion annually.

Image courtesy of Fremantle Port Authority

Developing Effective and Sustainable Growth Plans for the Inner and Outer Harbours

As Western Australia's population and economy continue to grow strongly, so too does the size of its freight task, placing added pressures on portside as well as landside transport infrastructure.

As the State's main population centre, growth pressures are particularly evident in Perth. The Perth and Peel regions are currently home to more than two million people and this is projected to reach 3.5 million by 2050. This population growth trend is expected to underpin an international container task increase from around 740,000 TEUs in 2014-15 to 1.25 million TEUs per annum by around 2030 and 2.2 million TEUs per annum by around 2050 – a substantial, more than threefold increase in demand over that time period.

A critical focus of the Perth Freight Transport Network Plan is to provide clear strategic direction about how the Government will manage these growth pressures to ensure an effective international trade gateway into the future.

Additional container port facilities to serve the metropolitan area and the State's regions will be required to complement the Inner Harbour. Future container port facilities located in the Outer Harbour (Cockburn Sound) will meet this critical infrastructure need.

Supported by the Perth Freight Link project and recent investment in the railway network, the divestment of the assets and operations of the port of Fremantle, and provision for major container port development, will catalyse a number of related infrastructure investments of strategic importance to the State and national economy.

Public and private sector investment will be dependent on future trade and port growth projections, the provision of metropolitan port capacity and use of port lands, as well as road and rail access and strategic integration with major industrial lands. The Perth Freight Transport Network Plan articulates these strategic directions.

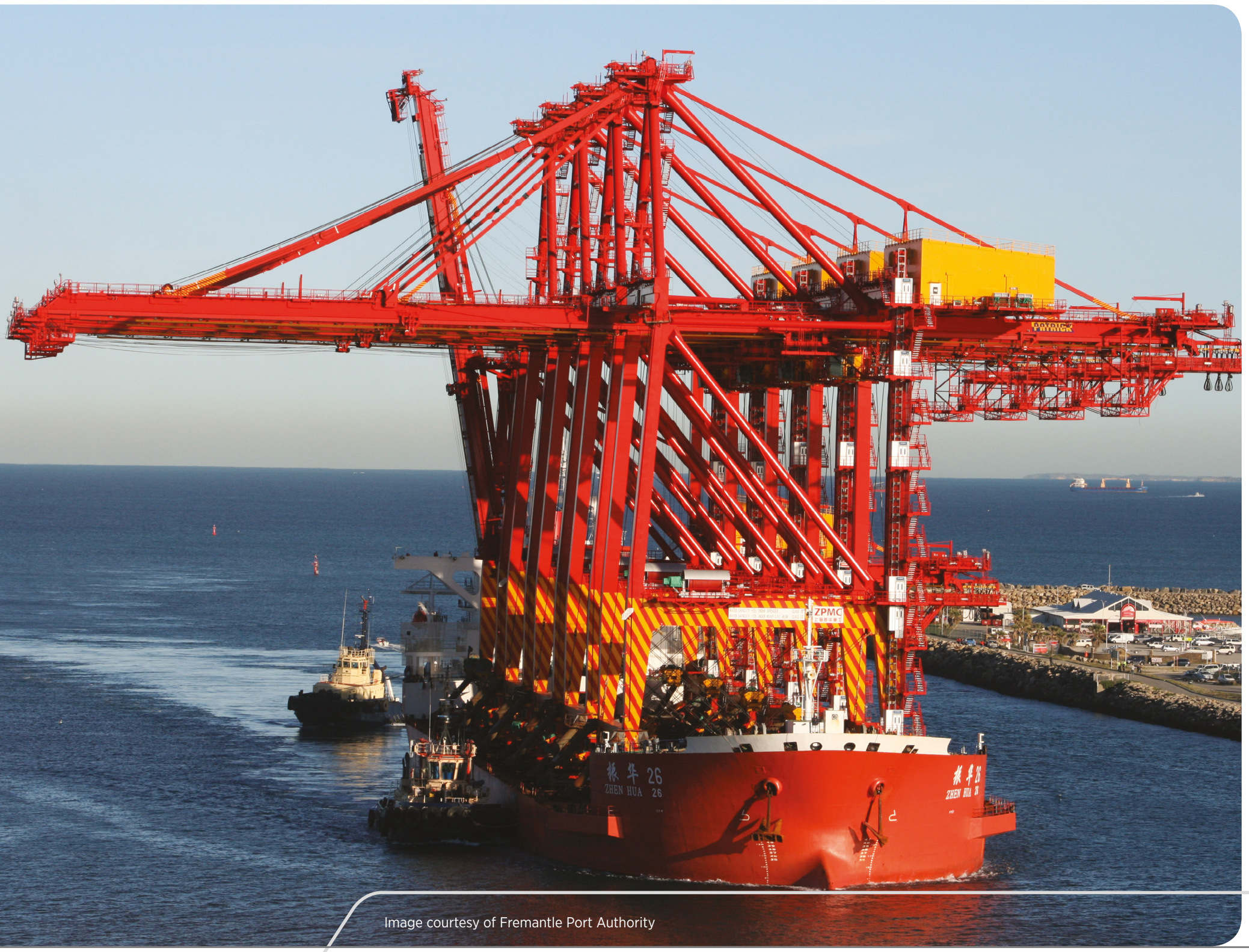


Image courtesy of Fremantle Port Authority

Enabling the Inner Harbour to Reach its Optimum Operating Capacity

The Inner Harbour has three main port operational areas:

- North Quay - located on the north side of the Swan River. North Quay includes 1,290 metres of berth used for container terminal operations and four general cargo berths used for both break-bulk and liquid bulk cargoes. The quay is directly linked to the rail and intermodal terminal networks via the North Quay Rail Terminal.
- Victoria Quay - located on the south side of the Swan River. Victoria Quay has a continuous wharf-face of 1,290 metres with a total of six common-user berths used for port operations. The quay is used mainly to accommodate the motor vehicle import trade. Agricultural equipment and other machinery are variously imported through Victoria Quay and North Quay, although this trade is mostly via Victoria Quay. Victoria Quay also hosts cruise ships and naval visits and is the location of the heritage-listed Fremantle Passenger Terminal.
- Rous Head - located adjacent to North Quay. The Rous Head Industrial Estate provides industrial land specifically allocated to activities that support, or are complementary to, the efficient operation of the port.

Major Government investments have been made at the Inner Harbour in recent years to extend its capacity and ensure it remains internationally competitive. Investments include harbour deepening and berth upgrades to increase port capacity as well as land developments to expand the port's footprint and optimise use of port lands. This will allow the port to accommodate larger, more efficient ships contributing to lower freight costs for Western Australia's communities and businesses. The Perth Freight Link investment will also transform the productivity of the land transport linkages.

Recent Major Investments in Port Infrastructure

Inner Harbour Deepening and Associated Projects

The most noteworthy of recent investments has been the Inner Harbour deepening and berth works project which began in 2009 and was completed in 2011. This $250 million project, one of the largest undertaken at the port since the opening of Fremantle Harbour in 1897, will contribute significantly to the long term sustainability of the Inner Harbour as a major gateway for national and international trade. This project involved:

- Deepening the Inner Harbour and approach channels to a depth of 14.7 metres to allow for 14 metre draft vessels to access the port at all tides.
- Upgrading a number of berths at North Quay to increase container handling capability including:
  - Upgrading Berths 4 to 9 to support larger container vessels and cranes and to protect the quay wall from damage by berthing vessels
  - Reconstructing Berth 10 to provide an additional 180 metres of heavy-duty wharf space for the port's container trade.
- An additional 27 hectares of land reclaimed at the Rous Head Industrial Estate as a result of the Inner Harbour deepening. This increased the land available for port related activities, mainly to support container trade.

  Important features of the development include a new truck marshalling area with fuelling facilities and amenities to assist traffic flow within the area and a new road along the seawall to improve public safety and access to North Mole. Another innovation is the automated call-up system for trucks waiting to enter the port's container terminals. This has reduced congestion caused by queuing, particularly at peak periods.

  The development also includes leased areas for container storage, quarantine service facilities and short term warehousing to ensure the optimisation of the container logistics chain connecting the landside and marine transport networks.

Future Outlook – Inner Harbour Container Trade

Overview

Container trade is handled at North Quay through two container terminals currently operated by DP World and Patrick. They operate a total of seven berths under two separate leases which were granted in 1996. One terminal lease for Berths 4, 5 and 6 has a quay length of 526 metres and an area of 15 hectares. The other terminal lease for Berths 7, 8, 9 and 10 has a quay length of 766 metres and an area of around 22 hectares. As currently configured, there are eight quay cranes located across the two terminals.

Given improvements in technology, operational efficiencies and transport linkages, the Inner Harbour is expected to have a container capacity in the vicinity of two million TEUs per annum, with potential for even greater capacity through further efficiency measures in the future.

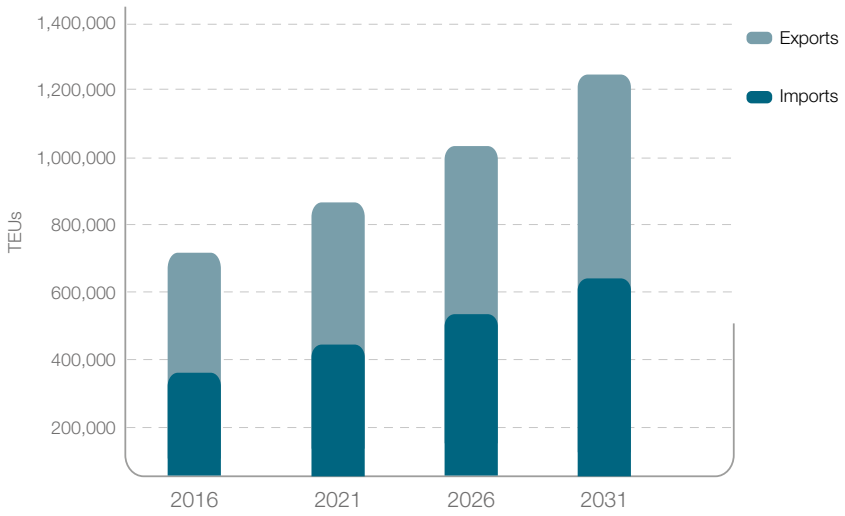


Figure 1: Forecast container volumes (Source: Fremantle Port Authority)

Future Trade and Development

The port of Fremantle's trade in containers has performed strongly in recent years. In 2014-15, the container terminals handled over 740,000 TEUs carried via 511 container vessel visits.

Significant growth is expected in Western Australia's container trade in the future with the total task forecast to grow to around 1.2 million TEUs per annum by around 2030.

In addition to improvements to, and further investment in the road and rail transport network supporting access to and from the port, there are a number of other strategies that can maximise the Inner Harbour's container handling capacity. These include:

- Buffers - the Government recognises the vital importance of protecting port operations and ensuring that existing buffering around ports is retained and strengthened. This is particularly important at the Inner Harbour in view of its location in the heart of Fremantle and projected strong growth in trade.
- Land use planning - with a number of existing industries planning to vacate the industrial site to the north of Tydeman Road, land use planning for the area will need to consider the port's future trade needs including ensuring that development in areas close to key port facilities is compatible with the 24-hour operational needs of the port.
- Container terminal leases - when the current leases expire there may be an opportunity to structure future agreements with clear performance criteria aimed at improving the efficiency of the international container supply chain and minimising impacts within and outside the port gate. This could include a requirement for container terminal operators to work proactively with other supply chain participants to increase rail mode share and manage truck queuing and congestion.

This is also an opportunity for greater investment by terminal operators to adopt container handling technology that enhances productivity, as seen in other domestic and international ports.

Future Outlook - Other Inner Harbour Trade

Overview

Other trades through the Inner Harbour have an impact on the freight network, although to a lesser degree than the container trade. These include the import of iron and steel, agricultural and other machinery and motor vehicles and the export of scrap metal and livestock.

Future Trade and Development

Imports of agricultural equipment and other machinery are expected to increase over the next two decades.

Recent strong growth in automotive imports has been driven by Western Australia's fast growing economy and population. More than 101,000 vehicles were imported into Western Australia in 2014-15, with most trade originating in Japan, Thailand and South Korea. Estimates of future growth indicate that volumes will continue to increase over the next two decades, although growth rates will depend on a number of factors including economic growth, population growth and vehicle ownership.

Most other trades are expected to increase steadily over the next two decades.

Freight growth and the overall trend towards larger ship sizes will translate into larger cargo transfers per ship visit and therefore a significant increase in peak periods of high intensity landside transport operations. This will underpin the need for larger lay-down areas for handling, storing and distribution.

There will be a need to consider sufficient storage facilities to cater for the expected growth in the motor vehicle trade and to handle larger shipments of up to 6,000 vehicles that are emerging as ship sizes increase.

Victoria Quay is the preferred berthing area for car carriers, and the roll-on roll-off trade generally, as the Quay is used for parking and pre-delivery inspection services. A dedicated roll-on roll-off terminal at Berths E to H is an opportunity to service this market. It will facilitate the port's ongoing commitment to the imported motor vehicle trade and enable the roll-on roll-off trade to be extended and consolidated on Victoria Quay.

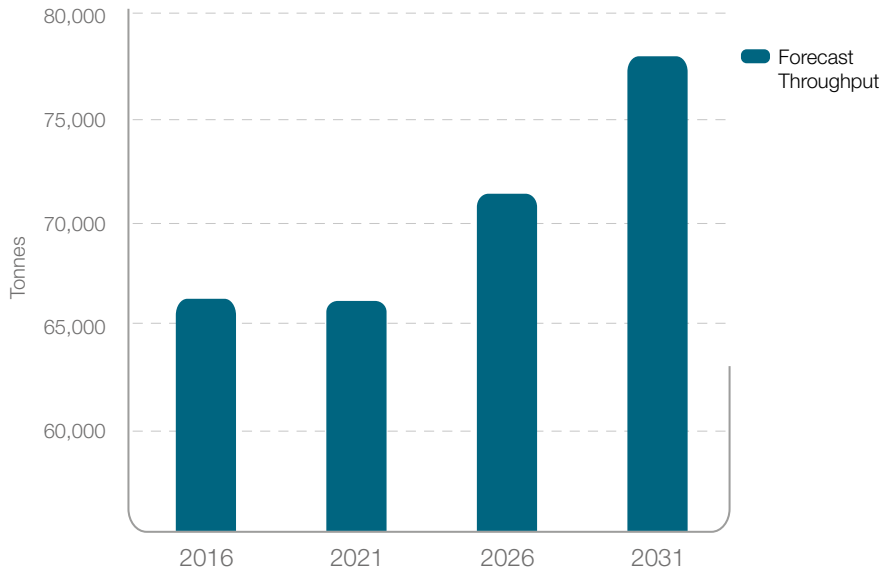


Figure 2: Forecast iron and steel import volumes (Source: Fremantle Port Authority)

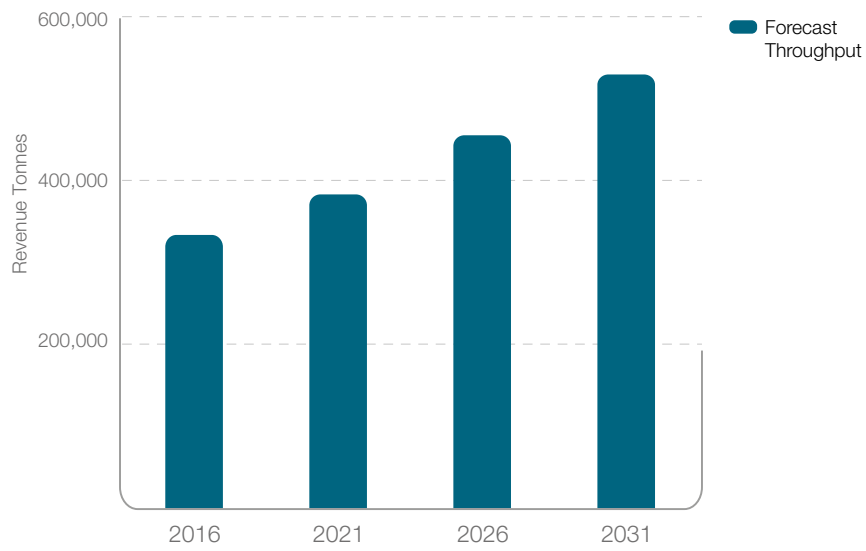


Figure 3: Forecast agricultural and other machinery import volumes (Source: Fremantle Port Authority)

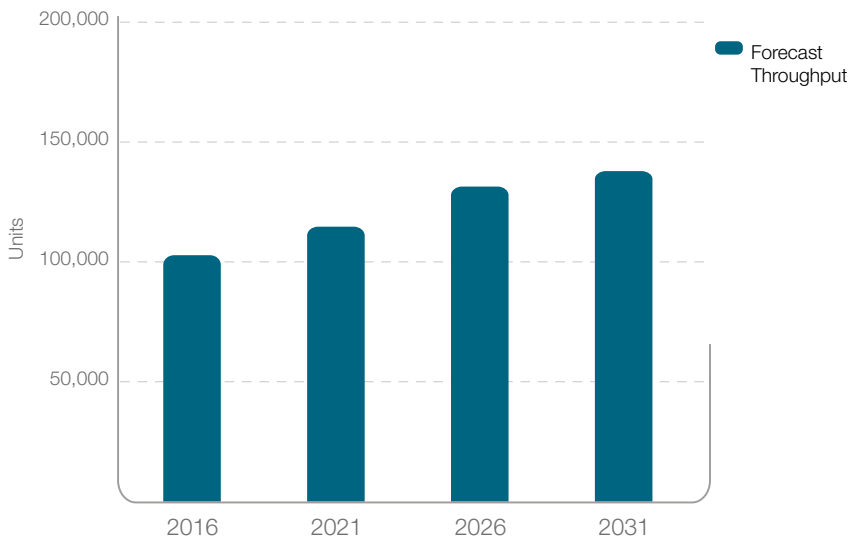


Figure 4: Forecast motor vehicle import volumes (Source: Fremantle Port Authority)

Image courtesy of Fremantle Port Authority

Facilitating Development of Bulk Terminal Capacity in the Outer Harbour

The Outer Harbour is located within the Western Trade Coast, a swathe of coastal land between Munster and Rockingham where some of Western Australia's most important heavy industrial assets are located. This includes the Kwinana Industrial Area, Australian Marine Complex, Latitude 32 Industry Zone and Rockingham Industry Zone.

The Outer Harbour hosts a range of port authority and privately owned and operated deep-water port facilities. These comprise:

- Kwinana Bulk Terminal currently owned and operated by the Fremantle Port Authority
- Kwinana Bulk Jetty currently owned and operated by the Fremantle Port Authority
- Three jetties operated by private companies: Alcoa, BP and Co-Operative Bulk Handling, generally under Agreement Acts and other Acts with the State.

The Government of Western Australia, while not directly involved in the management of these private port facilities, has a key role to play in ensuring they are effectively connected to the broader freight network. As such, the land freight task generated by these industries is taken into account in the Perth Freight Transport Network Plan.

The Government currently has a more direct role in planning and facilitating the delivery of key infrastructure and services at the Kwinana Bulk Terminal and the Kwinana Bulk Jetty.

The Kwinana Bulk Terminal and the Kwinana Bulk Jetty are included in the planned scope of the divestment of the assets and operations of the port of Fremantle. The new private leaseholder will therefore take over the primary responsibility for these facilities.

Future Outlook - Kwinana Bulk Terminal

Overview

The Kwinana Bulk Terminal was built in the 1950s and comprises two berths, Kwinana Bulk Berth 1 and Kwinana Bulk Berth 2, as well as an area of adjacent land. The southern berth, Kwinana Bulk Berth 2, is operational whereas the northern berth, Kwinana Bulk Berth 1, is not operational having been decommissioned in the late 1980s.

The Kwinana Bulk Terminal currently exports and imports a range of bulk cargoes including iron ore, cement clinker and nut coke. It is serviced by a rail terminal which currently supports iron ore exports.

Future Trade and Development

Increase in trade through the Kwinana Bulk Terminal will be driven in the short to medium term by exports including iron ore and in the medium to long term by imports.

The Fremantle Port Authority has made significant investments in the Kwinana Bulk Terminal in recent years to upgrade the terminal infrastructure and service capability. A commercial agreement was signed in May 2011 with Mineral Resources Limited to export 4.4 million tonnes of iron ore annually through the Kwinana Bulk Terminal. The ore is railed to the Kwinana Bulk Terminal from the Carina mine in the central Yilgarn. The first shipment of ore was exported in November 2011 and since this time the terminal has undergone a $44 million upgrade to its export infrastructure.

Infrastructure works to facilitate this trade included upgrading the rail infrastructure to accept standard gauge rolling stock, upgrading the train unloading system, installing new and upgraded conveyors, a new product sample and weigh station and stacker, upgrading the ship loader and providing electrical and water services.

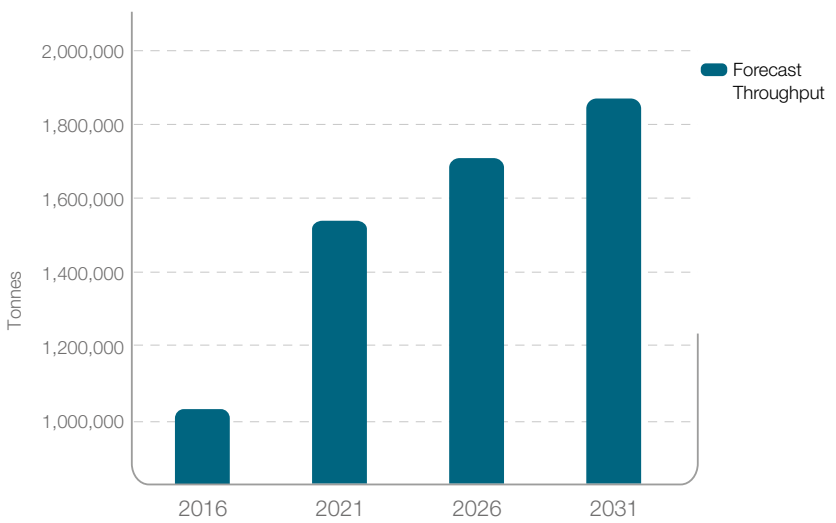


Figure 5: Forecast bulk import volumes through the Kwinana Bulk Terminal (Source: Fremantle Port Authority)

As such, Kwinana Bulk Berth 2 is relatively well-placed to handle future trade under a base case forecast. A future upgrade of Kwinana Bulk Berth 2 and its rail handling infrastructure possibly will be required to enhance the terminal's capability to efficiently handle major increases in trade volumes.

Future Outlook - Kwinana Bulk Jetty

Overview

The Kwinana Bulk Jetty comprises two berths, Kwinana Bulk Berth 3 and Kwinana Bulk Berth 4. Both berths are used for the import of various bulk commodities. This includes fertiliser, sulphur, slag residue, ammonia and caustic soda.

The Kwinana Bulk Jetty is serviced by a rail terminal and is connected to the freight rail network south of the connection that serves the Kwinana Bulk Terminal.

Future Trade and Development

There has been strong growth in both dry and liquid bulk trades over the past decade. Future bulk trade forecasts for the Kwinana Bulk Jetty indicate that the trade is expected to remain relatively constant over the next two decades.

There are opportunities to further the development of the Kwinana Bulk Jetty to include expansion of the Jetty and an additional terminal facility.

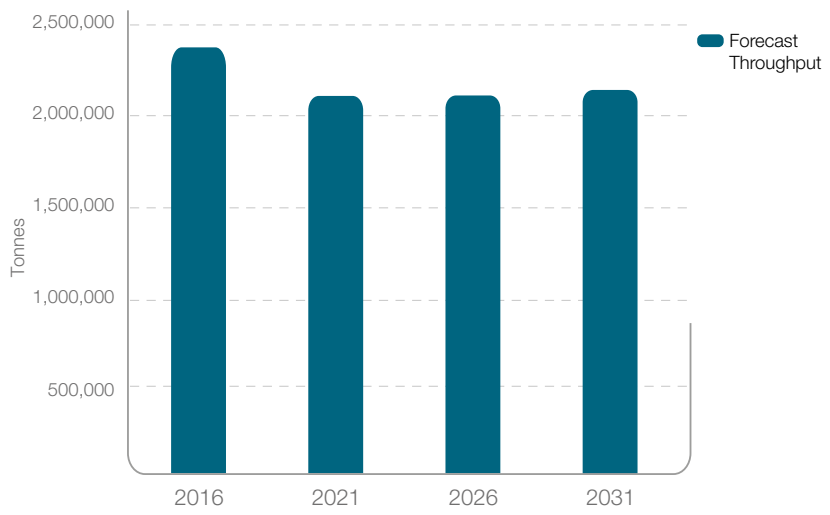


Figure 6: Forecast bulk import volumes through the Kwinana Bulk Jetty (Source: Fremantle Port Authority)

Planning Future Container and General Cargo Port Development in the Outer Harbour

The Location for Future Container and General Cargo Port Development

The State Government is committed to ensuring that Western Australia has a robust and flexible long term strategy to meet future growth in the international container task. To provide for demand beyond the capacity limits of the port of Fremantle's Inner Harbour, it will facilitate planning and approvals for future container port facilities in the Outer Harbour to handle future trade volumes.

Significant research over many years has identified the coastal area between the Naval Base and James Point in Cockburn Sound as a suitable location for additional container port facilities. Most recently, the Western Australian Planning Commission undertook a rigorous planning assessment of a range of options for new container port facilities in the Outer Harbour.

The Perth Freight Transport Network Plan provides for a future container and general cargo port development in the Outer Harbour as the preferred location for future container port facilities to serve Western Australia. Container port facilities in the Outer Harbour are well placed in that:

- The location is close to key consumer as well as industrial markets including the Western Trade Coast area
- The direct deep-water access and proximity to existing major shipping lanes will minimise dredging of the approach channels
- The location is already within a commercially operational trading port area with existing connections nearby to the land freight network

The container port facilities will operate in an industrial environment, where major industrial developments will interface with the development and its principal transport corridor. This important planning principle will be reflected in the land use planning overlays supporting the development.

The aim is to plan for container port facilities capable of handling at least 3 million TEUs per annum, with staged development.

This, combined with the ongoing capacity at the Inner Harbour, will be sufficient to accommodate the long term container trade demands of Western Australia well beyond 2050.

Planning Transport Access between the Future Container and General Cargo Port Development in the Outer Harbour and the Metropolitan Freight Network

The provision of high standard freight corridors to connect the future port development in the Outer Harbour to the broader metropolitan network is of particular importance in the provision of an integrated freight transport network. The Perth Freight Link investment with the extension of Roe Highway will be a critical link for both the Inner and Outer Harbours.

A critical focus of the Perth Freight Transport Network Plan is to give prominence to the Rowley Road Transport Corridor as the principal access route supporting the container port development in the Outer Harbour and an integral part of the Western Australian Government's long term vision for the development of the metropolitan freight transport network. Accordingly, Rowley Road is proposed to form part of Western Australia's proposed future National Land Transport Network.

The transport corridor can accommodate both road and rail linkages to the future port.

Road Access

The scale and scope of the port development along with further industrial lands development within the Western Trade Coast will profoundly influence the broader metropolitan road freight network in the future. These developments will underpin the need for a number of new or upgraded east-west links across the south-west and inner south-east metropolitan sub-regions, including the upgrade of the existing Rowley Road (east of the Kwinana Freeway), Mundijong Road and Anketell Road, and the construction of a major new north-south link, the Fremantle Rockingham Controlled Access Highway.

Rowley Road (west of the Kwinana Freeway) will be extended and upgraded to provide an 8 kilometre four-lane dual carriageway to the coast. A portion of the road will go through the Latitude 32 Industry Zone. The new road reserve will be a Primary Regional Road reserve in the Metropolitan Region Scheme. It will have controlled access status and incorporate interchanges or grade separated junctions at major intersections.

Stock Road will also be upgraded to full freeway standard south of the Roe Highway. It will be aligned into the future Fremantle Rockingham Controlled Access Highway to provide a linkage to the Kwinana Freeway via Mundijong Road at the southern end and the Fremantle Inner Harbour at the northern end via the Fremantle Tunnel.

Rail Access

Rail access to the future container port facilities is planned to connect to the existing Cockburn to Kwinana freight mainline through the Latitude 32 Industry Zone. The rail alignment will follow the western section of the road alignment within the Rowley Road Transport Corridor.

Planning for the rail alignment will allow for a dual-track connection and double-stacked containers. Operational effectiveness will be ensured by a 24-hour operation.

The provision for dual-gauge rail, together with efficient interfaces for long, double-stacked trains at the port and the Latitude 32 Industry Zone will ensure interoperability between the existing rail network and the future rail link to the port. The interface between the first inland passing loop, or dual-track line section, will be critical in determining the effectiveness of port rail terminal operations should the rail line into the port initially be constructed as a single line.

The transport planning will ensure a strong role for rail by minimising container handling imposts and enabling the efficient transfer of containers from the future container facilities to an integrated system of metropolitan intermodal terminals.

Latitude 32 Industry Zone

There are substantial parcels of industrial land allocated primarily outside the designated port area, within the Western Trade Coast, where there is potential to optimise port activities, including container management functions.

The Perth international container market is a net receiver of freight with loaded import containers representing the largest proportion. Around 50 per cent of the export containers are empty for return to origin markets. As such, there is a critical need for the port and associated intermodal terminals to provide sufficient capacity to manage the empty container task as overall container demand grows.

Strategic and master planning activities will identify container storage and management opportunities and establish grounds for enhanced connectivity and appropriate planning overlays outside the port environs to ensure the long term competitiveness of the container port facilities. Latitude 32 Industry Zone represents one of Western Australia's largest industrial developments. As a visionary project, it highlights the State's commitment to large scale development specifically designed to meet the medium and long term demand for industrial land in Perth.

The Industry Zone presents a strategic opportunity to synchronise port and industrial developments and release synergistic land uses which will become increasingly important within the metropolitan area as land for freight and logistics purposes is limited.

Image courtesy of Fremantle Port Authority

PRIORITY 2

Five Priorities for Action

1. A Generational Step-Up in Metropolitan Port Capacity
2. **Moving More of Perth's Freight Task by Rail**
3. Expanding the Metropolitan Intermodal Terminal System
4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy
5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Image courtesy of Brookfield Rail

PRIORITY 2

Moving More of Perth's Freight Task by Rail

Driving economic growth while reducing congestion and moving towards a more sustainable transport network for Perth

Highlights

The Perth Freight Transport Network Plan brings together infrastructure and non-infrastructure solutions to ensure a strong future for freight rail in the metropolitan transport system.

Key Supporting Actions

Making Rail More Competitive for Transporting Containers to and from the Port of Fremantle

- Extension of the North Quay Rail Terminal to 690 metres to improve port shuttle train turnaround times and enable longer trains to operate to and from the port (completed)
- Installation of a passing loop at Spearwood to provide greater mainline capacity (completed)
- Continued financial support to promote increased use of rail for transporting containers to and from the port of Fremantle

Non Infrastructure Solutions to Improve Mainline Capacity Utilisation

- Extension of network operating hours to increase the frequency of freight trains with additional evening and night operations
- Better utilisation of the network by industry through effective train scheduling to optimise available scheduled train paths
- Improved planning around the metropolitan freight terminal network to actively encourage more efficient location of freight and logistics activities

Planning Measures to Better Protect the Rail Network

- Consistent and informed application of land use planning to ensure sensitive land uses are not located or designed in such a way that expose the community to unacceptable amenity impacts
- Protection of non-operational and disused rail corridors for potential incorporation into the future freight network

The Steps Needed to Increase Mainline Capacity

- Infrastructure upgrades by 2.7m:
  - Duplication of single-track sections at the Forrestfield and Kewdale interstate intermodal precincts
  - Additional infrastructure required to address capacity issues at the Kwinana Triangle to serve the Kwinana Industrial Area
  - Installation of a passing loop adjacent to the Latitude 32 Industry Zone
- Infrastructure upgrades by 3.5m:
  - Track duplication between Cockburn Triangle and the Latitude 32 Industry Zone
  - Track duplication between the Latitude 32 Industry Zone and the Kwinana Triangle within the Kwinana Industrial Area
  - Construction of a dedicated bridge for freight rail over the Swan River

Provision for a New Rail Link to Support Container Port Facilities in the Outer Harbour in Cockburn Sound

- Planning investigations to progress the Rowley Road Transport Corridor to ensure interoperability between the existing rail network and a new rail link to serve future container port facilities in the Outer Harbour
- Statutory planning to secure the Rowley Road Transport Corridor in the Metropolitan Region Scheme as the principal access route for the new container and general cargo port development

Grade Separation Priorities

- Recently completed:
  - Lloyd Street, Midland
- Immediate priority (funded):
  - Nicholson Road, Canning Vale
- Future priorities:
  - North Lake Road, Bibra Lake
  - Toodyay Road, Middle Swan
  - Morrison Road, Midvale

The Importance of Perth's Rail Freight Network

The Perth Freight Transport Network Plan recognises the essential role the metropolitan rail freight network plays in meeting the city's freight transport challenges.

The growth of rail freight brings many benefits to the community. These include reduced fuel use and air pollution, less road congestion and improved safety. Rail also has an essential role to play in the regional economy by providing industries across the Goldfields, Wheatbelt, Great Southern and South West regions with access to metropolitan port facilities.

Given its strategic importance, the rail freight network remains under State ownership, but has been leased until December 2049 to a private rail operator, Brookfield Rail. The lease arrangement has been designed to allow the Government to pursue its policy objectives for the network, while allowing the lessee to pursue its commercial interests.

As a privately leased and operated network, there is scope for investment by industry and Brookfield Rail to address future needs. To this end, Brookfield's investment program takes place within a long term network planning framework focused on potential commercial opportunities being realised and justified over time while preserving the underlying operating integrity of the network.

The Western Australian and Commonwealth Governments also have an important role in achieving coordinated metropolitan, state-wide and national freight transport planning, funding and investment decision-making, particularly given that a number of the freight rail corridors within the metropolitan network are part of the National Land Transport Network.

In the past five years freight volumes on the rail network have increased significantly. The Western Australian and Commonwealth Governments, together with Brookfield Rail, have made substantial investments to transform the metropolitan rail freight network into effective and scalable infrastructure with a critical role to play in supporting the social and economic future of Western Australia.

Looking to the future, inevitably there will be increasing pressure on transport networks. In this context, rail is an essential transport mode, especially given community expectations regarding the provision of freight transport that balances economic objectives with issues of sustainability and safety. The Western Australian Government will continue its commitment to maintain a strong metropolitan rail freight network and consider infrastructure investment needs on a case-by-case basis.

Ultimately, however, the Western Australian Government recognises that Brookfield Rail has the financial capacity and expertise to facilitate the development of rail infrastructure and that many of the major network infrastructure upgrades included in the Perth Freight Transport Network Plan will be funded through commercial arrangements.

Image courtesy of LandCorp

Network Outlook – Future Growth, Pinch Points, Current Government Initiatives

Future Growth

Perth's rail freight network is one of the busiest networks in Australia. Around 600 train paths are scheduled across the network each week with much of the activity concentrated on the sections of track between Midland, Cockburn Triangle and the highly trafficked area around the Kwinana Triangle.

Within the next two decades, rail freight demand will increase significantly and require the allocation of an additional 300+ train paths per week - an increase of more than 50 per cent.

The movement of interstate and international containers is a particularly important element of this future increase as these transport many of the everyday items needed by Perth's businesses and consumers.

As Perth's population grows, so too will the need to move more containers. Containerised freight will grow to represent nearly 50 per cent of train paths within the next two decades. This growth will be underpinned by a large increase in container traffic associated with the Fremantle Inner Harbour.

Future Growth Areas

- By 2.7m the highest rate of freight growth, albeit from a modest base, will occur on the section of track between the Cockburn Triangle and North Quay Rail Terminal. Freight growth on this section of track will be underpinned by a more than doubling in container trade through the Inner Harbour together with an increase in the share of containers being transported to and from the port by rail.
- Train path demand among many of the network's existing major bulk freight users is likely to be relatively modest with much of the future demand likely to be met by higher train path utilisation and the operation of longer trains to and from the Western Trade Coast area.[1]
- By 3.5m freight volumes on the section of track between the Kewdale and Forrestfield areas and the Cockburn Triangle are likely to increase by more than 75 per cent, driven largely by container trade, although this increase will be adequately catered for by the existing double-tracked corridor.
- Significant growth will concentrate around the Cockburn Triangle, which is the focal point for northern, eastern and southern freight flows traversing the network, and where the Latitude 32 Industry Zone is expected to become one of Australia's largest industrial developments.

Network Pinch Points

North Quay Rail Terminal to Cockburn Triangle

Perth has one of Australia's few freight-only rail networks. Together with the ability to run 24-hour freight operations, this is a major competitive advantage underpinning rail's successful role in moving Perth's freight task.

There is, however, one small section of track at the Fremantle rail bridge where freight trains share track with suburban passenger services. This limits weekday morning and afternoon freight operations over the shared section of track during these passenger peak periods.

Rail freight operators also voluntarily minimise night operations where possible between 10pm and 5am to limit impacts on the surrounding community. These factors combine to constrain capacity and restrict the overall window of opportunity to run freight train operations.

In the future, the section of track between the Cockburn Triangle and the Inner Harbour will see significant freight growth. This will require extended hours of operation to keep pace with container freight demand and ultimately a new bridge.

Forrestfield and Kewdale Precincts

From Midland Junction, a dual-gauge double-track line proceeds south to the State's main interstate freight terminals at Forrestfield and Kewdale. Near the terminals, the dual-gauge line converges to isolated areas of single-track section, before returning to double-track configuration.

These busy sections of single-track are subject to a number of traffic conflicts, particularly at certain times of the day, as interstate freight trains arrive, are marshalled and depart and mix with other freight trains operating between the area and either Fremantle or Kwinana. These traffic conflicts are likely to increase in the future as new intermodal terminals establish operations in the Kewdale and Forrestfield precincts and as existing terminals expand to service growth.

[1] *The Perth Freight Transport Network Plan acknowledges that major expansion of existing businesses and/or the introduction of new proponents within the Western Trade Coast is possible.*

Cockburn Triangle, Kwinana Triangle and Western Trade Coast Rail Terminals

Another area of the rail freight network where capacity is constrained is the highly-trafficked section of track between the Cockburn Triangle and the Kwinana Triangle. Network performance is affected by the long single-track section between these two triangles which take a considerable time for trains servicing rail terminals in the Western Trade Coast area to traverse, and lengthens the time between rail terminal departure and arrival. This limits both terminal and mainline capacity.

The Kwinana Triangle directs a high volume of freight train traffic to and from southerly and northerly directions across different gauges to and from a number of port terminals and bulk siding facilities. This complex area of track results in a number of traffic conflicts. The northern part of the Triangle provides access for Alcoa's alumina refinery and the Kwinana Power Station. The western part of the Triangle is mostly configured as dual-gauge double-track, which splits to the north and south with the north providing access to the Kwinana Bulk Terminal and the south providing access for a range of industries including Co-operative Bulk Handling for grain exports.

Mainline network performance is, in part, dictated by the available capacity at the rail terminals and sidings that form part of the rail freight supply chain. Loading infrastructure at some sidings is already at capacity while others are constrained. In future it will be increasingly important for industry to focus on efficiency improvements and infrastructure upgrades at these facilities so that mainline infrastructure capacity can be optimised.

Refer to Map 1 for additional information.

Current Government Initiatives to Make Rail More Competitive for Transporting Containers to and from the Inner Harbour

Extension of the North Quay Rail Terminal and Installation of the Spearwood Passing Loop

The Government is committed to moving more of Perth's freight task by rail. In this regard it has co-funded, along with the Commonwealth Government, two infrastructure projects totalling $37 million to make rail more competitive for transporting containers to and from the port of Fremantle's Inner Harbour:

- The extension of the North Quay Rail Terminal to lengthen the existing rail terminal from 400 metres to 690 metres and enable the terminal to accommodate longer trains without the time-consuming and costly process of breaking up and shunting trains. The extended terminal also facilitates faster stripping and reloading of trains, so that each train set can be cycled through the terminal more quickly. This allows the length of trains serving the port to increase, enabling more freight to be carried per train and increasing the availability of train paths.
- The installation of an 850 metre dual-gauge passing loop at Spearwood to enable trains to pass each other on the long single-track section between the Cockburn Triangle and the North Quay Rail Terminal. This passing loop provides greater mainline capacity by increasing the availability of train paths.

The Metropolitan Rail Freight Subsidy

One of the major advantages that rail offers is reduced traffic congestion on roads, assisting in lessening environmental and social impacts. Greater fuel efficiency is another factor in rail's favour. Road transport consumes about four times as much fuel as rail per container per kilometre on a short haul, and over six times as much on the long haul across Australia.

Rail continues to receive financial support from the Western Australian Government in recognition of the vital role it plays in the transport system and the inherent difficulty it has in competing with road transport over short distances. The longer term objective is for rail to become financially self-sustaining as it becomes more established in the market place.

The Western Australian Government has committed further support to promote increased use of rail for transporting container freight to and from the port of Fremantle's Inner Harbour and has approved the continuation of the rail subsidy until 2021-22. Funding support beyond this date will be subject to further review.

The Government envisages that with effective coordination, improved rail access at ports, investment and expansion in metropolitan intermodal terminals and growth in freight volumes, rail can play a larger role in moving Perth's future freight task in the future. The aspirational goal is for rail to achieve a 30 per cent market share for haulage of containers to/from the metropolitan container port facilities.

Making Better Use of the Existing Network

Network Management Improvements

Expanded Operational Hours

In instances where significant infrastructure investment has already been made by Government, such as the section of track between the Cockburn Triangle and the North Quay Rail Terminal, there will need to be an increasing focus on non-infrastructure solutions to improve capacity utilisation.

As container trade associated with the Inner Harbour increases towards two million TEUs per annum, it is expected that the number of trains operating on the section of track between Cockburn Triangle and North Quay Rail Terminal will increase from around three to fifteen trains each way per day.

These additional trains can be accommodated by increasing the frequency of trains during the day together with some additional evening and night operations.

The Western Australian Government recognises that there is some community concern regarding the impacts of rail movements. Adverse effects on residents living alongside rail corridors can occur from exposure to increased train movements and development along transport routes that is not designed to mitigate noise and vibration.

Industry has a key role to mitigate impacts when designing and developing infrastructure upgrades, in using best practice rolling stock and supporting initiatives such as those led by the Rail Industry Safety and Standards Board to develop national standards that reduce noise and other emissions.

Expanding network operating hours to move more of Perth's freight task by rail will bring many benefits to the wider community and is a vital, cost-effective way to achieve a sustainable city.

The Western Australian Government, through the Department of Transport and the Public Transport Authority, will continue to work with stakeholders to facilitate initiatives required to reduce the adverse impacts of rail freight movements.

Better Utilisation of the Network by Industry

Brookfield Rail provides rail network capacity to customers or train operators (who contract on behalf of customers) in the form of train paths, which provide the right to run a train at specified times. Train paths are provided under long term commercial agreements.

The utilisation of metropolitan rail network capacity varies considerably depending on the freight task. Some tasks such as interstate freight and grain are much more highly peaked with considerable capacity available outside peak periods. Tasks such as iron ore and interstate freight use trains of up to 1,800 metres in length which maximise the use of contracted capacity.

As the freight task grows, so will the need for industry to ensure that rail network capacity (train length, axle load, train paths used) is used optimally to the benefit of all users requiring access through the metropolitan freight network.

Image courtesy of Brookfield Rail

Coordinated Measures to Protect the Network

Consistent and Informed Application of Land Use Planning

The future freight task over the next two decades is not likely to require the construction of major new rail links in the metropolitan area. Instead, future freight growth will require a staged program of network infrastructure upgrades and operational efficiency improvements within existing rail corridors.

The encroachment of sensitive land uses near freight infrastructure can create community amenity issues, leading to pressure to restrict freight activity. This is particularly so for the metropolitan rail freight network where a number of different land uses, including residential development, abut active rail lines; and the rail reserves which help protect freight activity from sensitive land uses are narrow. An example of this is in the Midland area, where the railway is in close proximity to residential properties and planning is progressing to investigate the merits of realigning the rail corridor.

The rail network has, over time, been compromised at locations where land buffers have been narrowed resulting in areas where further additional track works will be difficult to accommodate. These areas represent potential amenity impacts and limit opportunities to create additional rail capacity to service Perth's freight task.

A consistent and informed approach to land use planning is required to ensure that sensitive land uses are not located or designed in such a way that would expose residents to unacceptable amenity impacts. Rail operations can be inherently noisy and elevated noise levels may still occur in neighbouring areas even after all feasible and reasonable mitigation measures have been applied. Land use planning at the State Government level, the application of noise mitigation policies at the local Government level, together with the adoption of stronger building controls and standards by the private sector, will assist in providing better protection.

Protecting Non-Operational Rail Corridors

A select number of rail corridors, while currently not in use, may have potential to service industrial developments in the long term or to facilitate future rail infrastructure upgrade requirements. These should be retained for potential incorporation into the future freight network, particularly within the metropolitan area where land availability and acquisition opportunities are limited.

Disused or unconstructed rail reserves, together with land available within existing reserves, should be protected to allow for future rail infrastructure. Future investigations will focus on identifying opportunities to extend and protect the rail freight network for future freight transport use.

Image courtesy of Intermodal Group

The Steps Needed to Increase Mainline Capacity

Major Network Infrastructure Upgrades by 2.7m

Duplication of the Two Single-Track Sections at Forrestfield and Kewdale

The dual-gauge double-track line in the Forrestfield Kewdale section of the network converges to single-track configuration in areas causing congestion particularly during peak periods. In practical terms, these sections are bottlenecks situated on a key interstate mainline adjacent to two of Perth's busiest freight precincts.

The interstate mainline will continue its essential role as one of Western Australia's most critical supply routes, moving the majority of general freight from the east coast of Australia into the State.

It will require ongoing forward planning by the Western Australian Government together with Brookfield Rail to keep pace with increasing freight demand and to ensure the appropriate level of investment.

Brookfield Rail maintain that full duplication is required for sections of single-track to eliminate these existing bottlenecks, and to improve efficiency of freight train movements and allow for future expansion and development of intermodal terminals in the Kewdale and Forrestfield precincts.

Kwinana Triangle

Parts of the Kwinana Triangle are already nearing capacity, and without infrastructure investment, there will be insufficient capacity to support the expected increase in demand.

The most congested part of the network is the Kwinana Triangle. Investigations are underway to identify an infrastructure solution that would remove the rail traffic conflicts in the area and provide ample capacity to meet future demand.

Given the number of private sidings in the vicinity of the Kwinana Triangle, siding capacities would need to complement mainline improvements to optimise investments in this area.

Installation of a Passing Loop Adjacent to Latitude 32 Industry Zone

Substantial freight growth on the section of track between the Cockburn Triangle and the Latitude 32 Industry Zone will occur in the long term. This will necessitate capacity upgrades, including the construction of a passing loop at Latitude 32 to support increases in bulk exports from port terminals in the Western Trade Coast area. This loop would enable bulk trains travelling in opposite directions to pass each other and provide extra train path flexibility on this already busy section.

Refer to Map 2 for additional information.

Major Network Infrastructure Upgrades by 3.5m

Track Duplication Between Cockburn Triangle and Latitude 32 Industry Zone

Duplication of the single-track between the Cockburn Triangle and the Latitude 32 Industry Zone would provide the substantial capacity improvements needed to support the expected 70 per cent increase in bulk and container trains on this section of rail. The need for, and staging of, both a passing loop and track duplication will require further investigation.

Duplication of the Single-Track Between Latitude 32 Industry Zone and Kwinana Triangle

In the longer term, partial or full duplication of the single-track between the Latitude 32 Industry Zone and Kwinana Triangle will need to be investigated. This additional track, if linked with the track duplication between Cockburn Triangle and the Latitude 32 Industry Zone, would ultimately provide a fully-duplicated rail corridor between the Cockburn Triangle and the Kwinana Triangle.

This major infrastructure development would optimise capacity and provide resilience allowing for major increases in freight trains well into the future.

Double-Stacking

Governments across Australia have recognised that there are a number of benefits in stacking containers two-high on railroad cars. Using double-stack technology, a freight train of a given length can carry around twice as many containers, sharply reducing costs for industry as well as increasing overall capacity on the section of track on which it operates.

The Western Australian Government has undertaken investigations to consider the potential to introduce double-stack technology. Engineering investigations have however concluded that it is not economic to undertake a proactive upgrading program to provide double-stack clearances on metropolitan routes in the short to medium term.

The Public Transport Authority, Main Roads WA and Brookfield Rail will continue to ensure that all new and replacement structures over relevant rail freight lines are constructed with 7.3 metre clearance requirements to allow double-stacking, so that ultimately the objective of double-stack clearances may be achieved.

Fremantle Rail Bridge

The construction of a dedicated rail bridge in North Fremantle over the Swan River to provide for the separation of suburban passenger services from freight trains will be needed to allow better availability for weekday morning and afternoon freight train operations.

Freight Rail Realignments

Freight rail alignments through Mundijong and Midland are currently being investigated to improve urban outcomes. Investment opportunities to construct realigned railways will be considered.

Grade Separation Priorities

There are a number of at-grade rail/road level crossings within the metropolitan rail freight network.

Whilst the desire to eliminate level crossings is often based on safety needs, in the metropolitan context, road congestion is a key driver for grade separation. Crossings can cause significant delays to the movement of all forms of road based traffic, including both freight and passenger vehicles, and are a barrier to the efficient performance of the transport network.

Grade separation, making roads pass either under or over the railway, can provide an effective solution when the relatively high cost can be justified.

In recent years the Western Australian Government has invested in level crossing upgrades to improve road and rail safety and ensure the efficiency of Perth's transport network. In 2009 the level crossing at Daddow Road was grade separated to improve freight efficiency through the Kewdale and Forrestfield areas. This grade separation was co-funded by the State and Commonwealth Governments.

The Western Australian Government, through Main Roads WA, has funded a major grade separation at Lloyd Street, Midland to improve traffic flow and safety along Lloyd Street by building an underpass below the railway to replace the existing level crossing. Separating the road from the rail required the construction of two rail bridges to cater for the rail freight lines. The underpass, bridges and associated local road modifications was funded by the State Government and the City of Swan.

The Western Australian Government will continue its investment program in grade separations. Recent investigations into rail freight level crossings within the metropolitan network have identified four priority locations for future grade separation: the level crossing on Nicholson Road is an immediate priority which has been funded for grade separation, while level crossings on North Lake Road, Toodyay Road and Morrison Road are identified for detailed investigation for grade separation in the future.

Image courtesy of Department of Transport

Provision for a New Rail Link to Support Future Container and General Cargo Port Development in the Outer Harbour

A Strategic Focus on the Kwinana Industrial Area and Latitude 32 Industry Zone

Looking to the future, industrial land and port infrastructure of strategic importance to the State will develop in the south-west area of Perth.

Future development of container and general cargo port facilities in the area will trigger significant private sector investment. While it is not always appropriate for the Government to invest in all aspects of the freight system, transport access to major container port facilities requires oversight by Government, particularly where there are strategic challenges and opportunities occurring with far-reaching impacts on the State or significant implications for the overall metropolitan freight network and its many users.

Rowley Road Transport Corridor

In developing the Perth Freight Transport Network Plan, the Government has given priority to planning for future freight growth. For such forward planning to be successful, vital future freight corridors must be defined and set aside for future development and use. If these corridors are not defined and protected, particularly in the metropolitan environment, the cost of providing them at a later date will be very high because the land has not been reserved in advance.

The State's transport corridors will be defined and designated in planning schemes to accommodate road and rail infrastructure to avoid closing off either option in the future. This long term network planning ethos encourages an enduring view of the way the State needs to accommodate future growth.

A number of potential transport corridors have been investigated to complement various container port options considered in the Cockburn Sound area. The preferred transport corridor option is an extension and upgrade of Rowley Road between Kwinana Freeway and the coast. Within the corridor, the new rail alignment is planned as a westward extension from the Cockburn to Kwinana freight mainline through the Latitude 32 Industry Zone.

The Perth Freight Transport Network Plan provides for the Rowley Road Transport Corridor as the principal access route supporting future container port facilities. This is an integral part of the Western Australian Government's long term vision for the development of the metropolitan freight transport network. This corridor will complement the Perth Freight Link as a critical link for both the Inner and Outer Harbours.

The Department of Transport will be the Lead Agency to manage planning investigations for the preferred road and rail corridor to ensure interoperability with the existing road and rail network. This will include provision for dual-gauge rail and efficient interfaces to allow trains to service the future port. Land for the Rowley Road Transport Corridor will be reserved in the Metropolitan Region Scheme.

The Role of Rail in the Distribution of the Freight Task Associated with the New Container Port Facilities in the Outer Harbour

The Western Australian Government is committed to increasing rail freight movements to and from commercial ports.

The Inner Harbour operates at Fremantle in an urban environment, where neighbouring residential communities interface with port access corridors. In contrast, new container port facilities will operate at Kwinana in an industrial environment, where major industrial assets will interface with port access corridors. Growth in the future freight task will nevertheless flow beyond the immediate Kwinana area and place increasing pressure on the broader metropolitan road network if no action is taken.

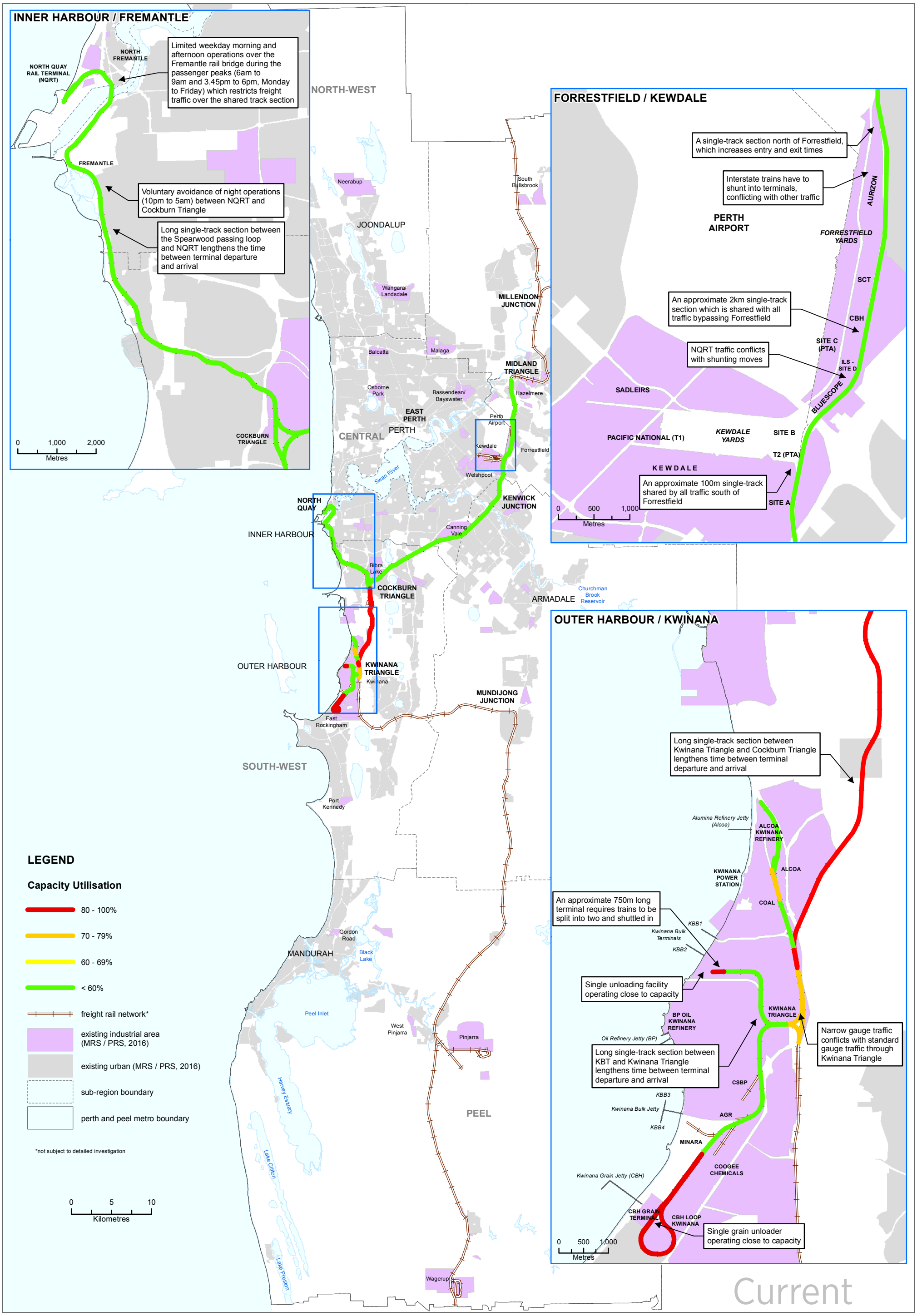
A key issue to address in relation to the transport options that may operate between new container port facilities and the Latitude 32 Industry Zone, is whether to prioritise the development of a specific transport mode within and outside the port's environs, taking into account the relatively short distance between the future port and the Latitude 32 Industry Zone.

This strategic issue has the potential to influence profoundly the metropolitan freight network development in the future. It has implications for port planning as well as facility development and land use planning within the Latitude 32 Industry Zone and possibly other intermodal terminal sites in the outer metropolitan fringe.

Image courtesy of Kwinana Industries Council

MAP 1

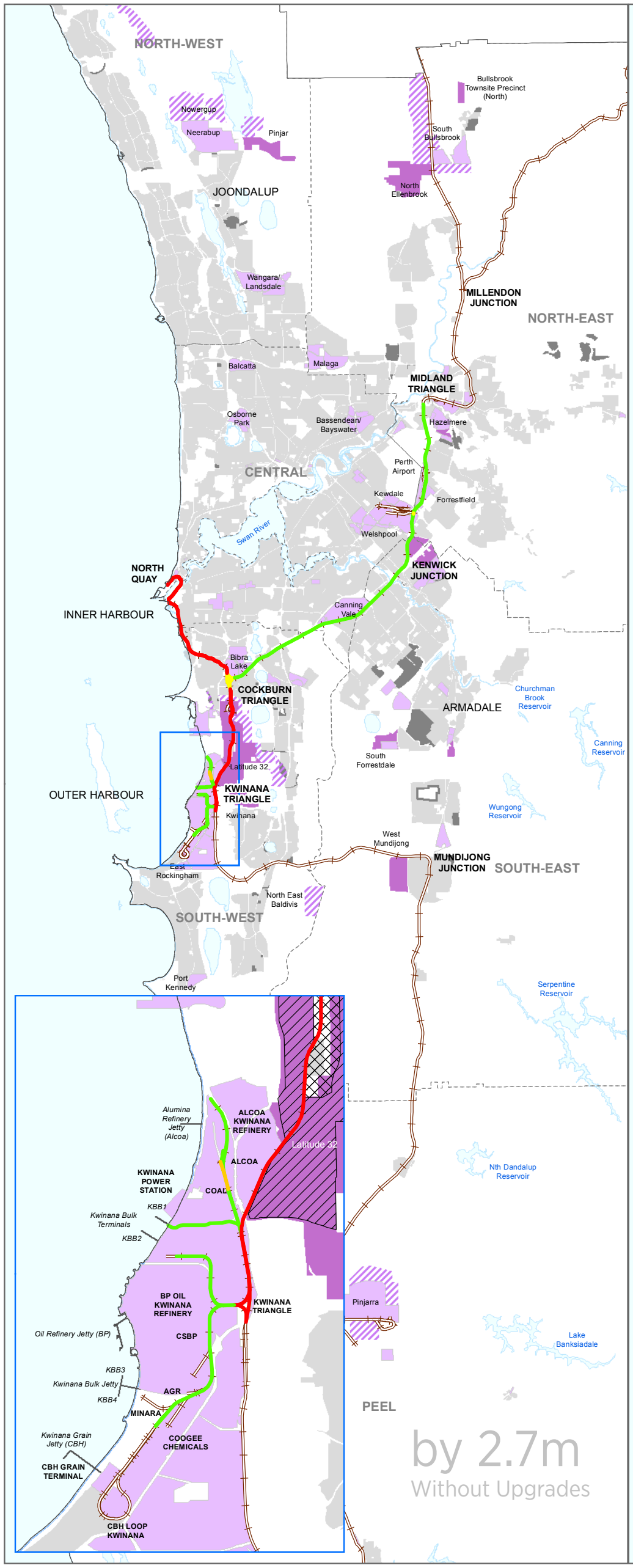
Metropolitan Rail Freight Network Constraints and Capacity Utilisation



Current

MAP 2

Metropolitan Rail Freight Network Capacity Utilisation with and without Upgrades



0 5 10
Kilometres

capacity utilisation
- 80 - 100%
- 70 - 79%
- 60 - 69%
- < 60%

grade separation priorities
- recently constructed (1 crossing)
- immediate priority (1 crossing)
- future priorities (3 crossings)
- level crossing removed by future planned works (3 crossings)

- freight rail network*
- perth and peel metro boundary
- sub-region boundary

*not subject to detailed investigation

- existing urban (MRS / PRS, 2016)
- urban deferred (MRS / PRS, 2016)
- latitude 32 intermodal logistics centre
- latitude 32 master plan

- existing industrial area (MRS / PRS, 2016)
- industrial investigation (Perth & Peel @ 3.5 Million)
- industrial - expansion (Perth & Peel @ 3.5 Million)

PRIORITY 3

Five Priorities for Action

1. A Generational Step-Up in Metropolitan Port Capacity
2. Moving More of Perth's Freight Task by Rail
3. **Expanding the Metropolitan Intermodal Terminal System**
4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy
5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Image courtesy of Intermodal Group

PRIORITY 3

Expanding the Metropolitan Intermodal Terminal System

Increasing the capacity, geographic reach and viability of Perth's intermodal terminals

Highlights

The Perth Freight Transport Network Plan brings together transport and land use solutions to reshape freight movements on the metropolitan transport network by facilitating the development of intermodal freight terminals in the central, south-west and north-east areas of Perth.

Planning work has started for a metropolitan intermodal freight terminal network. When fully developed this will comprise:

- A network of efficient road and rail links connecting the intermodal terminal network to both the existing container port at Fremantle and future container and general cargo port facilities in the Outer Harbour
- A series of high-capacity intermodal terminals located in the Kewdale and Forrestfield areas servicing the interstate and international rail freight markets including a new terminal at Kewdale Terminal Two (T2)
- New container and general cargo port facilities in the Outer Harbour (Cockburn Sound), integrated with a new major intermodal logistics centre at Latitude 32 Industry Zone servicing the State's freight and logistics industry
- A major intermodal terminal at South Bullsbrook to service Perth's north-east and north-west areas

Key Supporting Actions

Making Best Use of Perth's Existing Intermodal Terminal Network and Associated Industrial Lands

- Continue to support the expansion of the existing port shuttle operation at the Forrestfield Intermodal Terminal including giving priority to proposals for freight and logistics developments on adjacent State Government-owned land under long term capital leasing arrangements
- Expand Perth's intermodal terminal network by facilitating development of a new open-access intermodal terminal facility at Kewdale Terminal Two (T2) to serve as a central hub for international container trade

Establishing Latitude 32 Industry Zone's Strategic Relationship with the new Container Port Facilities in the Outer Harbour in Cockburn Sound

- An integrated planning program to develop a major intermodal logistics centre at Latitude 32 to serve the future container port facilities and the State's freight and logistics industry
- Integration of container storage and management functions to optimise the container supply chain to carry empty as well as full containers to and from port terminals

Progress Planning for a Major Intermodal Terminal Facility in the North-East

- Plan and secure land for a new intermodal terminal at South Bullsbrook to serve as the northern freight hub of the metropolitan intermodal terminal network and shift truck trips away from both Perth's existing and future container port facilities

The Importance of Perth's Intermodal Terminal Precincts

While Perth has an extensive transport network for moving people, it has a relatively concentrated network for moving freight with a strategic number of freight corridors and epicentres supporting the majority of Perth's heavy freight movements.

Perth's freight epicentres include the industrial precincts of Kewdale, Forrestfield, Welshpool and Hazelmere and the port precincts of Fremantle and the Kwinana Industrial Area. Most of these precincts, together with the transport, warehousing and logistics sector that embeds itself within them, are serviced by intermodal terminals which help to foster the agglomeration of economic activity and business synergies in the area.

An intermodal terminal is a facility where freight transfers from one mode of transport to another, for example between road and rail. Intermodal terminals play an important role in facilitating the efficient transport, storage and distribution of freight by concentrating heavy freight activity in comparatively small but intensive areas. Intermodal terminals also represent major gateways to the rail network which allow businesses to move freight by rail for distances and in quantities appropriate to their operational and commercial priorities. They are therefore essential if rail is to increase its role in the metropolitan freight transport and distribution system.

Given the road congestion pressures already evident in the metropolitan area, the Government of Western Australia recognises that continuing with current freight distribution patterns indefinitely into the future is unsustainable, and is committed to working in partnership with the freight industry to achieve a more suitable and efficient pattern of metropolitan freight flows.

A key initiative of the Perth Freight Transport Network Plan is to reshape freight movements on the broader metropolitan transport network by facilitating the development of a small number of large intermodal freight terminals which will support the efficient location of freight and logistics activities, and, over time, shift more freight onto rail to reduce both the number and length of truck trips on the road network. Initiatives will focus on the most substantial intermodal rail markets associated with the metropolitan area. These markets include interstate, mainly inter-capital non-bulk rail freight which operates over long distances, and international, mainly container imports and exports which operate over short distances to and from the port of Fremantle.

Image courtesy of LandCorp

Market Outlook - Intermodal Growth Areas

Interstate Containers

The interstate rail market handles around half of Western Australia's inbound general freight volumes.

These volumes mostly originate from Sydney and Melbourne and include a range of consumer and industrial products mainly destined for the Perth metropolitan area. Volumes also originate from Perth and are transferred to the east coast.

According to sources, including the Bureau of Infrastructure Transport and Regional Economics, interstate rail freight is likely to grow at around 3 per cent per annum into the foreseeable future. This will see the interstate rail freight task increase from around 760,000 TEUs per annum (5.8 million tonnes) to 1.2 million TEUs per annum (9 million tonnes) by 2031 and 1.8 million TEUs per annum (14 million tonnes) by 2051.

This substantial, near threefold increase in demand, will provide a strong base for the future development of Perth's interstate intermodal terminal network.

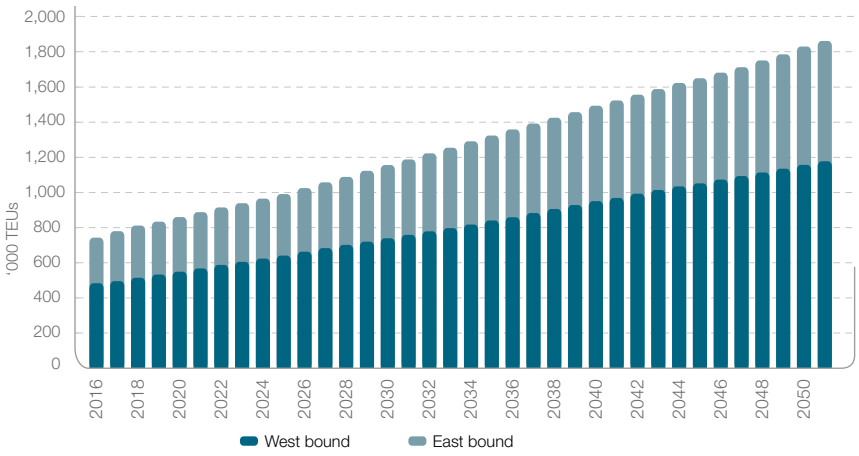


Figure 7: Forecast interstate rail freight volumes (Source: Department of Transport)

International Containers

Most of the remainder of Western Australia's inbound general freight volumes are handled by the port of Fremantle.

The international freight task is likely to increase from around 740,000 TEUs per annum to 1.25 million TEUs per annum by 2031 and 2.2 million TEUs per annum by 2051 – a substantial more than threefold increase in demand.

The two markets are therefore currently similar in trade volume. However, given the high rate of international container growth relative to the interstate market, international freight volumes are forecast to outstrip interstate volumes in the longer term. The scale of expected growth will provide a substantial potential market for the future development of Perth's international intermodal terminal network.

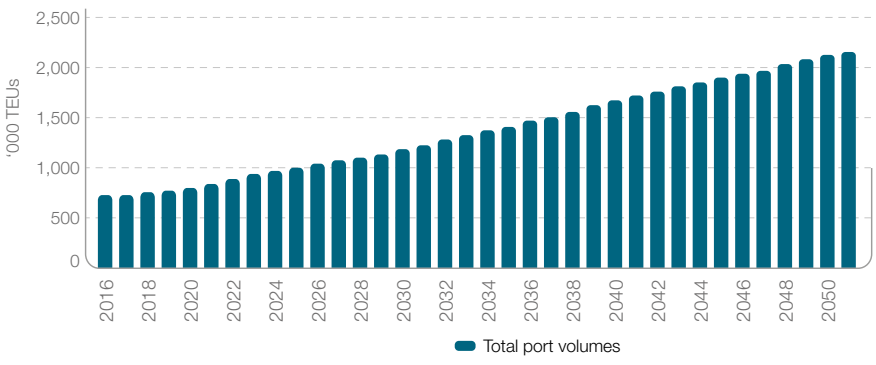


Figure 8: Forecast international container volumes (Source: Fremantle Port Authotity)

Perth's Intermodal Terminal Strategy

A Strategic Approach to Creating a Metropolitan Intermodal Terminal System

The zoning, size and availability of industrial land, and its location relative to freight transport corridors and other freight centres, is a key generator of freight transport demand. A critical focus of the Perth Freight Transport Network Plan is to ensure that existing and future industrial centres are well serviced by transport infrastructure, and where appropriate, intermodal facilities, to enable freight to be transferred between transport modes and allow rail to be used to best effect.

Industrial land supply will be met through the consolidation of existing industrial centres, the extension to existing centres and the creation of new priority centres.

While the freight activity likely to occur at these centres will be significant, not all centres will be suitable locations for intermodal terminals. It is important that terminals are located near the business markets they will serve and are linked to high-capacity, high-productivity road and rail routes. The number of locations suitable for intermodal terminals will therefore continue to be limited and the Government will take a proactive approach to reserve these valuable lands to service the future freight task.

The increasing performance and efficiency required of the State's logistics system precludes reliance on an expanded network of smaller terminals. While there is a place for small, local terminals,

these cannot provide the operating efficiencies and the co-location benefits for the related business facilities and linkages offered by major terminals.

Strategic alliances and consolidation along supply chains over the last decade have resulted in a number of vertically integrated third party transport and logistics companies playing an increasing role in freight and logistics infrastructure. Major changes within the sector, including advances in e-commerce technology and road freight vehicle performance, will continue to evolve. These trends will further concentrate freight capacity and capability at certain strategic freight activity centres across Perth to optimise freight logistics and to improve provision of products and services to the broader community.

The economies of scale essential for the commercial viability of the transport and logistics sector require Government to form integrated industrial land use and transport planning frameworks that allow for the development of a relatively small number of large intermodal terminals rather than a large number of small terminals distributed across the metropolitan area. This commercially-focused approach will bring about a number of net benefits to the State. Large sites ultimately represent a better proposition for land use planning because less overall land is required compared to multiple smaller sites offering the same overall capacity, and given the economies of scale for their operation, are also less likely to require financial support from Government.

A key issue for the Government is the location of additional intermodal capacity in Perth – whether development priorities should continue to be focused in the metropolitan central area or elsewhere. While the Kewdale and Forrestfield precincts have the advantage of existing infrastructure, there are strategic reasons for development priorities to also focus, longer term, on a select number of new large intermodal terminals away from this dominant precinct. This should be towards both the metropolitan south-west and north-east areas where strong freight growth and major greenfield infrastructure development is expected.

Refer to Map 3 for additional information.

Policy Context

Intermodal terminals need to be considered in the context of specific supply chains, port locations and road and rail networks. The Perth Freight Transport Network Plan acknowledges that it is not the role of the Government to operate commercial intermodal terminal businesses. These roles are more appropriately undertaken by the private sector. Intermodal terminals inherently incorporate a transfer cost. To be viable, they must produce other benefits and cost reductions in other parts of the logistics chain. If these benefits are too low or cannot be transferred to offset the cost, investment in an intermodal terminal cannot be justified commercially.

The role of the Government is to establish appropriate policy settings and create the right governance and regulatory environment to ensure effective, co-ordinated development of the network as a whole and enable the private sector to invest with confidence. Where a proposed terminal has a strong value proposition, location planning, terminal concept planning, land use zoning and planning overlays are important activities for the Government to undertake. The Government also has a role in identifying, planning, and where appropriate, undertaking complementary upgrades to road networks.

Image courtesy of Intermodal Group

Image courtesy of Intermodal Group

Metropolitan Intermodal Terminal Capacity by 2.7m

Making Best Use of Perth's Existing Interstate Intermodal Terminal Network

The Kewdale, Forrestfield, Welshpool and Hazelmere areas are among the State's most important transport interchanges where road, rail and air services meet to facilitate the movement of people and goods that are essential to the economy.

The Kewdale and Forrestfield areas are home to a number of intermodal terminals, as well as numerous other businesses which rely on freight and logistics services. These terminals handle thousands of interstate and international containers every day along with bulk exports from the regions. The terminals have a number of competitive advantages with effective links to dedicated freight rail lines, including the interstate mainline, and to major freight roads. These roads include the Roe, Tonkin and Leach Highways. The substantial State and Commonwealth investment as part of the Gateway WA Perth Airport and Freight Access Project will ensure efficient access to these major freight facilities by grade separating a number of busy intersections.

Previous investigations indicate that the existing Kewdale and Forrestfield intermodal facilities will continue to do much of the "heavy lifting" in terms of moving Perth's future interstate freight task and that there is adequate combined capacity at these facilities to service the interstate market well beyond the next two decades.

Accordingly, a key objective of the Perth Freight Transport Network Plan is to focus the State's freight planning, policy and infrastructure investments on supporting the development of the Kewdale and Forrestfield areas, and other significant areas of industrial land nearby, including Welshpool and Hazelmere, to ensure the robustness of the overall intermodal transport system.

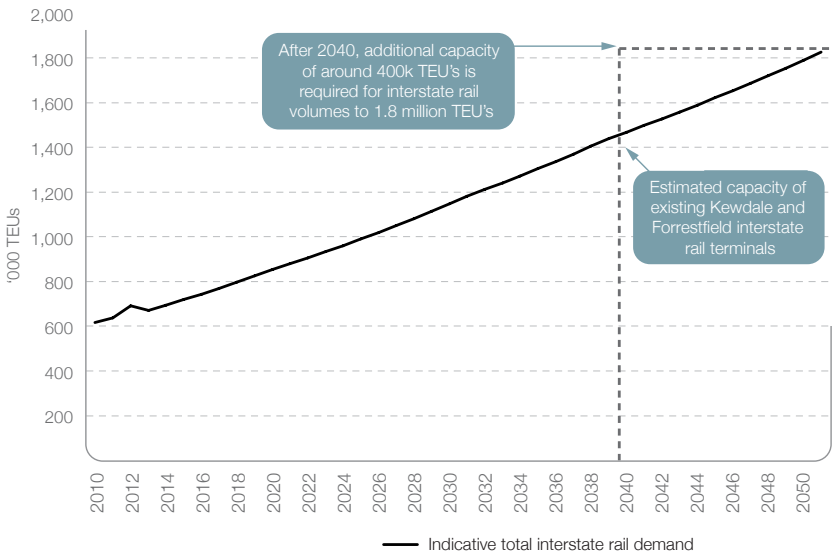


Figure 9: Estimated capacity of major existing interstate Intermodal terminals (Source: Department of Transport)

Taking Action to Expand Perth's International Intermodal Terminal Network

Kewdale and Forrestfield Precincts

While substantial latent capacity exists among the major terminals servicing the interstate rail market, recent investigations indicate that there is an emerging need for additional terminal capacity to service the international market.

There is currently only one intermodal terminal servicing the international container market in the metropolitan area. The Forrestfield Intermodal Terminal has established itself as an important part of the Government's strategy to move increasing volumes of freight by rail. The site is, however, relatively small at around 6 hectares. With limited on-site options available for expansion, the provision of additional capacity is an imperative for the terminal operator.

The Western Australian Government is committed to working in partnership with industry to develop a metropolitan intermodal system with the capacity required to increase the share of containers transported by rail. It will continue to work with terminal operators to support the expansion of the Forrestfield site to help meet this policy objective including giving priority to proposals for freight and logistics developments on adjacent State Government-owned land under long term capital leasing arrangements.

Ultimately however the expansion of the existing site will not, by itself, negate the need for an additional metropolitan intermodal facility to service the growing international container market.

There is an emerging need for a new, large, development-ready site to provide the substantial increase in capacity required to service the international container task.

At this time, there is an appropriate brownfield site in the Kewdale area which is readily available and owned by the State's Public Transport Authority. At 25 hectares, the Kewdale Terminal Two site is relatively large and will allow for a 300,000 TEUs per annum development. The site is adjacent to the existing freight rail line with direct access possible in a way that avoids shunting complexity. The site also has good connections to heavy vehicle access routes in the area, which support trucks with a mass exceeding 90 tonnes.

As trade grows through the port of Fremantle the need to improve the integration of the port with the existing and future intermodal terminal network has become increasingly evident, particularly in order to achieve infrastructure and land use development efficiencies.

The Department of Transport, in conjunction with the Public Transport Authority and other stakeholders, will facilitate development of an open-access intermodal terminal facility at Kewdale Terminal Two.

Private companies are likely to play a significant role in key infrastructure within the proposed Kewdale Terminal Two intermodal facility and this will require decisions in relation to both the funding and staging of the terminal capacity and its related rail sidings.

When the existing Forrestfield intermodal terminal and the proposed Kewdale Terminal Two intermodal terminal are fully developed, it is envisaged that the supply of terminal capacity will support the Government's rail objectives over the coming decades.

Establishing Latitude 32 Industry Zone's Strategic Relationship with Perth's Future Container Port Facilities in the Outer Harbour

Context

In the longer term, industrial land and port infrastructure of strategic importance to the State will develop in the south-west metropolitan area. A strategic opportunity exists to ensure the long term competitiveness of the international container supply chain by synchronising the planning of the new container port facilities in the Outer Harbour with industrial land development at Latitude 32 Industry Zone. This will release synergistic land uses that will be increasingly important within the metropolitan area where land for freight and logistics purposes is limited.

The container logistics model and transport linkages operating between the new container port facilities and the Latitude 32 Industry Zone will have a profound impact on the entire transport network. The Department of Transport will lead related investigations as an integrated planning program, given their interdependencies and far-reaching impacts on the overall network, and define reservations for preferred freight transport corridors and any freight facility sites in the Metropolitan Region Scheme.

Given the greenfield nature of the industrial land and port infrastructure, the integrated planning program will be unencumbered by the legacy infrastructure constraints and land shortages facing many metropolitan container ports.

Image courtesy of LandCorp

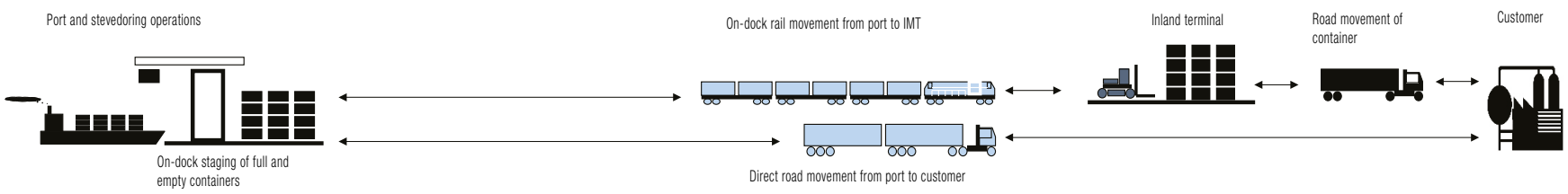
Potential Outer Harbour Container Logistics Models

In the future, freight growth and the overall trend towards larger ships will translate into larger cargo transfers per ship visit and thus a significant increase in peak periods of high intensity landside transport operations. This will underpin the need for large lay-down areas for container handling, staging and distribution. A key issue to address in relation to the various logistics models that may operate between the future container port facilities and Latitude 32 Industry Zone is whether the development of large lay-down areas for container handling, staging and distribution should be at the container port facilities or at the nearby Latitude 32 Industry Zone.

There is a general trend among ports, both nationally and internationally, to simultaneously increase value for their customers and overcome capacity constraints by playing an increasing role in the development and management of inland container logistics facilities and services. At some ports, where there are no significant constraints, development is possible within the port environs. At other ports, where there are constraints, development is not possible within the port environs and either occurs away from the port or through land reclamation.

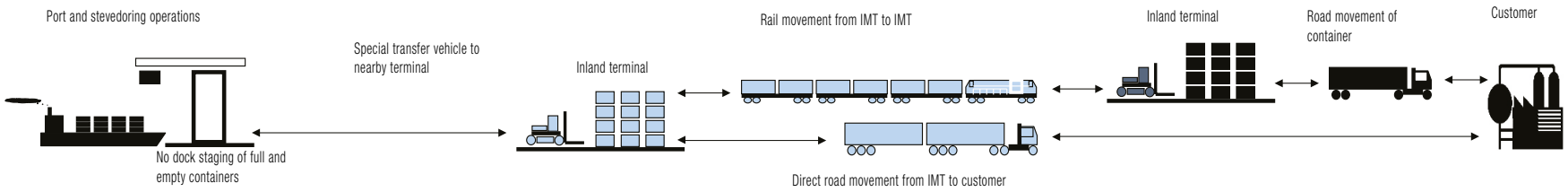
Generally, there are three distinct, but not mutually exclusive, development models for port logistics systems that inform port planning throughout the world:

Model 1



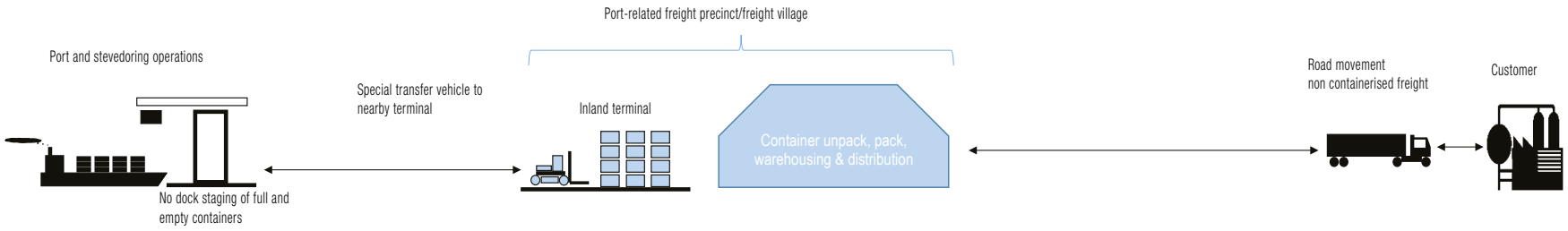
- In the first model, the port terminal areas are the primary place of activity for landside container logistics. There are large areas for storage behind the port's berths, which are used as a staging and interchange points, and rail loading facilities are contiguous with the port's terminals. On-dock rail moves containers to and from remote intermodal terminal facilities or major port customers.

Model 2



- In the second model, the primary place of activity for landside container logistics is an off-dock intermodal terminal, physically separated from the port terminals, but within close proximity and connected via dedicated transport linkages. Often the intermodal terminal is used as an interchange and staging area for transferring containers between the port and its customers or potentially other remote intermodal terminals. A number of variations are possible within this model dependent on the available dock space, degree of direct dock access and the types of freight transport technologies deployed.

Model 3



- In the third model, which can operate in parallel with the second model, the intermodal terminal is an integral part of an extensive transport and logistics centre. This integrated industrial development can be either within or near the port precinct. This model has a broader focus on cargo consolidation and de-consolidation and empty container management, whereas the other models focus mainly on the movement of full containers.

Metropolitan Land Requirements for Empty Container Management

The logistics associated with managing empty containers has a substantial influence on the international container supply chain, including the mode shares for road and rail transport serving port terminals, and the overall viability of intermodal terminals.

Currently, every container imported into the metropolitan area becomes an empty container before about half of these are reloaded and shipped overseas as full export containers. Those containers not used for export remain empty and are also shipped overseas. A significant proportion of this repositioning exercise occurs by road transport and is a contributing factor to road congestion, particularly around port terminals.

As the international container task grows, so too will the cumulative metropolitan land footprint required to accommodate the inventory of empty containers. Previous investigations indicate that the land required for empty container storage requirements will be at least 40-60 hectares by around 2050.

Given the scale of land required there is a need to integrate empty container storage and management functions into the future intermodal terminal network. This approach will reduce road congestion by enabling freight trains to carry large volumes of empty as well as full containers to and from port terminals.

For Government to provide adequate scope for the infrastructure required to cater for future international trade through the container port facilities, this imperative will need to be reflected in planning considerations for the Latitude 32 Industry Zone and other Intermodal Terminals.

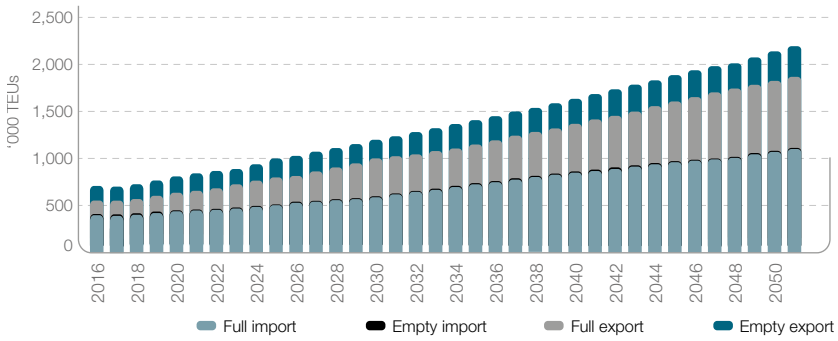


Figure 10: Forecast international container volumes including empty containers (Source: Fremantle Port Authority)

Metropolitan Intermodal Terminal Capacity by 3.5m

Latitude 32 Intermodal Terminal Development

There have been a number of investigations over the last few years regarding the market, function and scale of an intermodal facility within the Latitude 32 Industry Zone. Initial investigations considered the merits of a large container management facility supporting the future port, surrounded by a freight transport and logistics centre, while later investigations considered an intermodal terminal servicing either the international or interstate container market.

Planning for an integrated development that combines some or even all of these options would be prudent given the scale of Perth's freight task and the expansive industrial development occurring within the Latitude 32 Industry Zone. It is, however, most likely that the intermodal terminal facility at Latitude 32 would focus mainly on the international container market.

Optimal investment and the use of the Latitude 32 Industry Zone asset will depend on certainty and clarity of purpose for port growth plans, trade projections and the use of port lands. A clear view of the port facilities' landside logistics model and the associated governance arrangements linking the new container port facilities and a proposed intermodal terminal facility will need to precede and guide the overall design and functionality of the facility. This will take into account the opportunity for synergistic relationships to form with other rail terminals and marshalling yards in the area.

In the meantime, the State's planning agencies and authorities will continue to recognise the strategic value of the site by using the statutory planning system and appropriate land use zonings within the Metropolitan Region Scheme to protect and acquire the land and thereby preserve the opportunity for the development.

Latitude 32 Intermodal Logistics Centre

In Europe, in particular, it is common to use intermodal terminals as a focal point for the development of a cluster of transport and logistics related activities. At its most sophisticated, this integrated multi-functional approach creates what has become known as an intermodal logistics centre or a freight village. Intermodal terminals across Australia are also increasingly seeking to include value-added services, either within the terminal or nearby. Some examples of these services include freight consolidation and de-consolidation, warehousing and cross-dock operations, container storage and servicing, quarantine inspection and customs clearance, together with other services such as the servicing of rolling stock.

To this end, the Department of Transport is actively undertaking planning to define and reserve land within the Latitude 32 Industry Zone to allow scope for an integrated intermodal terminal and logistics centre.

This assessment will consider the needs of potential tenants and the opportunity to develop synergies with major port customers including both bulk and container importers and exporters, as well as other rail terminals and marshalling yards in the area.

A land footprint of 170+ hectares would allow scope for an integrated intermodal terminal and logistics centre as well as container management activities.

A Strategic Intermodal Terminal Facility in Perth's North-East

Context

Perth's future freight growth is, to a significant extent, aligned with the fortunes of the city's hinterlands, and in particular the growth of the resources sector in regional Western Australia. This sector, while largely outside the metropolitan area, often has distribution networks for major import and export supply chains located within the city.

Trends in logistics management, particularly just-in-time replenishment systems, will continue to accelerate the flow of goods in production and distribution processes to supply the resources sector more quickly and reduce the value of freight in inventory. In general, this will result in large integrated warehouse distribution points located at the less-costly urban fringe, increased adoption of intermodal transport solutions to minimise product handling, and greater focus on transport service reliability.

As Western Australia's regional industries grow, the Western Australian Government, through the Department of Transport, will plan for an intermodal facility in the rapidly developing metropolitan north-east area to ensure that the transport and logistics requirements of the resources sector in the North West of the State are met without placing excessive demands on the inner metropolitan road network.

A number of strategic plans have identified a location at South Bullsbrook as a site for a major intermodal terminal development in the longer term. The site is well situated near the existing freight rail line, the existing Great Northern Highway, other major local transport networks, and the new Perth Darwin National Highway.

Image courtesy of LandCorp

A drilling rig preparing blast holes in an open cut mine prior to blasting, Pilbara, Western Australia

South Bullsbrook – A Strategic Intermodal Terminal

The Department of Transport has undertaken preliminary work to investigate the strategic merit of an intermodal facility in the south Bullsbrook area, including determining the site's role as a solution for linking the city's north-east industrial areas to container port facilities in the Inner and Outer Harbours. This has led to the Western Australian Planning Commission endorsing a preferred site and supporting a Planning Control Area over the site.

The development of a new international intermodal terminal away from the Fremantle and Kwinana port precincts is a key component in the creation of the metropolitan intermodal terminal system, particularly given the shortage of future sites in the Kewdale and Forrestfield areas.

The Department of Transport is working with the State's planning agencies and Local Government to determine the optimal terminal land footprint and develop a terminal concept plan. Investigations to evaluate the need for upgraded rail links to the site will also be necessary, given that the terminal will lead to increased rail freight movements along the city's northern freight rail corridor.

For many port related freight movements, rail is unable to undertake a full end-to-end journey for the goods concerned. Intermodal terminals enable freight to be transferred between transport modes, to allow rail to be used to best effect to undertake the primary trunk journey, with other modes – usually road – providing the final pick-up and delivery legs of the journey.

Planning investigations will gauge the potential for strategic relationships between the South Bullsbrook site and other industrial lands within the greater area, including Pinjar, Neerabup and North Ellenbrook, which have the potential to act as collection and distribution points for the proposed intermodal terminal. The aim will be to group similar intermodal activities to help create viable freight volumes and achieve the benefits of agglomeration.

Main Roads WA will allow for the potential development of the South Bullsbrook site in its planning for the future road network and Restricted Access Vehicle regime in the area. The NorthLink WA project has provided a grade separated interchange with Stock Road to be the major gateway to the site.

Rail Connections at Industrial Lands in Perth's South-East

Mundijong

Planning reservations and controls put in place over time have provided an invaluable legacy of freight network capacity for Perth. Accordingly, a key objective of the Perth Freight Transport Network Plan is to ensure that scope for additional capacity options is preserved in the planning system to accommodate projected future growth.

Previous studies pointed to the south-east and, in particular, the Mundijong area as the potential location for an intermodal terminal. Recent investigations to establish the suitability of an intermodal facility at Mundijong indicate that for the foreseeable future the site is not likely to be viable as a large, general purpose, open access intermodal terminal.

An industrial area with direct rail access is more likely, particularly given Government's focus on the development of Latitude 32 Industry Zone, which is in the same general catchment area and has a number of competitive advantages over the Mundijong site. These types of rail freight interchanges are also important. The success and growth of rail freight and continued development of the traditional rail markets will require new or expanded interchange facilities if rail freight is to continue to be both attractive and efficient.

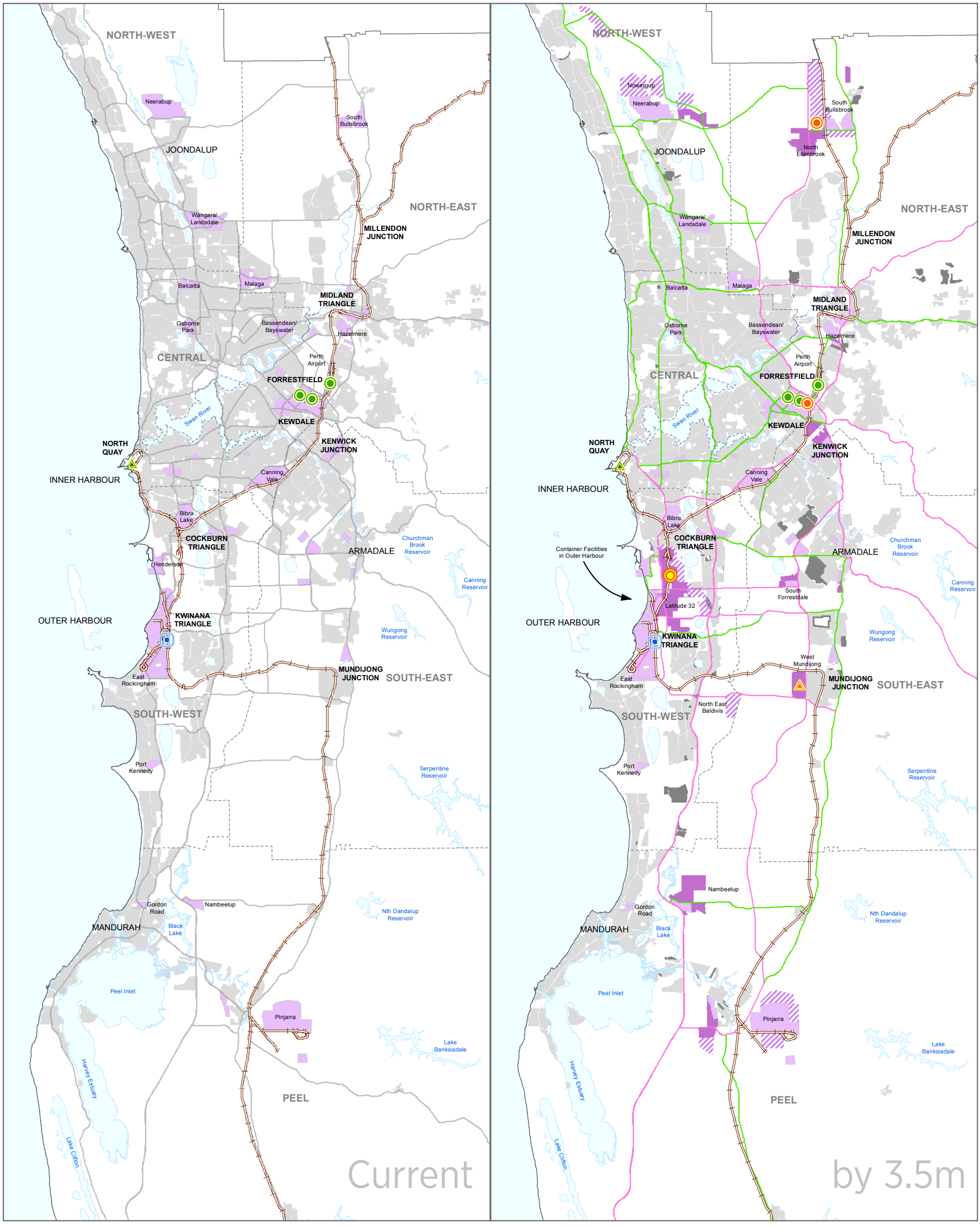
Whether or not Mundijong will develop as an intermodal terminal will ultimately be determined by the need and timing of a freight rail realignment in the area and the scope and nature of tenants attracted to the adjacent industrial precinct. Co-location of major production or processing facilities can provide the necessary economies of scale to support sustainable rail terminal operations. One of the main advantages of co-location for a producer is the ability to load containers to the maximum weight permitted which is often beyond the weight limits allowed under the State and local road access regimes. These types of tenants may seek access to rail services at the future planned Mundijong industrial precinct.

The designation and subsequent reservation of rail reserves in growth areas is essential to enable integrated structure planning to occur. As growth area planning in Perth's south-east is proceeding now, the planning overlay required to ensure designation of a rail reserve is timely. The Western Australian Government, through the Western Australian Planning Commission, is anticipated to give priority to designating provision for rail access at the Mundijong site through a freight rail realignment away from the Mundijong Town Centre. The pre-requisite of this is the completion of an amendment to the Metropolitan Region Scheme.

Image courtesy of LandCorp

MAP 3

Metropolitan Intermodal Terminal Network



PRIORITY 4

Five Priorities for Action

1. A Generational Step-Up in Metropolitan Port Capacity
2. Moving More of Perth's Freight Task by Rail
3. Expanding the Metropolitan Intermodal Terminal System
4. **A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy**
5. Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Image courtesy of Main Roads Western Australia

PRIORITY 4

A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy

New and upgraded links to drive jobs, economic growth and build prosperity – road freight network development priorities

Highlights

The Perth Freight Transport Network Plan articulates Perth's principal road freight network development priorities over the next two decades and beyond. The principal road freight network is made up of existing and future roads that connect the city's industrial epicentres, including its ports, airports, intermodal rail freight terminals and major industrial lands. This network will do much of the 'heavy lifting' for Perth's freight task well into the future.

The Plan focuses the State's road freight planning, policy and infrastructure investments on this principal network, and prioritises its integration with Western Australia's regional road network, to ensure the robustness of the overall freight transport system. When fully developed it is envisaged that the network will comprise:

- Two new major north-south corridors in Perth's north-west and north-east areas – NorthLink WA and the Whiteman-Yanchep Highway, as well as substantially upgraded east-west routes – Flynn Drive, Neaves Road and Stock Road (South Bullsbrook)
- The recently completed Gateway WA project, the Perth Freight Link project and the upgrade and southern extension of Tonkin Highway to create a heavy vehicle outer bypass of the metropolitan area
- A number of new and upgraded links across Perth's south-west and inner south-east areas, including the extension and upgrade of Rowley Road; the upgrade of Mundijong Road; the upgrade of Anketell Road; a major grade separation program for Stock Road; the construction of the new Fremantle Tunnel and a new north-south link – the Fremantle Rockingham Controlled Access Highway. This will create a comprehensive road freight grid to service massive industrial land and port development along the city's south-west coastline within the Western Trade Coast area, including the future container port facilities in the Outer Harbour at Cockburn Sound

Much of the principal road freight network will be progressively upgraded to allow access by high productivity freight vehicles, subject to stringent safety and compliance conditions.

Key Supporting Actions

Immediate Infrastructure Investment Priorities – Perth Freight Link Project

The Perth Freight Link Project is an 85 kilometre strategic freight route between Fremantle port and Muchea and an essential component in the long term planning for integrated freight transport for Perth. The project is jointly funded by State and Commonwealth Governments and consists of the following projects:

Gateway WA Perth Airport and Freight Access Project (completed): Completion of the $1 billion Gateway WA project has created landmark road infrastructure around the Perth Airport and the freight and industrial hubs of Kewdale and Forrestfield.

Roe 8 Extension and Fremantle Tunnel: This project will provide a high standard connection from the Kewdale, Welshpool and Forrestfield industrial hubs to the port of Fremantle Inner Harbour, incorporating:

- A 5.2 kilometre four-lane dual carriageway extension of Roe Highway, from Kwinana Freeway to Stock Road
- Major improvements to Stock Road north of Roe Highway extension with a grade separated interchange at Winterfold Road.
- A new 3.3 kilometre twin 12 metre bore tunnel between Winterfold Road and High Street allowing for two lanes and shoulder in each direction

NorthLink WA (planning underway): This project, which will enhance freight efficiency between the metropolitan area and North West of Western Australia, consists of:

- The construction of a new 37 kilometre realignment of the Perth Darwin National Highway to create a high productivity link between the junction of Reid Highway and Tonkin Highway at Malaga, and the junction of Great Northern Highway and Brand Highway at Muchea
- Tonkin Highway grade separation program including new interchanges at:
  - Benara Road
  - Morley Drive
  - Collier Road

Infrastructure Investment Priorities by 2.7m

Western Trade Coast Road Development: Development of a high productivity freight road grid spanning the city's south-west and inner south-east to accommodate further growth within Perth's most important heavy industrial and manufacturing area, the Western Trade Coast, incorporating:

- Stock Road grade separation program to upgrade the primary connection between the existing container port at Fremantle, the future container port facilities in the Outer Harbour and Roe Highway Extension to freeway standard. New grade separations at:
  - Phoenix Road
  - Spearwood Avenue
  - Beeliar Drive
  - Russell Road

Tonkin Highway Improvements: Widening of Tonkin Highway to six lanes between Great Eastern Highway and Reid Highway to provide a high standard link between NorthLink WA and Gateway WA.

Development of Tonkin Highway to freeway standard to ultimately form the core component of a heavy vehicle outer bypass of Perth connected at its northern end to the new Perth Darwin National Highway and its southern end, with both Mundijong Road and South Western Highway, incorporating:

- Tonkin Highway grade separation program including new interchanges at:
  - Hale Road
  - Welshpool Road
  - Kelvin Road
  - Gosnells Road
  - Mills Road
  - Champion Drive
  - Ranford Road
  - Armadale Road
- Tonkin Highway extension with new four-lane dual carriageway between Thomas Road and Mundijong Road to South Western Highway

Fremantle Port Connect: Completion of the 'last mile' of the Perth Freight Link, extending from Canning Highway to the port of Fremantle Inner Harbour.

Full Freeway Standard for Roe and Reid Highways:

- Widen Roe Highway to six lanes between Kwinana Freeway and Tonkin Highway, together with grade separations, elevating this freight route to full freeway standard along its entire length
- Widen Reid Highway to four lanes between Mitchell Freeway and the Great Northern Highway with grade separations elevating this freight route to full freeway standard

Infrastructure Investment Priorities by 3.5m

Western Trade Coast Road Development: Development of a high productivity freight road grid spanning the city's south-west and inner south-east to accommodate further growth within Perth's most important heavy industrial and manufacturing area, the Western Trade Coast, incorporating:

- Construction of the new Fremantle Rockingham Controlled Access Highway, a north-south coastal corridor linking to Stock Road and Mundijong Road extension, to provide an alternative freight route and reduce demand on Kwinana Freeway
- Establishment of Rowley Road Transport Corridor as the principal access route for the Outer Harbour, including an 8 kilometre four-lane dual carriageway between the Kwinana Freeway, Latitude 32 Industry Zone and the coast (with provision for an adjacent freight rail alignment at the western end, linking Latitude 32 Industry Zone with the new port facilities)
- Widening of the existing section of Rowley Road, to a four-lane dual carriageway, east of Kwinana Freeway to Tonkin Highway
- Upgrading of Anketell and Mundijong Roads to four-lane dual carriageways

Whiteman-Yanchep Highway: A new transport corridor for the city's north-east and north-west areas incorporating a four-lane divided north-south road between the NorthLink WA project (south of Gnangara Road) and Yanchep to accommodate future traffic generated from urban development and to connect emerging industrial investigation and expansion areas

Defining a Principal Road Freight Network for Perth

While freight moves throughout Perth's road network, a substantial proportion of current and future metropolitan freight movements are concentrated on a relatively small number of major road corridors, creating, in effect, a principal road freight network for Perth.[2]

Through the Perth Freight Transport Network Plan, the Western Australian Government's transport agencies have identified the principal road freight network for Perth. This network is made up of the existing and future roads that connect Perth's industrial epicentres, including its ports, airports, intermodal freight rail terminals and major industrial lands.

This network will carry the majority of Perth's freight task in the short and long term.

The principal road freight network is that part of the larger transport network over which the movement of heavy freight will be supported and increasingly consolidated. This includes a general reduction in the number of key freight routes compared to those designated in previous urban planning strategies and land use planning policies, and a general expansion in freight activity on these key routes including an expansion in the size, length and weight of heavy vehicles operating on these routes.

The development of the principal road freight network will focus on increased heavy vehicle productivity, coordinated land use planning controls and, most visibly, investment to upgrade the capacity of the network to accommodate increased heavy freight movements.

Refer to Map 4 for additional information.

Network Definition Process

Road Ownership and Responsibility

Road planning authorities over the years have adopted road hierarchies to guide orderly road development planning and define responsibilities for road asset ownership, management and funding.

Perth has evolved around a growing demand for road transport. Most of this demand has proceeded as intended by the city's various urban planning schemes, spatial frameworks and road hierarchies, but some freight demands and requirements will fall outside these frameworks in the future.

The principal road freight network has been defined on guiding principles that are independent of prevailing road hierarchies and classifications. It therefore represents a jurisdiction-neutral view of key freight roads for the long term.

Roads will be divided into a two-tiered classification system comprising strategic freight roads and major freight roads with strategic freight roads satisfying a higher number of criteria relative to major freight roads. The majority of these roads are generally declared State highways and main roads which cater for high-productivity freight vehicles, although several roads included are currently the responsibility of local government.

The need for change to road hierarchies associated with the principal road freight network will evolve over time, in line with freight demand. It will be considered as part of the ongoing implementation of the Perth Freight Transport Network Plan and be subject to the Main Roads WA road classification assessment process.

Network Inclusion Criteria

Criteria for inclusion of routes in the principal road freight network include:

- Significant existing and forecast volumes of freight relative to other transport routes
- Designation as an existing or future heavy vehicle route operating under the Restricted Access Vehicle regime
- Strategic functionality within the overall network – for example, contribution to connectivity between ports, intermodal terminals and other major freight origins and destinations
- Overall suitability of the road infrastructure to support both existing and forecast freight volumes
- Existing or potential future routes recognised under the National Land Transport Network

[2] *It should be noted that while the majority of road freight movements in the future will be on the principal road freight network, and is therefore the focus of this Plan, freight vehicles will continue to travel throughout Perth's entire road network. The demand on these roads, although lower in comparison to demand on the principal road freight network, can be significant and will continue to grow in the future as Perth's population and economic activity increases.*

Image courtesy of Main Roads Western Australia

Perth's North-West and North-East Sub-Regions

The principal road freight network development priorities for Perth's north-west and north-east areas include the construction of two new major north-south corridors and substantial upgrades to east-west routes - Flynn Drive, Neaves Road and Stock Road (South Bullsbrook).

The NorthLink WA project, which is already undergoing project planning and development, will transform access between the metropolitan area and the North West of the State. It comprises a new highway link between the junction of Reid Highway and Tonkin Highway and the junction of Great Northern Highway and Brand Highway to divert north-south heavy vehicle traffic from the Swan Valley wine growing and tourism area. The NorthLink WA project will be the main metropolitan component of a wider series of improvements to Perth Darwin National Highway. The second key component of the project is a series of grade separations on Tonkin Highway, which, together with the proposed upgrade of Tonkin Highway to six lanes between Great Eastern Highway and Reid Highway, will provide the crucial link between the Gateway WA precinct and Perth Darwin National Highway.

Mitchell Freeway is being extended from Burns Beach Road to Hester Avenue in the short term. The Freeway will be widened to six lanes between Hepburn Avenue and Burns Beach Road and extended further north from Hester Avenue to Alkimos Drive. This investment focus will reduce traffic on parallel routes including the northern sections of Marmion Avenue and Wanneroo Road.

By 3.5m the construction of the new Whiteman-Yanchep Highway is proposed to provide an additional commuter and freight route, and connect emerging economic and employment estates at Neerabup Industrial Area and future estates at Nowergup and Pinjar.

Flynn Drive will be extended east to Neaves Road and west to Mitchell Freeway to improve connectivity between these roads and nearby industrial lands. The construction of this missing link will complete an important east-west freight corridor that will help to reduce the number of heavy vehicles travelling on the area's local roads. By 3.5m a major upgrade of Stock Road (South Bullsbrook) will connect two freight roads – Perth Darwin National Highway and Great Northern Highway – as well as improve access to existing industrial lands at South Bullsbrook and future industrial lands at North Ellenbrook. This upgraded road will perform an important freight role given the likely development of a new major intermodal terminal in the area in the future.

Perth's Central Sub-Region

The principal road freight network development priorities for Perth's central area include the recent completion of the Gateway WA project, planning, development and construction of the Perth Freight Link project, and upgrade and southern extension of Tonkin Highway to create an outer bypass of the city.

The Gateway WA project, involved the widening of Tonkin Highway to six lanes between Great Eastern and Roe Highways, upgrading Leach Highway to expressway standard between Orrong Road and the Perth airport, and a major program of new bridges and interchanges in the area.

Within the general Gateway area, Abernethy, Kewdale, Orrong and Welshpool Roads are key links in the principal freight network. These roads play a vital role in distributing freight from the Kewdale and Forrestfield intermodal terminals which are among the State's most important supply nodes. These roads will continue to serve an important freight function given that existing interstate intermodal terminals will substantially expand their operations and new international intermodal terminals are likely to develop in the area. Upgrades to provide additional capacity will be undertaken on Abernethy, Kewdale and Orrong Roads to accommodate this growth.

The Roe Highway will be extended west to Stock Road as part of Perth Freight Link - a transformational port access project. Together with Gateway WA, the Perth Freight Link project will provide the city's principal freight corridor between the major industrial lands at Kewdale, Forrestfield and Welshpool and both the existing port at Fremantle and the future container and general cargo port facilities in the Outer Harbour.

Ultimately the delivery of Gateway WA, NorthLink WA and Perth Freight Link will form a freight corridor, suitable for high productivity vehicles, that stretches from Fremantle to Muchea. This corridor will generate significant efficiency benefits for the freight transport and logistics industry with the majority expected to be derived from travel time savings, vehicle operating cost savings and improvements in travel time reliability as a result of access to a completed, less congested freeway network.

Image courtesy of LandCorp

Image courtesy of LandCorp

By 2.7m Tonkin Highway will be upgraded via a grade separation program between Hale and Armadale Roads. The Highway will be extended south from Thomas Road to South Western Highway at Mundijong Road. These major investments will enable Tonkin Highway to ultimately form the core component of a heavy vehicle outer bypass of the city connected at its northern end with the new Perth Darwin National Highway and at its southern end with both Mundijong Road and the South Western Highway. This outer bypass will be further enhanced by road widening and grade separations on Reid Highway between Tonkin Highway and Roe Highway. These upgrades will improve traffic flows and road safety on this route.

Perth's South-East and South-West Sub-Regions to Peel

The scale and scope of industrial land and port development along the city's south-west coastline will have a profound influence on the broader metropolitan road freight network in the future. These developments will underpin the need for new and upgraded links across the south-west and inner south-east areas, including the extension and upgrade of Rowley Road and the upgrade of Mundijong Road. Much of this road development will proceed in line with the construction of future container port facilities and the area's industrial land development timelines.

Stock Road will undergo a major grade separation program to upgrade the majority of this road to freeway standard. Stock Road will also be extended north via the proposed Stock Road River Crossing to connect with the Mitchell Freeway and the north west corridor.

The construction of the Fremantle Rockingham Controlled Access Highway and Fremantle Tunnel is also proposed and these routes will be classified as strategic freight roads. Together, these routes will ultimately form an alternative north-south coastal corridor connecting the existing container port at Fremantle, the container port facilities in the Outer Harbour and the Roe Highway Extension. This new freeway standard corridor will provide heavy vehicles with an alternative to Kwinana Freeway which will undergo staged upgrading to six lanes between Roe Highway and Safety Bay Road.

The Rowley Road extension will be the principal access route for the container port facilities in the Outer Harbour and therefore an integral part of the Western Australian Government's vision for the development of the metropolitan freight transport network. Accordingly, Rowley Road will be classified as a strategic freight road and, with Stock Road, will form part of Western Australia's proposed future National Land Transport Network.

Mundijong Road and Anketell Road will also be classified as strategic freight roads. These roads, along with Rowley and Stock Roads and the proposed Fremantle Rockingham Controlled Access Highway, will provide a high-standard and comprehensive freight road grid supporting the container port facilities in the Outer Harbour as well as a cluster of some of Western Australia's most important heavy industrial assets located within the Western Trade Coast - a swathe of coastal land between Munster and Rockingham. These comprise the Rockingham Industry Zone, Australian Marine Complex, Latitude 32 Industry Zone and Kwinana Industrial Area. Within this area, Cockburn and Patterson Roads will continue to be important internal freight circulation roads.

Additional Upgrades across the Network

There will be other upgrades undertaken across the network on a number of major freight roads, including West Coast Highway, Nicholson Road, Lakes Road and Reid Highway (west of Tonkin Highway). These projects are significant as they will ensure an appropriate level of service is maintained on roads which provide strategic redundancy and flexibility within the overall network via secondary freight routes.

Shaping the Economy - Optimising Network Productivity

Larger, Safer, More Efficient Heavy Vehicles

The metropolitan footprint now stretches 150 kilometres from Mandurah in the south to Yanchep in the north, making Perth, in area, one of the largest cities in the world. The distance between Perth's coastline and its eastern fringe, however, is only around 25 kilometres. Perth's elongated shape means that freight will continue to be transported long distances. Maintaining network efficiency, in terms of delivering goods on time and at a reasonable cost, will therefore be of paramount importance.

This efficiency imperative, together with the increase in Perth's freight task, will necessitate the introduction of larger vehicle combinations – known generically as high productivity freight vehicles – for selected high-standard links on the principal freight network.

Larger vehicles offer transport operators the opportunity to achieve cost reductions by reducing the total number of trips required to transport freight. They also benefit other road users by reducing the number of vehicles on the network, improving road safety and reducing emissions per unit of freight moved.

The Western Australian Government, through Main Roads WA, will extend access to high productivity freight vehicles in a manner, and at a pace, that guarantees the highest safety standards and retains public confidence.

This will include the continued review of policies relating to the location, condition and configuration of major heavy vehicle assembly areas, recognising the important role these facilities have in supporting the development of the freight network and improving connectivity and safety of heavy vehicle operations both within the metropolitan area and between metropolitan and regional Western Australia.

Creating an Access Regime that Drives Productivity

In earlier stages, it is expected that freight demand will be mainly supported by existing approved heavy vehicle configurations allowed under the prevailing access regime. Over time, however, economic and population growth will create increased demand for heavy vehicle transportation and require longer, larger trucks to operate on the network.

Increases in the level of network access will mainly involve upgrading a select number of Perth's Restricted Access Vehicle (RAV) routes, RAV 4 to RAV 7. RAV 4 vehicles form an overall length of up to 27.5 metres and can carry three twenty-foot containers, or equivalent, whereas RAV 7 vehicles form an overall length of up to 36.5 metres and can carry four twenty-foot containers, or equivalent. This increase in payload per-vehicle of up to one additional twenty-foot container is an important way to mitigate congestion by reducing the number of trucks on designated routes, as well as emissions and transport costs.

In the city's north-east, the new Perth Darwin National Highway will be built to accommodate RAV 7 vehicles to ensure optimum productivity of heavy vehicles travelling to the North West of the State. A new road train assembly area is being planned at Muchea, in order to ensure a smooth transition between metropolitan and regional heavy vehicle operations. The existing Great Northern Highway will continue to be an important freight route in the future and will retain RAV 7 status to maintain access for a number of existing businesses along its route.

In Perth's central area, the northern end of Tonkin Highway and the eastern end of Reid Highway will also facilitate RAV 7 access to ensure end-to-end connectivity for freight transferring between central metropolitan and northern regional Western Australia. Improved access will also benefit businesses located within the Malaga industrial area.

Roe Highway will provide RAV 7 access along its entire length. This will further enable the development of a high productivity corridor between the existing port of Fremantle, the future container and general cargo port development in the Outer Harbour and the main industrial centres at Kewdale, Welshpool, Forrestfield and Hazelmere. Improved access will also benefit manufacturing and warehousing facilities within Canning Vale. Stock Road (south of Roe Highway) as well as the proposed Fremantle Rockingham Controlled Access Highway will also accommodate RAV 7 vehicles in the future, providing high-productivity access to the Western Trade Coast. Main Roads WA will investigate the case for higher productivity vehicle access to the port of Fremantle Inner Harbour upon completion of the Perth Freight Link project.

In the south-west, Rowley Road will be upgraded and extended to optimise access to the container port facilities in the Outer Harbour. Anketell and Mundijong Roads will also provide RAV 7 access boosting the number of high productivity east-west connections to service future growth within the Kwinana Industrial Area, Latitude 32 Industry Zone, Australian Maritime Complex and Rockingham Industry Zone. Cockburn Road will also be upgraded to RAV 7 status together with the Rockingham Road-Patterson Road route to improve internal heavy vehicle circulation within the area.

In the future Tonkin Highway will emerge as a strategic north-south freight route. Tonkin Highway will be upgraded to RAV 7 status to ensure consistent RAV access from Reid Highway in the north to Mundijong Road in the south, thereby creating a high productivity outer bypass of the city. Kwinana Freeway south of its interchange with Mundijong Road to the Forrest Highway will provide RAV 7 access to ensure optimum productivity of heavy vehicles servicing the South West region of the State.

In 2014, the Commonwealth Government approved $10.8 million to build a new heavy vehicle assembly facility in Bunbury. The new facility includes 20 road train assembly bays, parking, lighting and fencing, as well as a new intersection on Bunbury Port Access Road. These works are now complete. The new heavy vehicle assembly area will allow for the eventual extension of the RAV 7 network for the length of the Perth to Bunbury corridor.

Refer to Map 5 for additional information.

Further Improvements to Over-Size Over-Mass and High Wide Load Networks

The Western Australian Government recognises that Perth's road transport network must be able to accommodate special purpose vehicles and vehicles carrying over-dimensional and indivisible loads. While these types of vehicle movements are relatively infrequent, they carry critical components for large resource and construction projects, or agricultural equipment for harvesting activities, and are therefore of high economic value.

Over-dimensional loads – generally known as Over-Size Over-Mass (OSOM) loads – place particular demands on the transport network requiring larger clearances. Main Roads WA will continue to balance the requirements of industry for large and heavy loads with the need to minimise road safety risk and excessive wear to infrastructure such as bridges and road pavements. This balance will be achieved through continuing to issue permits with appropriate conditions as well as selectively enhancing the OSOM road network.

Indivisible loads – generally known as High Wide Loads (HWL) – place special demands on road infrastructure. These loads require extra lane width and height clearances. These characteristics are not always available on the principal road freight network, and despite the ability of HWL vehicle access to enhance productivity, it is currently restricted on some key parts of the network.

Main Roads WA has recently invested a significant amount of resources to identify and establish an appropriate HWL network in the metropolitan area. Nevertheless there is a broader need to protect and where necessary further develop a strategic network of HWL routes across metropolitan and regional Western Australia. Engineering investigations to extend the HWL network to the South West will be a priority in this regard.

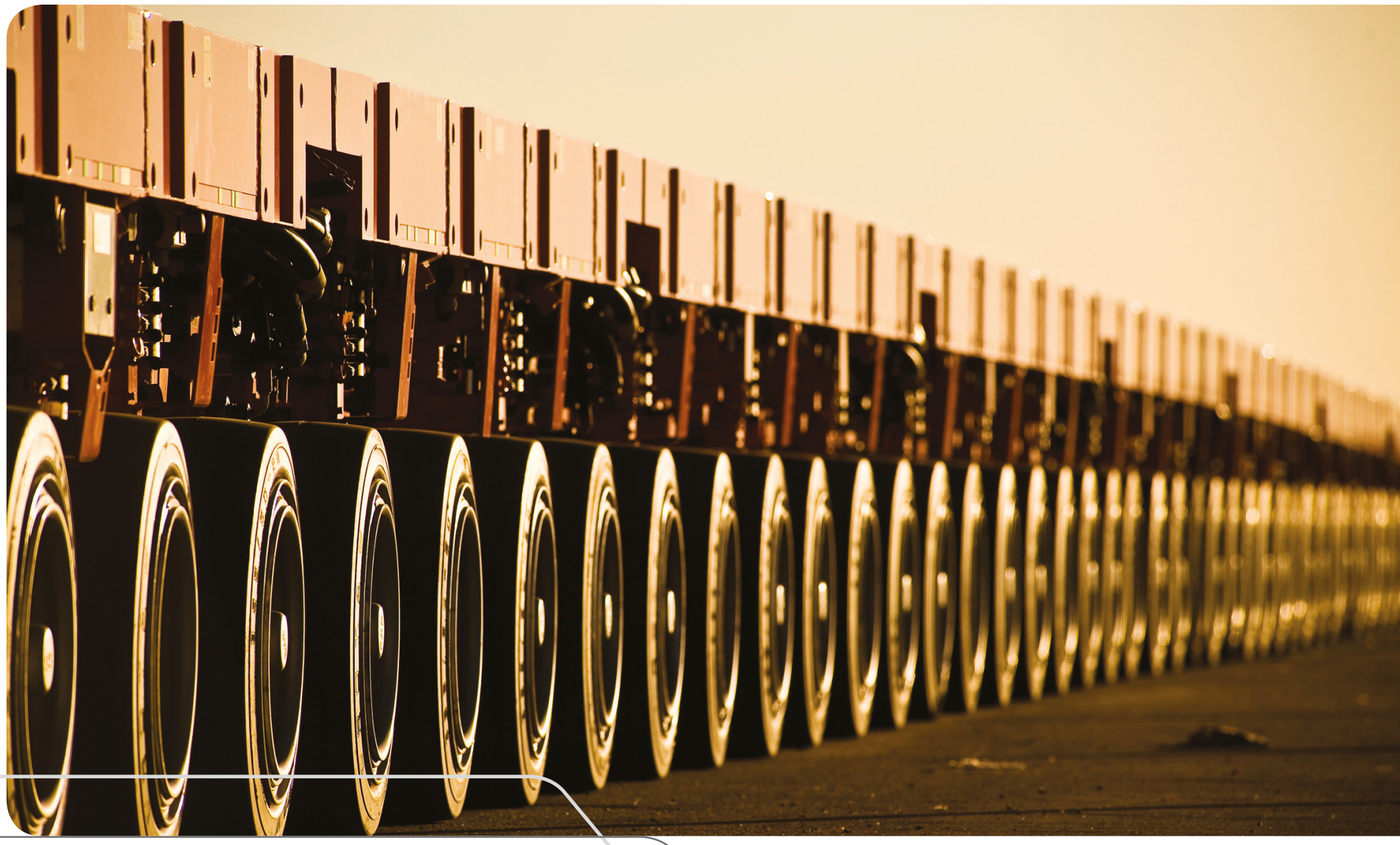


Image courtesy of LandCorp

Getting Better Use Out of the Existing Network

Freight Productivity and Technology

Adoption of new technologies over the coming decades will have a number of positive effects on transport productivity, safety and travel behaviour.

Managed Freeways is a set of traffic management and Intelligent Transport Systems (ITS) strategies, which optimise transport network performance. Solutions most notably include priority lanes and coordinated ramp signals which control access onto freeways to manage traffic flow, optimise speeds and minimise congestion – without requiring significant additional road capacity which is expensive and can be difficult to achieve in urban areas. Managed Freeways can be applied to give priority to freight vehicles at selected on-ramps through bypass lanes, which would be of particular benefit near major industrial areas.

Main Roads WA is well-placed to play a lead role in the future use of Managed Freeways. It has already invested in the necessary ITS foundation infrastructure, such as power and telecommunications, along with traffic monitoring devices, across the metropolitan freeway and highway network. Plans for a Managed Freeways program have been developed and will be rolled out as part of future network optimisation measures for the freight network.

Image courtesy of Main Roads Western Australia

Perth's Growing Freight Task

The Bureau of Infrastructure, Transport and Regional Economics estimates that the metropolitan freight task will increase significantly from approximately 5.5 billion net tonne kilometres (ntk) per annum in 2011 to 7.55 billion ntk per annum in 2020 (a 3.5 per cent average growth rate) and 9.3 billion ntk per annum in 2030 (a 2.1 per cent average annual growth rate).

The principal road freight network will do much of the heavy lifting for this freight task. Roads where the freight task is likely to increase significantly include:

- Roe Highway – Roe Highway is the most heavily trafficked heavy vehicle route in the Perth area. The future extension of the Roe Highway between Kwinana Freeway and Stock Road will establish it as the main east-west route into the Fremantle Inner Harbour further underpinning substantial growth in freight volumes.
- Leach Highway – Leach Highway forms one of Perth's earliest and most integral freight routes and is a strategic east-west connection between the existing port and the industrial lands and interstate rail terminals at Kewdale and Forrestfield. In the future, sections of Leach Highway, particularly between Welshpool Road and Tonkin Highway, will support increases in freight traffic. The exception is the section between Stock Road and Kwinana Freeway where the construction of the Roe Highway extension will significantly reduce the number of trucks travelling on Leach Highway.
- Stock Road – Stock Road will continue to act as an important metropolitan freight corridor in the future and will undergo substantial growth given its integral role in connecting the existing port of Fremantle, the future container port facilities at the Outer Harbour and Roe Highway Extension. Stock Road and Rockingham Road will also continue to provide north-south connectivity for Anketell and Rowley Roads which will be important routes for heavy vehicles accessing the future container port facilities. Heavy vehicle traffic is expected to increase on both of these east-west roads in line with industrial land use in the south-west area and future port development.
- Reid Highway – Reid Highway, along with Roe Highway, forms a metropolitan strategic ring road. One of the main purposes of the ring road is to provide an efficient freight route and to improve connectivity to industrial and employment centres in the middle and outer suburbs of Perth. In the future, freight volumes will increase significantly particularly between Malaga Drive and the Great Northern Highway.
- Tonkin Highway – Tonkin Highway connects a number of freight roads including Great Eastern, Leach, Roe and Albany Highways. It carries a large freight task relative to the overall road network with the section near Perth Airport, south of Great Eastern Highway among the busiest in terms of freight activity, although sections around Kewdale and Forrestfield also carry substantial traffic volumes. Freight volumes will increase significantly in the future particularly between Thomas Road and Albany Highway, and north of Kewdale and Forrestfield due partly to the future connection with NorthLink WA.

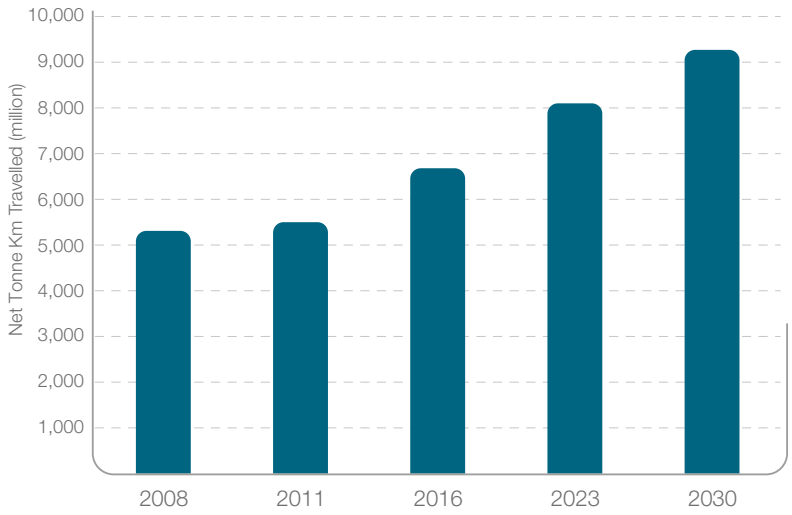


Figure 11: Perth Road Freight Task Forecasts (Source: Bureau of Infrastructure, Transport and Regional Economics)

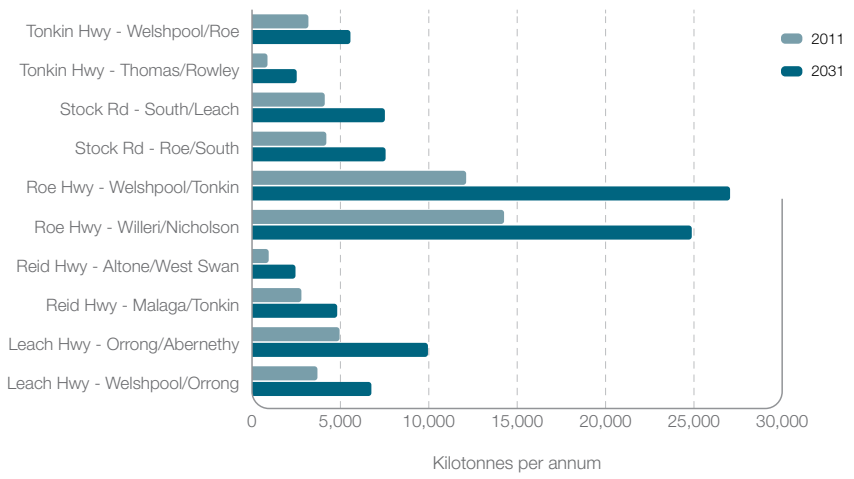


Figure 12: Existing and Forecast Freight Task on Key Perth Roads (Source: Department of Transport and Main Roads WA)

Major Network Investments

As the freight task continues to grow and capacity constraints develop, the Western Australian Government will play its part in optimising existing freight network infrastructure and delivering new and upgraded infrastructure critical to the overall transport system and the State as a whole.

The Western Australian Government, through Main Roads WA and in partnership with local government, will continue to identify investment priorities for the principal road freight network to ensure appropriate asset conditions and standards as freight demand continues to grow. It will undertake major road upgrade programs to accommodate increasing freight volumes, reconfigure the State's roads to mitigate the impact of heavy vehicle movements on Perth's communities, and construct new freight linkages to ensure Western Australia reaches its full potential.

Maintenance funding will also continue to be important to ensure that the network continues to provide a high level of service to both heavy and light vehicles.

While continuing with its program of investment in the upgrade and targeted expansion of Perth's freight network, the Western Australian Government will work closely with the Commonwealth Government to maximise funding partnerships that deliver critical freight network improvements and to progress the necessary national reforms to obtain the best use of the network for the long term.

Refer to Maps 6 and 7 for additional information.

Aligning Strategies for Growth

Aligning the State's road freight transport needs with its economic development and sustainability objectives will require:

- Strong corridor management focus
- Purposeful road asset management and investment programming with an emphasis on heavy vehicle productivity
- Adequate provision of recurrent funding to maintain the network to obtain the maximum value from the overall road transport network at minimum whole-of-life cost
- Direct influence on, and by, emerging urban and industrial land use and planning. This process will on occasions require land use conflicts to be resolved
- End-to-end connectivity of principal freight routes including the possible reclassification of some local roads to State ownership

Image courtesy of Main Roads Western Australia

Immediate Investment Priorities – Perth Freight Link Project

The Perth Freight Link is the 85 kilometre strategic freight route between Fremantle Port and Muchea and an essential component in the long term planning for integrated freight transport for Perth.

These combined road projects will provide substantial improvements to Perth's freight transport network with improved access to Perth Airport, the Outer Harbour, as well as the Fremantle Inner Harbour. They will also serve the Western Trade Coast, including the Kwinana Industrial Area, Rockingham Industry Zone, Latitude 32 Industry Zone and the Australian Marine Complex.

The Perth Freight Link Project consists of the following projects:

Gateway WA Perth Airport and Freight Access Project (completed)

This State and Commonwealth Government jointly funded $1 billion project was designed to improve the safety and efficiency of road infrastructure around Perth's most important transport interchanges and industrial hubs. The project involved:

- A major freeway-to-freeway interchange at Tonkin Highway and Leach Highway, including a new primary access road to the consolidated Perth Airport terminal
- A new interchange at Tonkin Highway and Horrie Miller Drive / Kewdale Road
- A new interchange at Tonkin Highway and Dunreath Drive
- A new interchange at Leach Highway and Abernethy Road
- Upgrading of the existing Tonkin Highway and Roe Highway interchange
- Upgrading Leach Highway between Orrong Road and Tonkin Highway to expressway standard and associated upgrades to local roads in the Kewdale area
- Upgrading Tonkin Highway between Great Eastern Highway and Roe Highway to six lanes

The Gateway WA project improves access to Perth Airport to complement the airport redevelopment and provide sufficient capacity to handle the expected growth in transport demand. It will also improve the operational efficiency of freight vehicles including those servicing interstate and international intermodal freight terminals at Kewdale and Forrestfield.

In addition, it is recognised that air freight plays an important role in facilitating domestic, interstate and international trade, particularly for high-value, time-sensitive commodities. The Gateway WA project ensures that Perth moves forward with improved airport access to efficiently service continued growth in this freight mode.

Roe 8 Extension and Fremantle Tunnel

Also critical to developing Perth's road freight network is the formation of a high-standard freight connection, around Perth's central urban areas, from the Kewdale, Welshpool and Forrestfield industrial epicentres to the existing port at Fremantle.
The project consists of:

- A 5.2 kilometre four-lane dual carriageway extension of the Roe Highway from Kwinana Freeway to Stock Road
- Major improvements to Stock Road north of Roe Highway extension including a grade separated interchange at Winterfold Road
- Construction of a new 3.3 kilometre tunnel between Winterfold Road and High Street

Future construction of Fremantle Port Connect will complete the network connection to Fremantle Inner Harbour.

NorthLink WA

The project development work to deliver the $1.12 billion NorthLink WA project is also underway. NorthLink WA comprises two main projects funded by the Commonwealth and State Governments:

- Construction of a new 37 kilometre section of the Perth Darwin National Highway link between the junction of Reid Highway and Tonkin Highway at Malaga and Great Northern Highway and Brand Highway at Muchea
- A Tonkin Highway grade separation program including:
  - A new interchange at Tonkin Highway and Benara Road
  - A new interchange at Tonkin Highway and Morley Drive
  - A new interchange at Tonkin Highway and Collier Road

The primary objective of these improvements is to enhance freight efficiency and productivity by reducing travel time and improving journey time reliability between the metropolitan area and the North West of Western Australia.

The existing Perth Darwin National Highway currently follows the Great Northern Highway alignment, commencing at the intersection of Roe Highway and Reid Highway, as a two lane road. The route passes through the Swan Valley and growing freight traffic volumes are impacting on the community. The new route will provide improved amenity for Swan Valley residents and tourists.

Connecting the Perth Darwin National Highway to Tonkin Highway will further increase the importance of Tonkin Highway as a key north-south route, linking industrial areas such as the Perth Airport and Kewdale precincts to the north. The Tonkin Highway grade separations project recognises this and will complement the new route by reducing traffic conflicts at highly trafficked intersections and improving journey reliability on the corridor.

These grade separations on Tonkin Highway, together with the proposed upgrade of Tonkin Highway to six lanes between Great Eastern Highway and Reid Highway, which is also part of the NorthLink WA project, will provide the crucial link between the Gateway WA precinct and Perth Darwin National Highway.

Image courtesy of Fremantle Port Authority

Image courtesy of Department of Transport

Investment Priorities by 2.7m

Road Developments to Service the Western Trade Coast

The focus of Perth's freight transport and logistics activity will shift further south, mainly towards the south-west area of the city.

The Western Australian Government will focus on coordinating further growth within Perth's most important heavy industrial and manufacturing area, the Western Trade Coast, to maximise its economic and employment potential.

A comprehensive, high productivity freight road grid spanning Perth's south-west and inner south-east will be required including:

- Stock Road grade separation program – Stock Road along with the Fremantle Tunnel will be the primary connection between the existing container port at Fremantle and the future container port facilities in the Outer Harbour. The grade separation program will reduce traffic conflicts, improve safety and increase heavy vehicle freight efficiency. The program will include:
  - A new overpass at Stock Road and Phoenix Road
  - A new interchange at Stock Road and Spearwood Avenue
  - A new interchange at Stock Road and Beeliar Drive
  - A new interchange at Stock Road and Russell Road

Tonkin Highway Upgrade and Expansion

In the future progressive construction of high productivity orbital connections will be needed to accommodate the future expansion of Perth. Upgrading and extending Tonkin Highway to the South Western Highway at Mundijong will provide additional north-south road capacity, which is currently provided solely by Kwinana Freeway.

Traffic issues have become an emerging concern for the community in the south-eastern corridor of Perth. Upgrading and extending Tonkin Highway south of Thomas Road will alleviate congestion, reduce travel times and better accommodate the needs of future urban growth.

These upgrades will also service the future freight task associated with industrial land and port development within the Western Trade Coast area as well as transfer freight between other major freight and logistics precincts, which will progressively migrate to the urban periphery including commercial developments at Forrestdale, Mundijong and North-East Baldivis.

Tonkin Highway will undergo a significant number of grade separations between Hale and Armadale Roads. This will upgrade the route to full freeway standard. Grade separation of all intersections will significantly improve freight efficiency by allowing traffic to move freely and at higher overall speeds, as well as improving safety through reduced traffic conflict. This is particularly important as a number of the intersections on this route have relatively high crash rates and are predicted to have significant vehicle growth in the future.

Projects include new interchanges at:

- Tonkin Highway and Hale Road
- Tonkin Highway and Welshpool Road
- Tonkin Highway and Kelvin Road
- Tonkin Highway and Gosnells Road
- Tonkin Highway and Mills Road
- Tonkin Highway and Champion Drive
- Tonkin Highway and Ranford Road
- Tonkin Highway and Armadale Road

Tonkin Highway will be extended with a new 14 kilometre section of four-lane dual carriageway between Thomas Road and South Western Highway, via Mundijong Road. Completion of this extension is essential for the efficient movement of freight through and around the metropolitan area.

The development of Tonkin Highway to full freeway standard with grade separation at its main intersections, will enable Tonkin Highway to ultimately form the core component of a heavy vehicle outer bypass of Perth connected at its northern end with the new Perth Darwin National Highway and at its southern end with both Mundijong Road and South Western Highway. This bypass will avoid the more densely populated part of the metropolitan area as well as provide strong connections to the Western Trade Coast via Rowley Road, Anketell Road and Mundijong Road, and to the Wheatbelt, Great Southern and South West regions via Welshpool Road East, Albany Highway and South Western Highway.

Fremantle Port Connect

Future construction of Fremantle Port Connect will complete the network connection to Fremantle Inner Harbour from Canning Highway via Stirling Bridge and Tydeman Road.

Western Trade Coast – At a Glance

The Western Trade Coast comprises the Kwinana Industrial Area, Rockingham Industry Zone, Latitude 32 Industry Zone and Australian Marine Complex.

These assets currently produce around $15.5 billion annually and employ 11,600 people. The Government's long term goal is to increase the Western Trade Coast's output to $28.3 billion per annum and generate 22,000 jobs.

Kwinana Industrial Area

- Total 2,400 hectares for major resource processing industries
- Fabrication and construction facilities
- High technology chemical and bio-technology plants
- Alumina, nickel and oil refineries; coal and gas-fired power stations

Australian Marine Complex

- World-class Centre of Excellence servicing the marine, defence and resource industries
- Manufacturing, fabrication, assembly, technology, repair and maintenance services
- Four wharves accommodating vessels up to 300 metres in length

Latitude 32 Industry Zone

- Total 1,400 hectares of industrial land across six precincts
- Accommodating light, general and transport industry uses

Rockingham Industry Zone

- Seven precincts covering 1,150 hectares
- Largest remaining undeveloped special and heavy industry area in metropolitan region
- Warehousing, transport and logistics, medium to large fabricators and marine-related industries

Image courtesy of Kwinana Industries Council

Full Freeway Standard for Roe and Reid Highways

Along with its critical port access function, the extended Roe Highway will perform a ring-route function (in conjunction with Reid Highway), bypassing much of the inner city. This route will also complete the strategic link in Perth's road network to connect Reid Highway, Great Northern Highway and Great Eastern Highway to Tonkin Highway, Kwinana Freeway and Stock Road.

Upon completion of the Perth Freight Link project, Roe Highway will be widened to six lanes to increase capacity between Kwinana Freeway and Tonkin Highway, in order to ensure this strategic freight route continues to meet future heavy vehicle demand and remains the city's main east-west route into the port of Fremantle.

Additional grade separations will be undertaken at the intersections of Morrison and Toodyay Roads on the northern section of Roe Highway. These roads also intersect with the rail freight network, and rail grade separations are a future priority at these intersections. Given Toodyay Road is in close proximity to the rail line, road and rail grade separations at this intersection will need to be undertaken simultaneously. The Morrison Road / Roe Highway intersection is further removed from the rail line and so road and rail grade separations do not necessarily need to be undertaken at the same time.

Grade separation of the intersection of Roe Highway and Great Northern Highway is also planned in the future, elevating this freight route to full freeway standard along its entire length.

Widen Reid Highway to four lanes between Mitchell Freeway and the Great Northern Highway, with grade separations elevating this freight route to full freeway standard.

Investment Priorities by 3.5m

Road Developments to Service the Western Trade Coast and New Container and General Cargo Port Development

- New Fremantle Rockingham Controlled Access Highway – Fremantle Rockingham Controlled Access Highway will integrate with the upgraded Stock Road and the new Fremantle Tunnel to form a high-standard coastal corridor connecting the existing container port at Fremantle and the future container port facilities at the Outer Harbour.

  The route will continue south linking Rockingham Road, near the proposed Rowley Road extension, with the newly constructed Mundijong Road extension west of Kwinana Freeway, recently completed by the City of Rockingham. The Fremantle Rockingham Controlled Access Highway will be required in the future to take port and other Western Trade Coast heavy vehicle traffic off the Kwinana Freeway. Work is already underway by Main Roads WA to finalise a preferred alignment for reservation in the Metropolitan Region Scheme.
- Rowley Road extension and upgrade – Rowley Road will be the principal access route to the future container port facilities. The road will be extended and upgraded to connect to the port and will comprise an 8 kilometre four-lane dual carriageway between Kwinana Freeway, Latitude 32 Industry Zone and the coast. Construction within the Rowley Road Transport Corridor will include provision for freight rail at the western end of the Corridor between the Latitude 32 Industry Zone and the new port facilities.

  The existing section of Rowley Road, which runs east of the Kwinana Freeway, will be widened to ensure a consistent four lane dual carriageway standard along its entire length to Tonkin Highway.
- Anketell and Mundijong Road upgrades – Anketell Road will be widened from a two-lane undivided road to a four-lane dual carriageway west of Kwinana Freeway to Battersby Road. Anketell Road will be the key route for transporting Over-Size Over-Mass and High Wide Load cargos to and from the Western Trade Coast.

  Mundijong Road will also be widened from a two-lane road to a four-lane dual carriageway between Fremantle Rockingham Controlled Access Highway and the future extension of Tonkin Highway. Mundijong Road will serve an important function in the future as a high-standard east-west link to the Western Trade Coast Precinct from the proposed Tonkin Highway extension and the Kwinana Freeway.

Tonkin Highway Expansion

The extension of Tonkin Highway south of Mundijong Road to Pinjarra will provide a complete outer bypass of the metropolitan area and meet the demands of urban growth and access in the south-eastern corridor. Its integration with the upgraded Lakes Road will also provide connectivity to Nambeelup industrial precinct east of Mandurah.

A north-south bypass to the east of the town of Pinjarra is planned in the future to improve transport efficiency and the safety and amenity of the town. The realignment will link into Greenlands Road south of the town and also provide for east-west bypassing traffic. This alignment is protected in the Peel Region Scheme.

A New Transport Corridor for Perth's North-East and North-West Areas – Whiteman-Yanchep Highway

In the future, additional road network upgrades, including a new major inter-regional transport corridor, will be needed across Perth's north-east and north-west areas to accommodate future traffic generated from urban development and emerging economic and employment estates.

The new Whiteman-Yanchep Highway will be constructed as a four-lane divided road and will integrate with the local road network to function as an additional high-standard north-south commuter and freight route.

To the north, Whiteman-Yanchep Highway will connect to Flynn Drive and Neaves Road. Flynn Drive and Neaves Road will be upgraded, Flynn Drive extended west, providing a high standard east-west link between the Perth Darwin National Highway and the extended Mitchell Freeway to better connect emerging economic and employment estates at Neerabup Industrial Area and future estates at Nowergup and Pinjar. A planning study will be undertaken to assess the scope for a direct connection between Stock Road and Neaves Road.

To the south, Whiteman-Yanchep Highway will connect with Gnangara Road. Gnangara Road will be upgraded from Alexander Drive to the new Perth Darwin National Highway, enhancing connectivity and improving access for the existing Landsdale, Wangara and Enterprise Park industrial estates.

Perth Adelaide National Highway

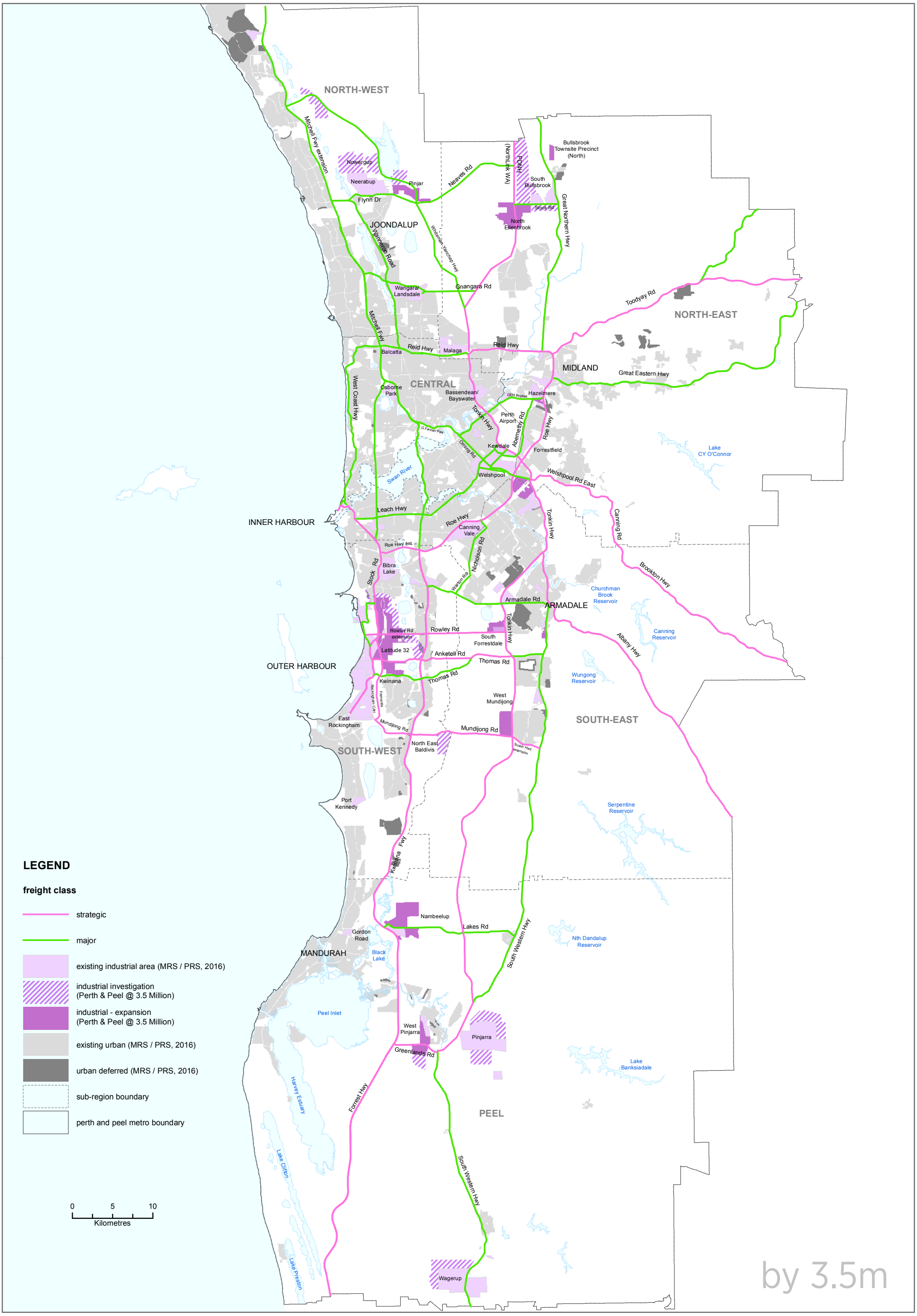
The future Perth Adelaide National Highway ("Orange Route") will improve safety and amenity on the Northam to Perth section of the Great Eastern Highway and improve interstate access to metropolitan Perth. This longer term planning concept, protected in the Metropolitan Region Scheme, will reduce gradients and provide significant productivity and safety benefits for freight vehicles. The alignment is to the north of the existing route and generally follows the Toodyay Road corridor, deviating through the Red Hill section and connecting with the former rail reserve at Bakers Hill on Great Eastern Highway. The realigned route will also address safety and amenity issues at the Greenmount Hill entrance to Perth on the Great Eastern Highway, which has steep grades and is in close proximity to residential areas.

Investment Priorities beyond 3.5m

Beyond the timeframe of the Perth Freight Transport Network Plan the potential development of the proposed Southern Link Road may also be required. The Southern Link Road concept connects the Brookton, Albany and South Western Highways with Tonkin Highway at Mundijong Road, and will accommodate future traffic growth in the south-eastern metropolitan area. The link road will provide improved access for regional exporters travelling from the Great Southern and the Central Wheatbelt regions to the metropolitan area, particularly to the future container port facilities in the Outer Harbour as well as to the broader Western Trade Coast area. An alignment for the Southern Link Road has not been resolved and no reservation is protected in the Metropolitan Region Scheme.

MAP 4

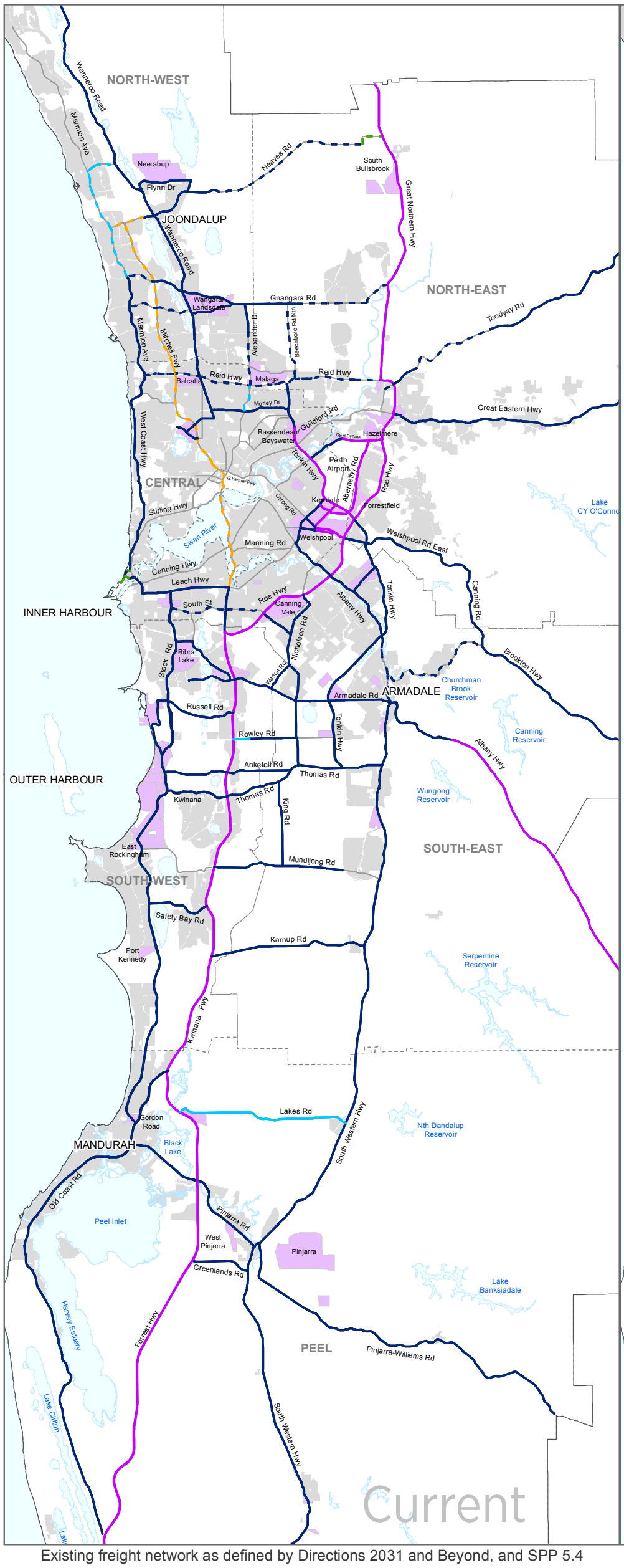
Metropolitan Principal Road Freight Network

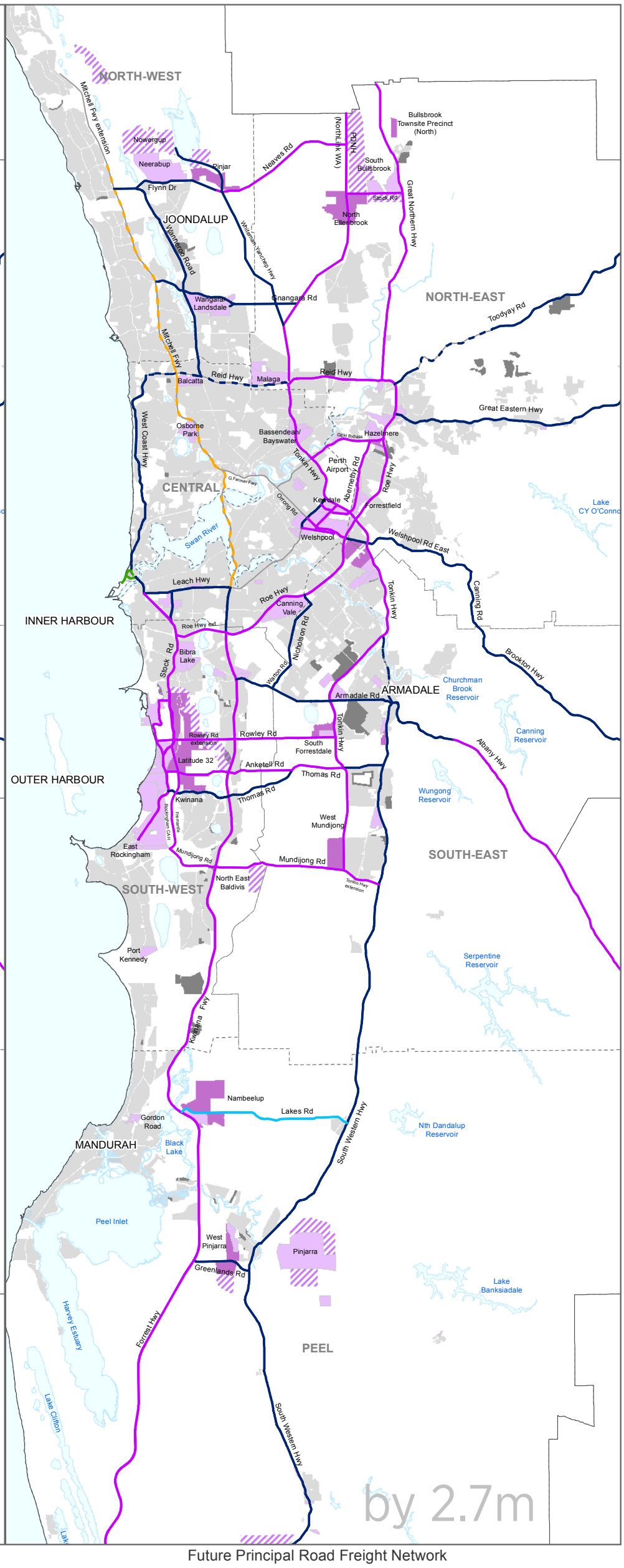


by 3.5m

MAP 5

Metropolitan Restricted Access Vehicle Regime Upgrades





Existing freight network as defined by Directions 2031 and Beyond, and SPP 5.4

Future Principal Road Freight Network

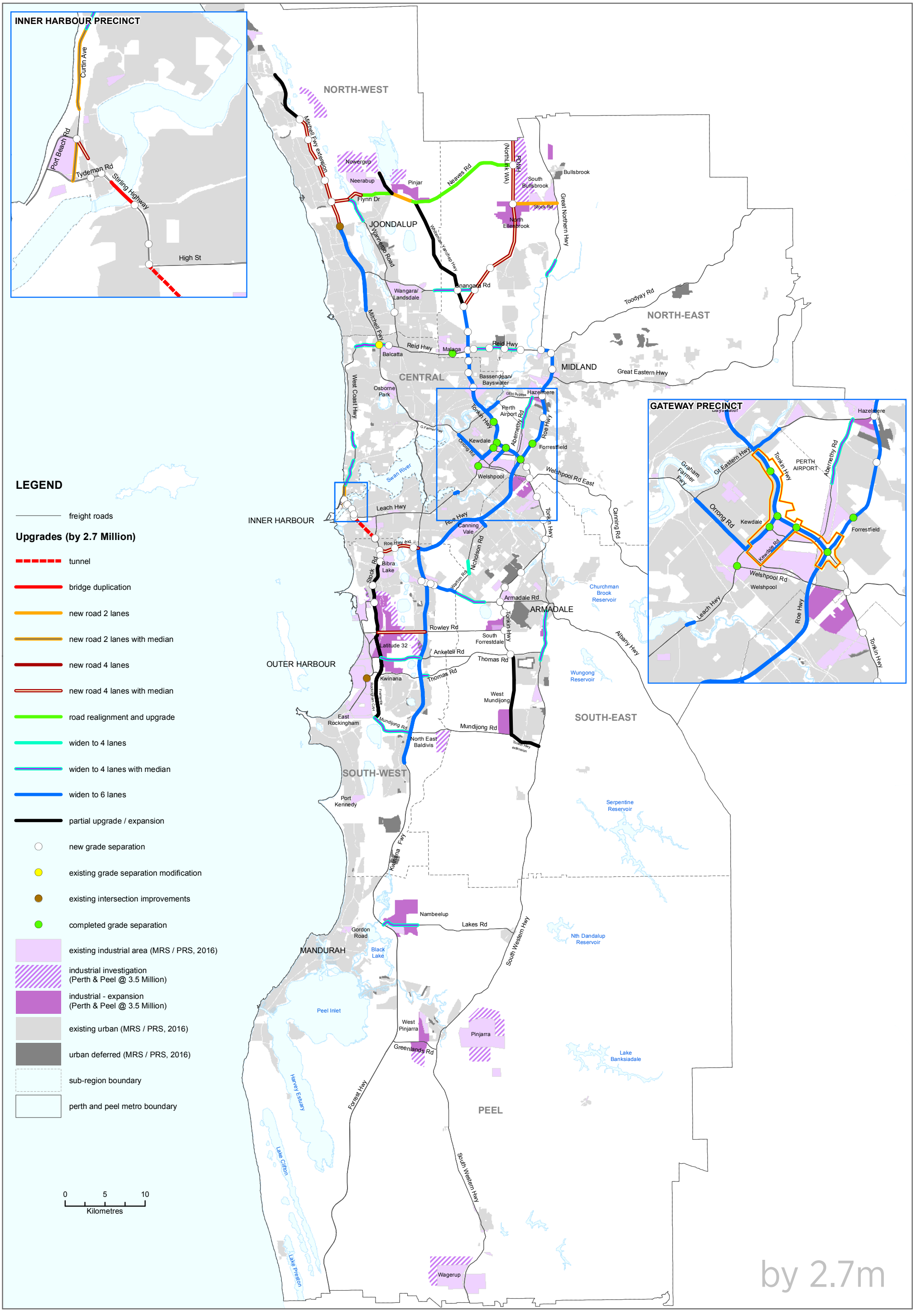
0 5 10
Kilometres

RAV Class MRWA Networks
- 2 (with conditions)
- 3
- 3 (with conditions)
- 4
- 4 (with conditions)
- 6
- 6 (with conditions)
- 7
- operating restrictions may apply

- perth and peel metro boundary
- sub-region boundary
- existing urban (MRS / PRS, 2016)
- existing industrial area (MRS / PRS, 2016)
- industrial investigation (Perth & Peel @ 3.5 Million)
- industrial - expansion (Perth & Peel @ 3.5 Million)

MAP 6

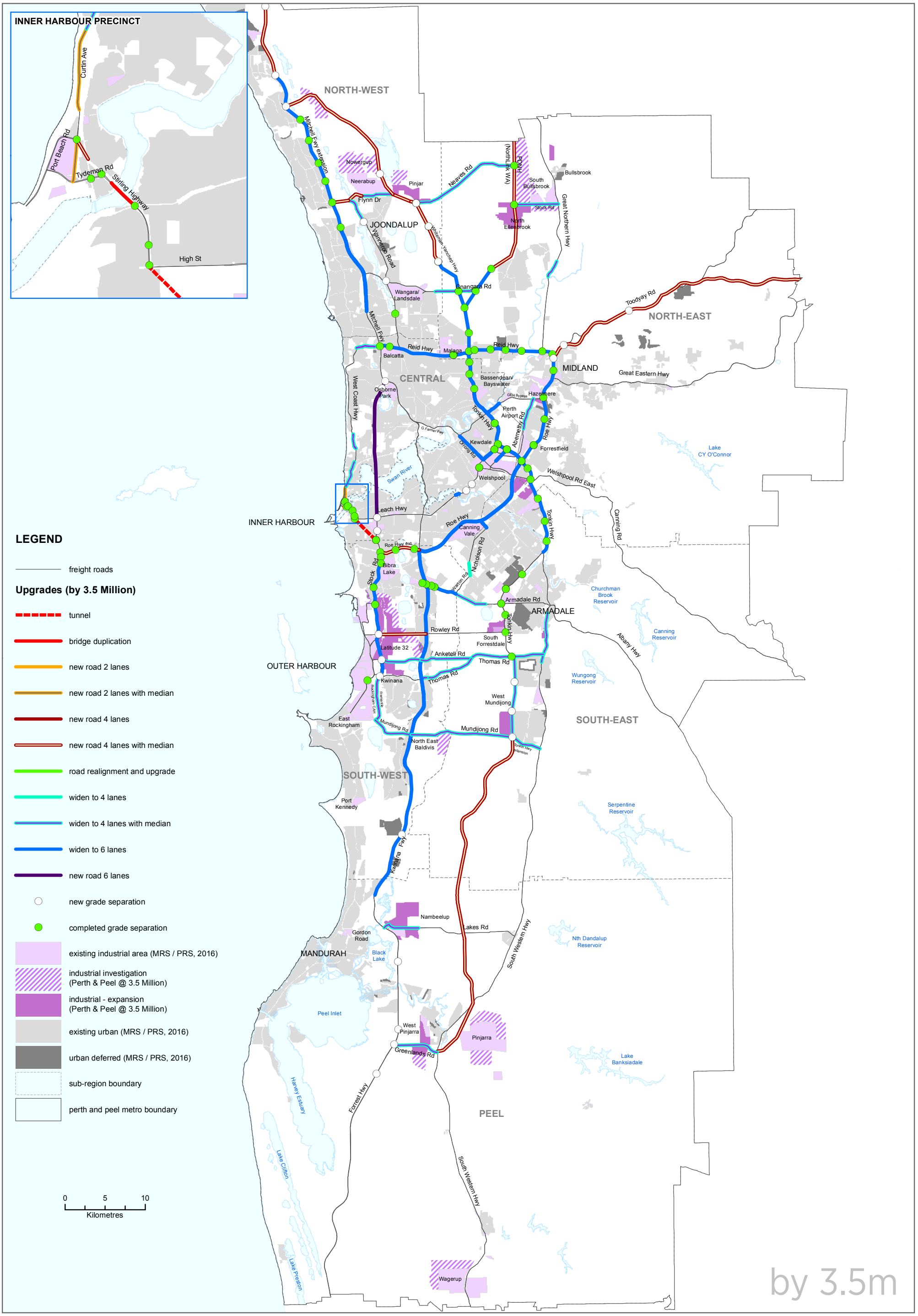
Metropolitan Principal Road Freight Network Strategic Investment Priorities by 2.7m



by 2.7m

MAP 7

Metropolitan Principal Road Freight Network Strategic Investment Priorities by 3.5m



by 3.5m


FREMANTLE MUNICIPAL TRAMWAYS
WRONG WAY GO BACK

PRIORITY 5

Five Priorities for Action

1. A Generational Step-Up in Metropolitan Port Capacity
2. Moving More of Perth's Freight Task by Rail
3. Expanding the Metropolitan Intermodal Terminal System
4. A High-Standard, High-Productivity Road Freight Network to Strengthen the Economy
5. **Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity**

Image courtesy of Fremantle Port Authority

PRIORITY 5

Locking in Measures to Protect Transport Infrastructure Critical to Economic Prosperity

Integrating land use and transport planning to manage freight impacts on the community

Highlights

The Perth Freight Transport Network Plan takes a major step forward by identifying, for the first time, the existing and future network of freight corridors and freight activity centres critical to the State's economic prosperity.

The Plan articulates how the Government can better protect this strategically valuable network in the planning system, to accommodate the projected future growth of the freight task and to ensure that sensitive land uses are not located or designed in such a way that exposes the community to unacceptable amenity impacts.

This planning approach will underpin national as well as state economic competitiveness and is consistent with the development of a national corridor protection strategy as proposed in the National Land Freight Strategy.

The priority will be to protect the highly strategic rail freight network, which transports more than $5 billion of trade every year through the metropolitan area. The network is essential for the movement of the State's freight task, while reducing road congestion and creating a more sustainable transport network for Perth. This asset of strategic economic importance needs to be better protected within the Western Australian planning system, because future increased rail activity is vulnerable to residential encroachment adjacent to narrow rail reserves.

Key Supporting Actions

Designate the Freight Network for Perth

- Ensure metropolitan spatial planning processes are cognisant of the metropolitan freight network in sub-regional planning frameworks including the:
  - Central Sub-Regional Planning Framework
  - North-West, North-East and South Metropolitan Peel Sub-Regional Planning Frameworks

Reducing Rail Freight Noise

- Work with industry to encourage an ongoing regime for the management of noise relating to rolling stock

State Planning Policy

- Continue to work with the Department of Planning to review State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning to:
  - Ensure development adjacent to major roads and freight railways meet contemporary noise standards
  - Address the interface requirements of the strategic freight network
  - Establish guidelines for development of sensitive land uses within proximity of the network

Image courtesy of Fremantle Port Authority

Integrated Land Use and Transport Planning

Introduction

The Western Australian Government recognises that an integrated approach to land use and transport planning is essential to ensure Western Australia's ongoing prosperity. Integrated land use and transport planning is one of the most cost-effective ways to optimise the performance of critical infrastructure, maximise use of latent capacity within existing land reserves, and facilitate the pipeline of investment needed to build new infrastructure to accommodate future growth.

Both public and private sector participants in these processes will continue to seek certainty regarding the planning conditions under which future development will proceed and the rate and scale at which it will take place. They will require clarity and consistency in the way in which planning principles and mechanisms will be applied to existing and future infrastructure. These assurances are essential, across all levels of government, to maintain community as well as investor confidence in the planning system.

The Government will direct infrastructure growth and improvement to create a city structure that drives productivity, supports investment certainty and creates jobs in ways that are economically, socially and environmentally sustainable. One of the most effective ways to achieve a city structure that meets these goals is by shaping freight transport infrastructure and usage patterns.

The network of transport corridors and industrial facilities that supports the movement of freight is of considerable economic value and strategic significance to the State and the nation.

This freight infrastructure network will continue to shape Perth in the future. It will be integral to the continuing competiveness of the local, interstate and international supply chains that drive the Western Australian economy and keep the cost of goods and services purchased by the community and required by industry affordable.

Freight Facts:

$5 billion – Value of State rail freight assets

$43 billion – Value of Main Road WA's road assets

23% – Main Road WA's road assets as a proportion of the State's total asset value

$28 billion per annum – Value of trade through the port of Fremantle

$5 billion per annum – Value of trade carried on the metropolitan rail freight network to and from the city's ports

A Major Step Forward – Perth Freight Transport Network Plan

In developing the Perth Freight Transport Network Plan, the Government has given priority to planning for future freight growth.

While the focus of this planning is to ensure the most efficient possible movement of freight, it must also take into account environmental and social impacts on Perth's communities. For such forward planning to be successful, vital existing freight infrastructure must be identified and protected. New corridors, freight activity centres and logistics precincts must also be defined and set aside for future development and use.

This will highlight existing and future urban areas where certain land uses, particularly residential, may not be compatible with existing and future freight operations without appropriate interface management. Improving the quality of information available to decision-makers across all tiers of Government, and enhancing opportunities for better integrated land use and transport planning outcomes, will assist to minimise such land use conflicts.

The Perth Freight Transport Network Plan takes a major step forward by identifying, for the first time, the existing and future network of principal freight corridors and freight activity centres critical to Perth's economic prosperity. The Plan also outlines the Government's vision for this network along with clear strategic development priorities.

For this vision to be achieved, and its economic and social benefits realised, the planning, transport and statutory decision making authorities and agencies will work together to achieve the integrated land use and transport planning outcomes needed to coordinate future infrastructure growth and change.

Strategic Approach

Context for Collaboration

The Western Australian planning system has served the State well and has enabled the capital city to grow over six decades in line with the vision and spatial layout in the Stephenson-Hepburn Plan. The system is based on stable institutional arrangements governed by strong legislation, centralised statutory regional planning, subdivision control and oversight of local planning. It also has a statutory authority - the Western Australian Planning Commission which has state-wide responsibilities for urban, rural and regional land use planning and land development matters - to exercise powers, allocate resources and provide expert advice with the support of the Department of Planning.

Planning systems throughout Australia, however, face significant challenges in dealing with a range of complex social, economic development and environmental issues with increasing population. While efficient, equitable and sustainable land use planning and infrastructure provision underpin the goals and strategic plans of each state and territory across Australia, the development of planning mechanisms and their implementation at statutory decision stage can vary widely. A number of historic decisions have resulted in urban developments that conflict with existing and future transport activity.

State, Territory and Commonwealth Governments across the country are increasingly acknowledging the need to identify, plan for and protect corridors and sites for major infrastructure provision. Infrastructure Australia argues a national corridor protection strategy is needed for nationally significant corridors that handle or are likely to handle nationally significant transport flows. In essence, these would be corridors and sites associated with major export-import gateways, principal interstate freight networks and substantial passenger flows between Australian capital cities.

There has been growing recognition that distinction should be made between corridors and facilities for moving people, and corridors and facilities for moving freight, as there are different land use associations and very different performance requirements. A number of reviews of national and state planning systems have been undertaken with an emphasis on measures to link strategic land use planning with freight network infrastructure provision and protection. These have been articulated in both the National Ports Strategy and the National Land Freight Strategy which advocate measures to better protect freight corridors and facilities.

The location of freight corridors and centres, and the manner in which goods move between them, can have a significant impact on the amenity and liveability of local communities in Western Australia. Conversely, incompatible land use and development in close proximity to freight corridors and centres can compromise the efficiency of freight operations which can ultimately lead to costly infrastructure duplication.

The Government recognises the importance of keeping the regulatory environment current and responsive to the changing needs of the community and industry. The Western Australian Planning Commission is currently reviewing the main planning mechanisms relating to the freight network and making the appropriate changes, in collaboration with the Department of Transport, to ensure that land use and development decisions support the objectives of the Perth Freight Transport Network Plan. This includes consideration of the need to address the interface requirements of the strategic freight network and establishes guidelines for the management of sensitive land uses within close proximity of key corridors.

Image courtesy of Main Roads Western Australia

Optimising Existing Planning Mechanisms

The Government supports a planning philosophy which acknowledges that development, land use and transport are not separate activities but facets of the same major challenge.

A broad and holistic approach to improving the Western Australian planning system will be needed to address this major challenge. The diagram below provides an overview of the development, land use and infrastructure planning system mechanisms currently in place in Western Australia, across state and local government jurisdictions.

The diagram highlights the multi-faceted approach needed to fulfil the objectives of the Perth Freight Transport Network Plan.

These strategic priorities will be progressed in conjunction with incremental strategic and spatial planning improvements, including the review of State Planning Policy 5.4.

	Legislation	Strategic Planning	Spatial Planning	Statutory Planning	Applications	Review & Enforcement
State	*Planning and Development Act 2005*	State Planning Strategy State Planning Policies DC Policies Guidelines & Manuals Planning Bulletins				
Region		**State Planning Policies** DC Policies Guidelines & Manuals Planning Bulletins	Regional Planning and Infrastructure Frameworks	Metropolitan and Peel Region Scheme		
Sub-Region		**State Planning Policies** DC Policies Guidelines & Manuals Planning Bulletins	**Sub-Regional Structure Plans**			
Local Government		Local Planning Strategies Local Planning Policies		**Local Planning Schemes** Local Interim Development Orders		
District	*Hope Valley Wattleup Redevelopment Act 2000* *Swan Valley Planning Act 1995*		District Structure Plans	Local Interim Development Orders Improvement Plans and Schemes		
Locality			Local Structure Plans (e.g. Activity Centre Plans)	Improvement Plans and Schemes Planning Control Areas	**Subdivision**	
Street / Lot			Local Development Plans		**Subdivision Development**	
Other	*Environmental Protection Act 1986* *Heritage of Western Australia Act 1990* *Contaminated Sites Act 2003*					Review Enforcement

Legend: Priority Area for Perth Freight Transport Network Plan

Figure 13: Overview of the Western Australian Planning System

Aligning Metropolitan Spatial Planning and the Perth Freight Transport Network Plan

Perth and Peel@3.5million, the spatial framework for the Perth and Peel regions, focusses on the long term need to accommodate 3.5 million people in the wider metropolitan area. As Perth moves towards this population growth scenario, so too will the size of its freight task. There will be an increasing need for transport and planning agencies to work together to align Perth's spatial planning with its transport plans and to embed freight network requirements, in order to achieve a balance between efficient freight movement and sustainable urban development.

The Departments of Planning and Transport will collaborate to embed the freight network into Perth's sub-regional structure plans to strengthen the linkages between strategic spatial planning and infrastructure provision.

Sub-regional planning frameworks are strategic spatial plans that provide a broad framework for planning at a sub-regional level. They cover planning issues including location for urban growth and consolidation, population trends, employment areas, major commercial centres, transport links, infrastructure and servicing requirements, and regional open space. Together with the recently released draft Central Sub-Regional Planning Framework, draft planning frameworks have also been released for the Metropolitan North-West, Metropolitan North-East and South Metropolitan Peel areas to guide future land uses.

A key outcome of this collaboration will be the clear identification of existing and future freight corridors and strategic sites. The Government acknowledges that setting this context is essential to avoid land use and transport conflicts at sub-division and development application stage. Recognising the freight network at structure plan level will help focus the land development process. This will result in more effective management of the interface between communities and freight corridors and freight activity centres, thereby achieving a balance between industry, community and environmental needs.

Improving Current Practices and Planning Policy

Planning Framework Referrals

A recent review of the existing planning framework by the Department of Planning identified the need for greater scrutiny of proposals within close proximity of the metropolitan freight rail network.

As a result, the referral process for all applications for structure plans, local planning scheme amendments, MRS amendments and other instruments has been refined to ensure that all applications located within 100 metres of the metropolitan freight rail corridor are addressed.

State Planning Policies - Improving Strategic Planning Provisions

The Western Australian Planning Commission's State Planning Policy 5.4, Road and Rail Transport Noise and Freight Considerations in Land Use Planning, seeks to promote a system in which sustainable land use and transport are mutually compatible.

The Policy provides a triple-bottom-line framework for the consideration and management of the impacts of transport noise and freight operations. It deals with new noise-sensitive development in the vicinity of existing or future major transport corridors or freight handling facilities, new major road or rail infrastructure projects (including major redevelopments of existing railways or major roads) in the vicinity of existing or future noise-sensitive land uses, and the location of freight handling facilities.

The current objectives of State Planning Policy 5.4 are to:

- Protect people from unreasonable levels of transport noise by establishing a standardised set of criteria for use in the assessment of proposals
- Protect major transport corridors and freight operations from incompatible urban encroachment
- Encourage best-practice design and construction standards for new development proposals and new or redeveloped transport infrastructure proposals
- Facilitate the development and operation of an efficient freight network

The policy aims to achieve this by identifying the situations in which it would be appropriate to assess proposals for transport noise impacts, establishing noise criteria to be used in the assessment of these proposals and identifying measures that can be adopted to reduce road and rail transport noise in these instances.

With continuing economic growth, and projected strong growth in both population and number of households, demand for goods will increase significantly over the next 20 years. This will lead to increased demand for the movement of goods. Although the freight transport industry will continue to respond with more efficient ways of operating, the challenge will be to accommodate large-scale, 24/7 freight demand in a way that is acceptable to the community and industry.

There is a need for State Planning Policy 5.4 to adequately reflect the growing scale of Western Australia's freight task and the changing needs of the community and industry. This includes contemporary noise standards and the requirement to consider noise as early as possible in the planning process. In terms of protecting freight rail corridors and avoiding impacts on nearby buildings it is important that vibration be considered alongside noise. Although ground-borne vibration is rarely a problem from road traffic, even at very close distances to major highways, it is important to understand that it

can be a considerable issue alongside freight railways. Vibration impacts need to be considered and minimised through treating the issues at-source through working with rail operators and the freight industry.

Freight rail represents a special case, being more problematic than passenger rail due to the significantly greater length, weight and axle loads of freight trains and also because vibration and low frequency noise from freight rail can be more difficult to mitigate.

As such State Planning Policy 5.4 is being reviewed to ensure the noise standards meet contemporary standards for development adjacent to major roads and freight railways. Improvements to the Implementation Guidelines will assist with the revision of State Planning Policy 5.4 by providing improved supporting information on identifying, assessing and managing potential noise impacts.

Improved community and industry awareness is a key part of helping the public and land developers understand the implications of living near freight corridors and making informed decisions about purchasing or developing land that is subject to the requirements of State Planning Policy 5.4.

Image courtesy of LandCorp

Reducing Rail Freight Noise

It is important to note that managing conflict between transport corridors and adjacent noise sensitive land uses through the use of setbacks and building treatments is only a partial solution, and when used in isolation can only be partially effective in providing a suitable level of amenity to the community. The planning system cannot act retrospectively, and the review of State Planning Policy 5.4 primarily addresses issues in yet to be developed, infill or greenfield areas. There remains an existing and ongoing conflict in brownfield areas, which is more difficult to address through planning mechanisms.

Alternative on-corridor solutions have to be utilised to help resolve noise issues in established urban areas that interface with major transport routes; many of which carry substantially higher volumes of freight than in previous years, and are forecast to carry higher volumes in future.

The Department of Transport will work with freight rail operators to identify affordable noise mitigation solutions in parts of the network where noise is a known issue. Managing noise from rolling stock over time will ensure that rail remains a long term viable option for moving freight through the metropolitan area.

Image courtesy of Fremantle Port Authority

Priority Infrastructure

The Metropolitan Rail Freight Network

Over the past 30 years, Perth has seen strong economic and population growth. This is reflected in the significant increase in urban zoned land within the Metropolitan Region Scheme, which has grown substantially from around 60,000 hectares in 1984 to almost 90,000 hectares in 2016 – an increase of around 50 per cent.

Some urbanisation has occurred in areas that abut the metropolitan rail freight network. This type of development can create land use conflicts particularly as the rail reserves that protect freight activity from sensitive land uses are very narrow in the metropolitan area. Most of the key sections of mainline (around 75 per cent) within the metropolitan rail freight network sit within a rail reserve of less than 50 metres in width.

Since 1984 there has been a major increase in urban land abutting key sections of the freight rail corridor. Of particular concern, is that around 90 per cent of urban land abutting key sections of the freight rail corridor occurs within 50 metres of the rail track centreline, with 70 per cent of this urban land considered noise sensitive.

As a result, community amenity issues have arisen and opportunities to create additional rail capacity to serve Perth's future freight task have been limited. The rail network has been compromised resulting in pinch points where further additional track works will be difficult to accommodate. Ongoing policy improvements between planning and transport will continue to improve the interface management between land-use and transport corridors.

Refer to Map 8 for additional information.

Since 1984:

30% decrease - in rural land abutting key sections of mainline freight rail corridor

70% increase - in urban land abutting key sections of mainline freight rail corridor

10% increase - in industrial land abutting key sections of mainline freight rail corridor

Image courtesy of Department of Transport

Without appropriate interface management, types of land use conflicts are likely to worsen in the future as the freight task increases. Within the next two decades, rail freight demand is forecast to increase significantly and require the allocation of an additional 300+ train paths per week across the metropolitan network - an increase of more than 50 per cent. These additional trains will be accommodated by increasing the frequency of trains during the day together with additional evening and night operations.

Adverse effects on residents living alongside rail corridors can occur through exposure to increased train movements, extended rail operating hours and development along transport routes that has not been designed to mitigate noise and vibration. A suite of initiatives to reduce impacts will need to be applied to the rail track and / or to affected future adjacent properties.

Ultimately, expanding network operating hours to move more of Perth's freight task by rail will bring many benefits to the wider community and economy, and is a vital, cost-effective way to achieve a sustainable city.

The Perth Freight Transport Network Plan recognises the essential role the metropolitan rail freight network plays in the Western Australian economy moving freight both within and beyond the metropolitan area. Every year the metropolitan rail network transports goods worth around $5 billion to and from the city's ports. Rail freight has traditionally been associated with the transport of heavy bulky goods and construction materials. It continues to be extremely important for these goods but its role today is much broader. During the last decade or so, rail freight has undergone a transformation and has taken an increasingly important role in the transport of consumer goods.

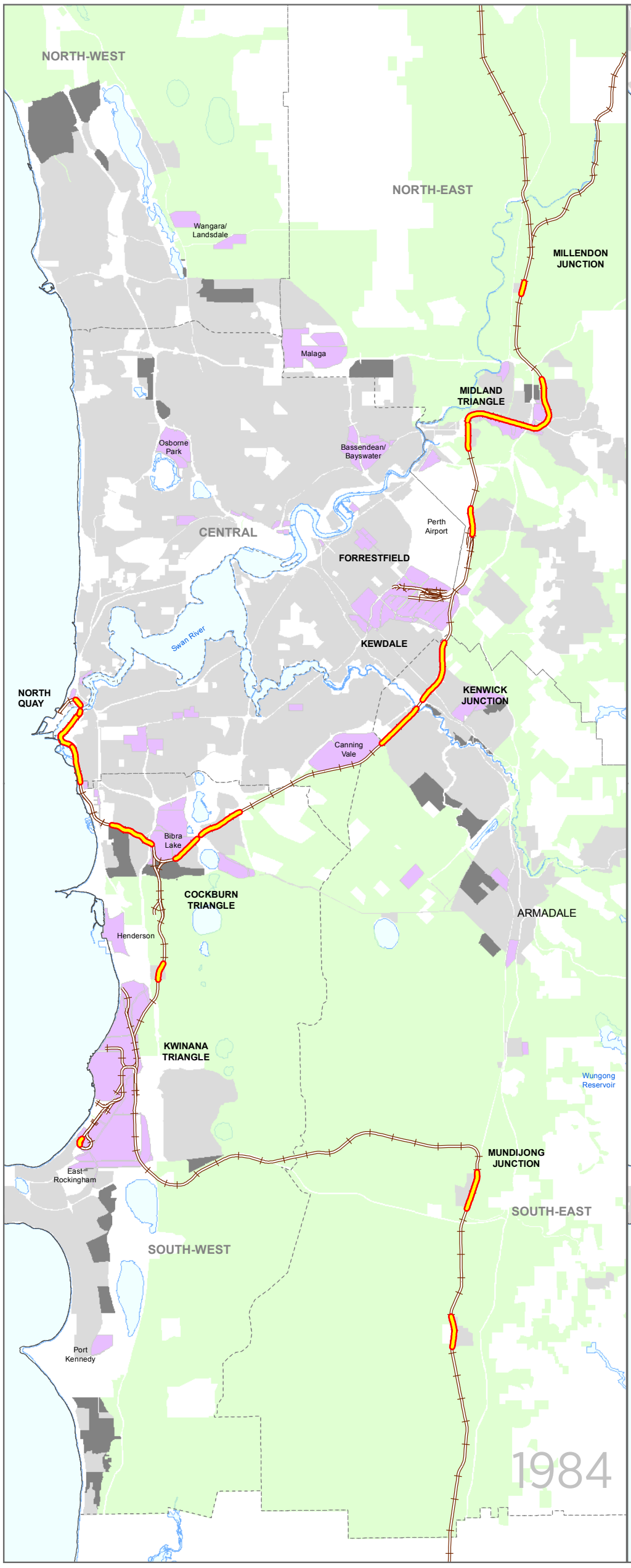
Freight rail corridors and terminals provide vital conduits through Perth, providing effective ways of moving freight en masse. The effectiveness of these conduits is critical to the general liveability, as well as economic prosperity, of Perth and Western Australia. Moving Perth's freight task by rail brings many benefits to the community including reduced air pollution, less road congestion and improved road safety.

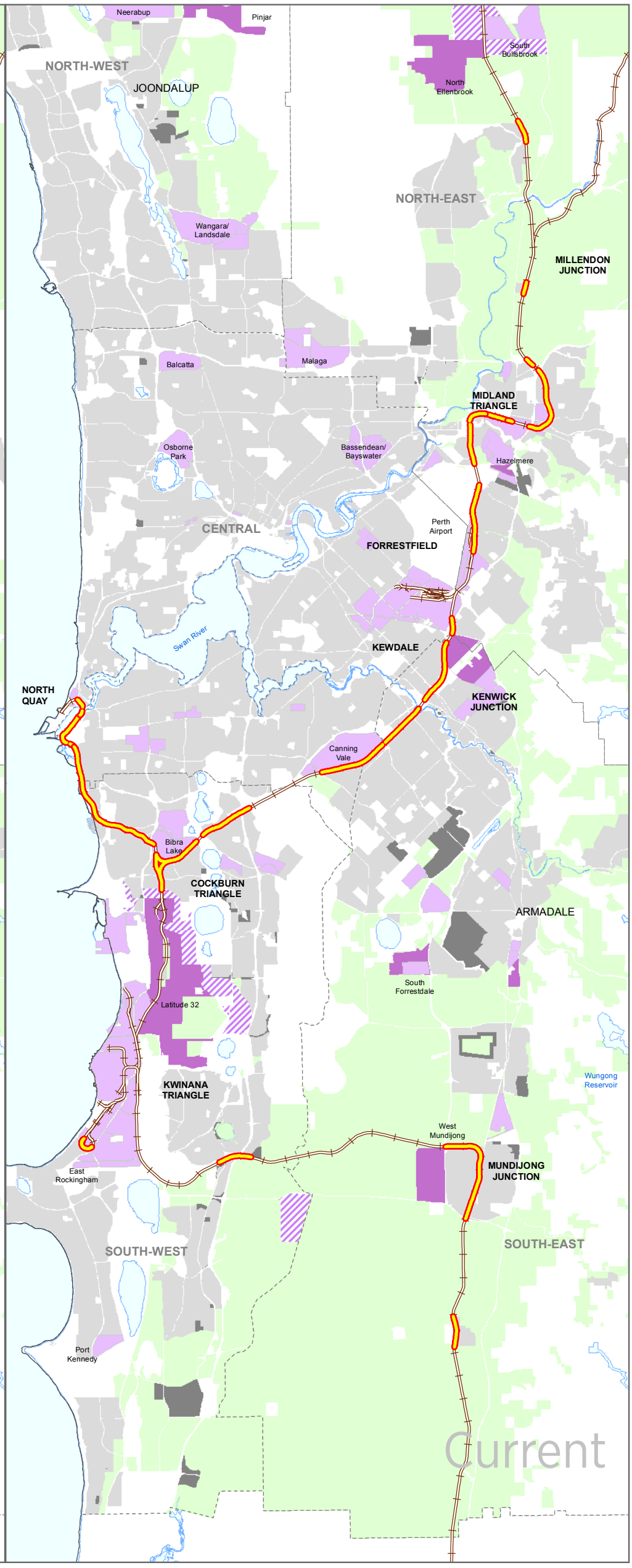
A key objective of the Perth Freight Transport Network Plan is to ensure that there are options to preserve and increase network capacity in the Western Australian planning system to accommodate projected future growth of the freight task. A consistent and informed approach to land use planning will be essential to ensure that sensitive land uses are designed in such a way that doesn't expose residential areas to unacceptable amenity impacts, leading to pressure to restrict freight operations.

The Department of Transport will focus its efforts on protecting the rail freight network, given its strategic economic and social value and the issues it faces in terms of existing and future urban encroachment, restricted land reserves and limited scope for new freight railways.

MAP 8

Interfaces Between Freight Rail and Urban Development





0 4 8
Kilometres

*freight rail interfacing urban land
freight rail network
perth and peel metro boundary
sub-region boundary

existing urban (MRS, 1984 / 2016)
urban deferred (MRS, 1984 / 2016)
rural (MRS, 1984 / 2016)

existing industrial area (MRS, 1984 / 2016)
industrial investigation
(Perth & Peel @ 3.5 Million)
industrial - expansion
(Perth & Peel @ 3.5 Million)

* indicates where urban or central city area
MRS land faces at least one side of rail

Glossary of Terms

Connectivity

Connectivity is the ability to use forms of transport to and from and between key freight centres that deliver the highest possible productivity.

Corridor

The parallel or competing modal routes between two locations (e.g. road and rail routes between two cities). A corridor is multi-modal where more than one mode operates and uni-modal where only a single mode operates (as is the case in many rural areas).

Freight Centre

The term freight centre defines a key node where intense freight and logistics activity takes place. These centres may include ports, airports, rail yards, intermodal terminals, manufacturing activity, warehouses and distribution centres. Freight centres are connected by the Principal Freight Road Network and freight rail network.

Freight Task

The freight task is the aggregate movement of freight of all kinds (bulk and non-bulk), typically over a year. There are several ways in which it can be measured. Unless otherwise specified, in this report, reference to the road and rail freight task is expressed in terms of tonnes. The port freight task is expressed in either tonnes or TEU's. All tonnages expressed are net tonnes.

High Productivity Freight Vehicle (HPFV)

A High Productivity Freight Vehicle (HPFV) is a vehicle configuration that is permitted to operate after gaining approvals through the national Performance-Based Standards (PBS) process. These vehicles must comply with approved safety and infrastructure protection performance measures. HPFVs can range from specialist rigid trucks, through to multi-combination articulated configurations.

High Wide Load (HWL)

High Wide Loads (HWLs) are over-dimensional loads up to 8m high, 8m wide and 24m long, with a maximum 270 tonne net mass.

Infrastructure

Infrastructure refers to civil engineering structures that have been built to facilitate the movement or people and/or goods for various social and business reasons.

Intelligent Transport Systems (ITS)

Intelligent Transport Systems (ITS) refers to the application of computer and communication technologies to manage transport problems. Electronic data or intelligence is collected, to provide relevant and timely information to road managers and users. ITS systems include Managed Freeway schemes, electronic tolling, driver information through GPS systems, CCTV and Variable Message Signs (VMS).

Intermodal Terminal (IMT)

An Intermodal Terminal (IMT) is a location for the transfer of freight from one mode to another. It is typically used to describe the transfer of shipping containers from road to rail and vice versa.

Light Commercial Vehicle (LCV)

The Light Commercial Vehicle (LCV) Group is defined by the Australian Bureau of Statistics as "Vehicles primarily constructed for the carriage of goods, and which are less than or equal to 3.5 tonnes gross vehicle mass". Included are utilities, panel vans, cab-chassis, and forward-control load carrying vehicles.

Major Freight Road (MFR)

Major Freight Roads (MFR) supplement Strategic Freight Roads (SFR) and are corridors which do not fit the SFR criteria. They accommodate significant freight movements and provide substantial access.

Managed Freeways

Managed Freeways is a 'toolkit' of traffic management and ITS solutions which delivers benefits to the road user, the economy and the environment. Managed Freeways aim to make the best use of the existing freeway network, particularly during times of high demand or incidents.

Metropolitan Region Scheme (MRS)

The Metropolitan Region Scheme (MRS) is a town planning scheme for land use in the Perth metropolitan area. The MRS defines the existing and future use of land, dividing it into broad zones and reservations. The MRS uses a set of maps and a scheme text. The scheme text provides planning rules for zones and reservations.

National Land Transport Network

The National Land Transport Network is a single, integrated network of land transport linkages of strategic national importance. It is based on national and inter-regional transport corridors (including connections through urban areas), connections to ports and airports and other rail / road inter-modal connections that together are of critical importance to national and regional economic growth, development and connectivity.

Net Tonne Kilometre (NTK)

Net Tonne Kilometre (NTK) is the sum of the tonnes multiplied by the distance travelled.

Network

A network is a collection of routes that provide inter-connected pathways between multiple locations for similar types of traffic. They can be multi-modal (typically comprising several uni-modal networks) or uni-modal.

Over-Size Over-Mass (OSOM)

Over-Size Over-Mass (OSOM) vehicles are a subset of RAVs that have a height, length, rear overhang, forward projection or mass exceeding statutory dimensions or mass limits. OSOM loads are commonly large, indivisible items, special purpose vehicles (e.g. cranes) or agricultural machines/implements.

Peel Region Scheme (PRS)

The Peel Region Scheme (PRS) is a town planning scheme for land use in the Peel Region. The PRS defines the existing and future use of land, dividing it into broad zones and reservations. The PRS uses a set of maps and a scheme text. The scheme text provides planning rules for zones and reservations.

Performance Based Standards (PBS)

The Performance Based Standards (PBS) Scheme offers the heavy vehicle industry the potential to achieve higher productivity and safety through innovative and optimised design. PBS is based on a vehicle's real-world performance not just its dimensions and mass, which is the basis of the traditional regulatory system. The scheme enables operators to assemble individually certified components into a unique combination to increase a vehicle's payload or length beyond standard regulated limits.

Pinch Points

Pinch points are traffic congestion points, intersections or short lengths of roads at which a traffic bottleneck exists slowing down the broader network. They can cause traffic to build-up resulting in delays at these locations and on the wider road network.

Points

A railway switch, turnout or [set of] points is a mechanical installation enabling railway trains to be guided from one track to another, such as at a railway junction or where a spur or siding branches off.

Program

A program is a suite of appraised initiatives to be delivered within a specified time frame and sequence.

Principal Road Freight Network (PRFN)

The Principal Road Freight Network (PRFN) is the freight network defined in the Perth Freight Transport Network Plan.

Rail Head/Rail Terminal

The point on a railway at which supplies are unloaded/loaded and distributed, often via another transport mode. A rail facility where rail services may commence or terminate and where cargo may be transferred between trains.

Restricted Access Vehicle (RAV)

A Restricted Access Vehicle (RAV) is one that, alone or together with any load, exceeds one or more of the following limits:

- Mass limit prescribed in Part 3 of the Road Traffic (Vehicle Standards) Regulations 2002; or
- One of the following dimension limits:
  - a width of 2.5 metres;
  - a height of 4.3 metres;
  - a length of 12.5 metres in the case of a motor vehicle that is not part of a combination; or
  - a length of 19 metres in the case of a combination;
  - any other dimension specified in the:
    - Road Traffic (Vehicle Standards) Regulations 2002; or
    - Road Traffic (Vehicle Standards) Rule 2002.

Rolling Stock

Rolling stock refers to all vehicles that move on rail, including powered (locomotives) and unpowered (wagons) rail vehicles.

Route

A route is defined as a physical pathway connecting two locations for a particular mode. In land transport, this consists of a continuous length of infrastructure (e.g. road, rail line). In shipping and aviation, it is delineated by operating or regulatory or administrative practices (shipping lane, air route).

State Regions

Western Australia's State Regions as defined by the Department of Planning comprise the regions of Kimberley, Pilbara, Gascoyne, Mid West, Goldfields Esperance, Wheatbelt, Great Southern and South West, as well as the regions of Perth and Peel. The Perth Freight Transport Network Plan focuses on the Perth and Peel regions, which are also referred to as "Perth", "Metropolitan" and "City" throughout the Plan.

State Road Network

The State Road Network consists of Declared Highways and Main Roads, which form the primary road network for Western Australia. Main Roads Western Australia manages this network on behalf of the State. Public roads not part of the State Road Network are generally local roads managed by local government or minor roads managed by other State Government agencies.

Strategic Freight Road (SFR)

Strategic Freight Roads (SFRs) are high-productivity routes in terms of tonnage, volumes and value. These key corridors will connect strategic heavy industrial areas, heavy fabrication centres, major intermodal terminals, freight hubs, multi-user ports, resource provinces and regional centres.

TEU (Twenty-foot Equivalent Unit)

Twenty-foot equivalent unit (TEU) is the international measurement based on the volume of a 20 foot long international container.

Department of Transport
Phone: 08 6551 6000
Email: info@transport.wa.gov.au
www.transport.wa.gov.au

Department of Transport
Public Transport Authority

mainroads
WESTERN AUSTRALIA

Public Transport Plan

Transport @ 3.5 Million

July 2016

This page is intentionally blank

Table of Contents

Executive Summary

The Public Transport Plan (the Plan) proposes a rigorously tested and integrated public transport network, capable of efficiently moving people around the Perth and Peel regions at a population of 3.5 million. It was prepared to support the development of *Transport @ 3.5 Million* – the Perth Transport Plan for 3.5 million people and beyond.

The Plan gives a background into the strategic context and history of the delivery of the Plan, and stresses the importance of public transport as a vital aspect of an integrated and healthy transport system. While assessing the existing system, and planning principles that underpin a world class system of a comparable size (around 3.5 million), the Plan highlights the complementary projects underway or planned.

The Plan then details the proposed enhancements to the public transport system that will be required, by population milestones of 2.7 million, 3.5 million people, and beyond 3.5 million. Many projects have been included in previous plans, and despite the changes in land use proposed by the draft *Perth and Peel @ 3.5 million* planning frameworks, are still justified. Several major mass rapid transit proposals have not been justifiable before a horizon of 2031 or without the changes in land use, and so are now proposed for the first time.

Of note, the Plan proposes:

- Extensions to the Midland, Armadale, Thornlie, and Joondalup heavy rail lines;
- A new heavy rail line through the North East corridor;
- A new orbital rail line connecting the Thornlie Link Extension and Stirling City Centre;
- A Light Rail Transit service connecting University of Western Australia (UWA) to Canning Bridge via the Perth Central Business District (CBD) and Curtin University; and
- A separate Metro (subway) system within the area surrounding the Perth CBD in the longer term.

The Plan assesses whether the proposed public transport network achieves the required targets set for it, and complements the strategic planning frameworks.

The Plan represents a substantial body of work undertaken by the Transport Portfolio to understand the public transport needs for a city of 3.5 million people. However, significant further work is required to confirm the viability and functionality of the proposed network, and to further prioritise investment. This work will continue beyond the release of the Plan.

1. Introduction

In 2015, the Western Australian Planning Commission (WAPC) released the draft *Perth and Peel @ 3.5 Million*, a suite of documents laying out the future planning direction of the Perth and Peel regions to a population of 3.5 million. Following this release, the Department of Premier and Cabinet (DPC) released the *Perth and Peel Green Growth Plan for 3.5 Million*, the strategic environmental assessment of proposed infrastructure identified as being required to support the land use plan.

These planning documents included a preliminary transport assessment. In late 2015, technical experts from the Transport Portfolio were assembled with the goal of proposing a rigorously tested and integrated transport network, capable of efficiently moving 3.5 million people to and from work, home, school, and around the Perth and Peel regions.

This Public Transport Plan (the Plan) forms part of the resultant suite of documents (along with a road network plan, cycling plan, freight plan and travel demand management plan) that support the overarching outcome report, *Transport @ 3.5 Million* – the Perth Transport Plan for 3.5 Million People and Beyond.

Transport @ 3.5 Million aligns with the draft *Perth and Peel @ 3.5 Million* planning frameworks and may need to be updated in line with the WAPC/Department of Planning's finalised planning frameworks as they become available.

2. Project overview

2.1 Scope of Public Transport Plan

The Plan highlights several mass transit network enhancements as identified by both the Transport Portfolio and through an independent assessment by the Planning and Transport Research Centre of WA (PATREC), and the lower tier public transport network intended to support such a system. This includes corridors that have been identified as requiring priority for transit (such as queue jump lanes for buses).

The Plan considers the public transport network that would be required at three separate timeframes, based on population thresholds: by 2.7 million, by 3.5 million, and beyond. Hence, while the Plan identifies projects that should be operational by each time bracket, it does not make recommendations on the relative priority of each project within the timeframes. While the report considers the networks at population targets rather than cut-off dates, the population of the Perth and Peel region is currently expected to reach 3.5 million around 2050. Hence, the terms '3.5 million' and '2050' are used interchangeably.

As a strategic and long term document, the Plan must at times be purposefully high level. Preferred alignments, station locations, land impacts and other similar details can only be determined after substantial further work within the Transport Portfolio, which has not yet been completed for all future projects. To make detailed and precise recommendations concerning such large and strategically important projects, some of which are not likely to be justified for up to four decades, would be misleading. Project costs are highly spatially and temporally variable, and as such require significant further investigation before hard numbers are used to compare similar options and make value for money judgements.

The Plan does not comment on improvements that will need to be made to existing infrastructure in order to implement the proposed network, except to highlight several strategically important projects identified in the Public Transport Authority (PTA)'s Route Utilisation Strategy. As an example, these projects include overhauls to the signalling system and vertical transport improvements at CBD stations, both of which will be critical to improve the throughput of Perth's existing heavy rail lines.

While the alignments and operating characteristics of local bus routes are a necessary consideration in modelling the proposed networks, the Plan recognises that such details are flexible and responsive to changes in community expectations and demand, and hence inappropriate to be discussed in detail in such a long term document.

This Plan is based on the *Perth and Peel @ 3.5 million* suite of documents and land use projections. Any alteration to those plans, or failure to achieve targets, may necessitate a change in this Plan. For example, if population density increases in the inner city area faster than projected, then inner city enhancements (such as a CBD based subway system) may need to be brought forward.

The Plan should be read in parallel to the other documents prepared to support *Transport @ 3.5 Million*.

2.2 Mass Transit Research Study

To inform the public transport component of *Transport @ 3.5 Million,* the State Government requested specialist researchers from PATREC to undertake a high-level study. The study provided a recommended mass transit network plan with documented justification, which along with other internal work was used by the Transport Portfolio as a guide for ongoing planning and design, and the development of staged implementation.

The study undertaken by the PATREC research team consisted of specialists from UWA and partner universities, with participation of personnel from the Department of Transport (DoT), Department of Planning (DoP), PTA, and Main Roads WA (MRWA).

The objective of the mass transit research study was to research, evaluate, and advise on options for the primary mass transit network to serve the Perth and Peel metropolitan region to cater for a population of 3.5 million and beyond as set out in *Perth and Peel @ 3.5 million*. Due to the long term (35 year) planning horizon, the study produced a high-level research report to provide guidance for more detailed work to follow in future years. There was reference in the research study to the findings of other relevant studies which have noted the need to encourage urban development close to employment centres and transit nodes. The long-term planning horizon in the study required that it be 'broad-brush' with a realistic order of accuracy in estimates of population and employment. It used simple calculation tools such as empirical patronage models.

Being unconstrained and stepping back for the wide view, the project took a fresh look at long-term planning of mass transit in Perth. There was flexibility as the future primary mass transit network was not constrained to use current road and rail corridors, but could involve routes aligned with major roads or in underground or other corridors. The research was also not restricted to one mass transit movement modal option.

The key activities undertaken by PATREC were:

- Obtained an understanding of *Perth and Peel @ 3.5 million* and relevant transport and land use studies
- Investigated Transit Mode effectiveness and provided advice about the effect on patronage, general traffic, and urban amenity of light rail, bus rapid transit, and bus priority using routes such as dedicated corridors, high capacity divided roads and four or two lane undivided roads. Advised on the advantages / disadvantages of those modes plus heavy rail with respect to optimum operating length, capacity, frequency, station / stop spacing, peak and peak-of-peak relationship, and circle / radial mix.
- Patronage forecasting – reviewed options and testing for a long-term planning horizon
- Assessed capacity limitations on the existing network
- Tested network options, by applying network options to land use to iteratively test accessibility and service delivery against hub linkages and catchment servicing, travel time, transfer opportunities, service frequency, and effective operating hours

- Undertook sensitivity testing to determine effect on patronage of variations in employment growth and spatial distribution
- Undertook a literature search on the impact of technology and social change over time
- Developed a layout of the Perth city network configuration
- Reported on the findings

3. Strategic context

3.1 Imperatives for action

A long term view on the future of public transport and a commitment to develop the network and system is essential because:

- Projected population growth out to 2050 remains strong, despite the recent slowdown in economic activity.
- We need to plan for a continually growing city in the short, medium, and long-term. This expectation is clearly identified in the WAPC's *Perth and Peel @ 3.5 million* report and sub-regional frameworks.
- Traffic congestion will continue growing at significant economic cost. In 2015, the avoidable social cost of Perth's congestion was estimated to be $2 billion. By 2030 this figure will more than double to $4.4 billion - $5.7 billion [1]. Steps taken to reduce congestion will have a significant positive impact on productivity, especially in inner and central areas.
- Road transport contributes some 11 per cent of Western Australia's total greenhouse gas emissions, with just over half of this being emitted from cars [2]. Encouraging a greater uptake of public transport by making a high quality transport system available to more people will make a significant contribution to the reduction of greenhouse gases.
- It is financially prudent to have a plan that guides the State's investment in public transport to ensure robust and 'fit-for-purpose' investments are made, and for those investments to maximise the efficiency of the system.
- Strategic alignment between projects is necessary to help secure support from stakeholders, including Federal Government.

4. Importance

An effective public transport system is essential for the long-term health, vitality, and sustainability of Perth.

4.1 Moving people

Perth has developed as a linear city. The Perth and Peel metropolitan area now stretches 150 kilometres from Bouvard in the south to Two Rocks in the north [3]. In area, Perth is one of the largest cities in the world. Its elongated shape means that residents travel long distances for work and other purposes. Development in Perth, particularly on the urban fringe, is characterised by low density residential suburbs, with limited land use diversity. These suburban tracts have limited employment opportunities and many people have to commute long distances for work, with nearly one quarter of workers residing in the Peel and outer metropolitan subregions commuting to the inner subregion [4].

The central city area (including Northbridge, East Perth and West Perth) is the dominant employment generator in Perth and provides approximately 125,000 jobs (Figure 1). This represents 18 per cent of all jobs in the metropolitan area. Most of these jobs are white-collar, retail, or service industry jobs. The current public transport network supports and reinforces the concentration of employment, residential, and commuter activity in the central area.

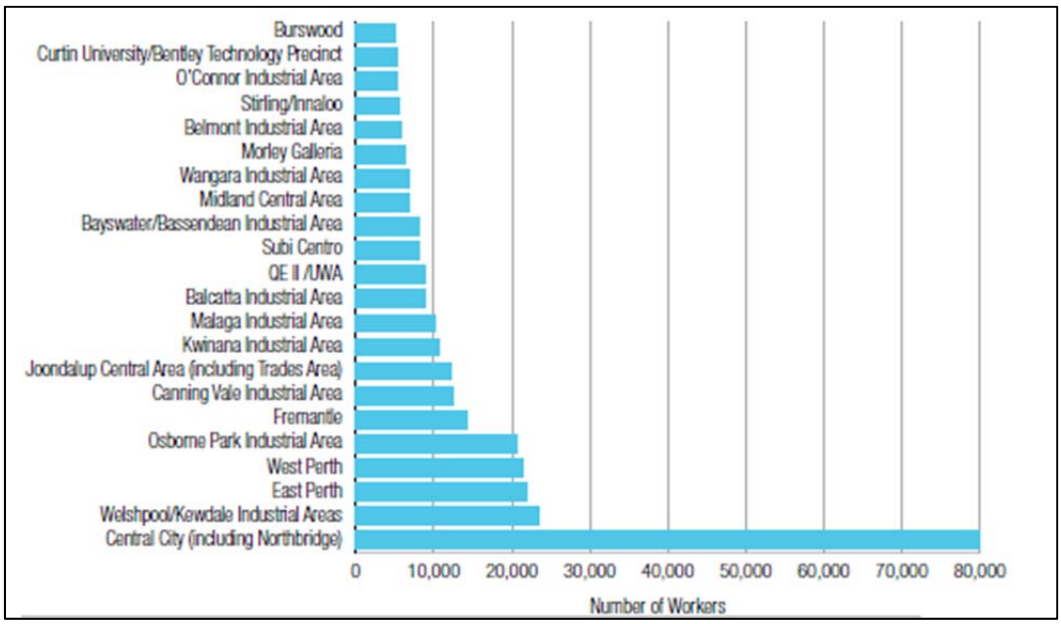


Figure 1: Employment centres with greater than 5000 workers (Australian Bureau of Statistics, 2010)

Residential densities of inner-metropolitan Perth will continue to increase, as will the population of the outer suburban development regions. It is important that public transport addresses both of these growth challenges and that development responds to the location of transport infrastructure to ensure accessibility.

In addition to moving commuters, public transport has an important role to play in improving the mobility of people who may not have access to any other form of transport, those who cannot afford a car, and those who choose to use alternative transport. Public transport provides access to essential education, health, and social services.

4.2 Managing congestion

Over the last few decades Perth has experienced growth in the levels of traffic congestion. The dominance of the central city area as an employment centre for much of Perth's white-collar and service industries, along with a predominance of private car usage, has resulted in significant peak period traffic.

Currently the public transport network is focused on the central city area, with the majority of trips occurring within 15 km of the Perth CBD. During the peak-hour 17 per cent of the distance travelled is by public transport; it is much higher to the Perth CBD (over 60 per cent) and along major transport corridors such as the Mitchell Freeway / Joondalup Line (50 per cent).

On major road corridors feeding into the CBD (such as Fitzgerald and Beaufort Streets), bus services are carrying up to 70 per cent of the people in 5-10 per cent of the total number of vehicles on the road.

Public transport already makes a significant contribution to commuter travel in the busiest areas of Perth. Its contribution to limiting congestion will increase in the future as the city grows.

The Joondalup Line currently carries the equivalent of seven lanes of freeway traffic in the peak period.

4.3 Creating development opportunities

Public transport is a catalyst for more intensive and diverse land uses.

Transit-oriented development provides a focus on higher density development around well-serviced transit nodes. It is important that Perth locates more of its population close to transit services to enable mobility alternatives. Higher density developments around transit nodes increase accessibility to the network for more people, whilst contributing to housing diversity and affordability and balancing low density urban development on the city's fringes.

Higher residential densities around transit nodes provide more people with the opportunity to walk or cycle to public transport. These mixed-use precincts also offer employment opportunities for locals, and for people to access public transport, making these both origin and destination hubs.

Mixed-use developments in these areas provide people with employment opportunities and access to goods and services while reducing dependence on cars.

It is recognised that access to parking at public transport stations is important, and certain stations are good locations for park-and-ride centres where development opportunities are limited, such as within large freeway interchanges. Other station sites are appropriate for development opportunities where mixed-use precincts can be created and the station is fed by a high frequency bus network.

Subiaco Station and the creation of Subi Centro provides a model of how urban redevelopment and transit-oriented development can lead to higher public transport use - more people now live near the station and more jobs are available. Patronage has more than doubled from 1,600 boardings per day before the development to 3,300 boardings per day in 2015 (October).

Joondalup is another example of where a station has been located close to employment, shopping, and residents. Around 6,000 people per day board trains at this station with many journeys originating or destined for locations within 800 m of the station. There are also a high number of bus passengers travelling to both the station and the Joondalup City Centre.

4.4 Connecting centres

Not all people want to travel to the central city area. University and school students, people who work at strategic centres, and those who wish to access goods and services from other areas of Perth all have public transport requirements that may not be met adequately by a radial system.

A public transport network that provides east-west as well as north-south connections will open up opportunities for many more travellers for work, education, and other purposes. The construction of the Mandurah Line allowed the bus network in the southern suburbs to re-orient in an east-west direction between the Armadale Line and Fremantle, providing important cross-city connections to major centres such as Murdoch and Cockburn.

4.5 Environmental and social benefits

Studies, such as the *Garnaut Climate Change Review* (2008), highlight that Australian cities are among the most car dependent in the developed world. Road transport contributes some 11 per cent of Western Australia's total greenhouse gas emissions, with just over half of this being emitted from cars [2].

Wider environmental benefits, including improved air and water quality and a reduction in noise pollution, can improve the local environment and help to mitigate the negative health impacts experienced within the community from increasing carbon emissions and other particulates associated with motorised transportation.

Public transport has the added benefit of promoting more active lifestyles simply by encouraging individuals to walk or cycle to the bus stop or train station. Research

indicates that public transport commuters will, on average, have seven times more incidental exercise than private motorists. These associated personal fitness benefits may lead to improvements in individual health, thereby reducing the burden on the health system.

Greater use of public transport, and consequent reductions in car travel, can have a positive impact on the number of road fatalities and serious injuries and the resultant costs of road trauma.

5. Aims of the future public transport system

Public transport will continue to play a vital role in Perth and Peel, with large numbers of passengers moving through the metropolitan area using an efficient, reliable, and sustainable integrated network of railways, bus lines, and ferry routes. The share of daily trips carried by the future public transport network will be almost twice what the current system handles. Taking into account population growth, the future network needs to account for about four times the number of journeys that it does currently.

The growth in patronage will obligate a fundamental shift in the nature of public transport operations in the city, as the efficient movement of large numbers of people become an increasingly important focus. Infrastructure such as Automatic Train Control (ATC) and exclusive bus lanes will be necessary to improve the reliability and capacity of the system as a whole.

The proposed public transport system will be built conceptually as a grid of high frequency lines, running independently, and integrated at transfer points such as bus / train stations and terminals. Transfers between different services will become an increasingly prevalent experience for passengers, further building on one of the key strengths of the existing system. As such a network affords operating efficiencies, it is expected that passengers will be able to access a higher provision of faster services which more than offsets the 'transfer penalty', often used as an argument for one seat rides. Transfer points also represent an access point for cyclists to utilise public transport for part of their journey, and an increased provision of bicycle storage facilities is expected to increase the attractiveness of both the public transport and active transport networks.

The attractiveness of a public transport system is relative to the alternatives available to potential passengers. If congestion worsens for private car drivers and their passengers, the relative attractiveness of the public transport system increases, which in turn leads to increased levels of service to accommodate the growth in demand. Investing in the public transport network will increase its convenience, and potentially decrease the level of congestion that drivers will tolerate before switching to public transport. In short, by investing and improving the public transport network, the predicted growth in traffic congestion across the city can be slowed.

The public transport system should set key activity centres as focus points for demand, and recognise that the provision of infrastructure can stimulate development in these areas.

Finally, planning should seek to make the system intuitive and legible, increasing the viability of the system to attract impromptu journeys. To this end, provision of services should focus on creating high frequency corridors to link strategic activity centres and public transport nodes.

6. Committed projects

A number of committed and funded public transport improvements are underway.

6.1 Perth City Link

As part of the Perth City Link development project for city centre land between Wellington Street and Roe Street, all rail lines between Perth Station and King Street have been located underground. A new underground bus station will replace the Wellington Street Bus Station and enable the inner-city development and construction of public spaces in this prominent location. This project has been part funded by the Federal Government and the City of Perth, demonstrating how the three levels of government work together.

6.2 Forrestfield-Airport Link

The Forrestfield-Airport Link will connect with the existing Midland line near Bayswater Station and will run to Forrestfield through underground tunnels. There will be three new stations on the line: Belmont; the Airport Central Terminal Station (below ground at the current international terminal, where all domestic and international flights will be co-located in the early 2020s); and a terminus station in Forrestfield. The supporting bus feeder network and provision of up to 3,000 Park 'n' Ride bays between Belmont and Forrestfield Stations will extend the effective reach of the rail network to the eastern suburbs, from Belmont to Kalamunda. The line will also effectively provide extra rail services from Bayswater, relieving capacity issues in the inner core of the Midland and Fremantle lines.

6.3 Aubin Grove Station

The Aubin Grove Station will be located at the intersection of Russell Road and the Kwinana Freeway, 26km south of Perth. To cater for the projected traffic increase in the area, PTA is working with MRWA to upgrade Russell Road, improve the intersection and create a dedicated access into the new station car park. Delivering these pieces of work together will minimise public disruption and create cost efficiencies.

Features of the project include:

- A multi-modal station with approximately 2,000 Park 'n' Ride bays
- Six bus feeder services into Cockburn and Aubin Grove stations
- Bicycle facilities and connections to local paths
- Passenger amenities, including toilets, lifts, stairs and escalators

Construction began in 2015 and will be completed in early 2017.

6.4 Train station parking

Parking at train stations is being increased to better cater for demand. A multi storey Park 'n' Ride facility at Edgewater Station, to provide for approximately 1,000 car bays, is being constructed.

Works are also underway to increase parking at Guildford Station by 360 bays.

The number of car parking spaces at future train stations will need to remain flexible until the ultimate planning for the land has been undertaken by the Department of Planning.

6.5 Charles Street Bus Bridge

The Charles Street Bus Bridge project involves construction of new bus lanes including a (approximately) 110m bus bridge over Graham Farmer Freeway (from Charles Street to the existing James Street bus bridge) and 500m of bus lanes on Charles Street, replacement of the James Street freeway off-ramp with a new off-ramp onto Roe Street, and intersection works. This project is expected to improve travel times and reliability for over 1,200 bus services carrying almost 16,000 passengers per day from Perth's northern and north-western suburbs, and to also alleviate congestion for cars in the busy Northbridge area.

6.6 Additional Rolling Stock

Delivery of an additional 22 three-car train units commenced in 2013/14 and is largely complete.

6.7 Perth Stadium transport infrastructure

Perth Stadium is being constructed to accommodate a crowd of up to 60,000 people and access by private vehicle will be limited. The most effective ways for people to arrive and depart the site are directly by public transport and on foot to access either public transport and / or car parking at other locations. Perth Stadium presents an opportunity for PTA to concurrently develop the transport solution within a new precinct at Burswood, rather than retrofit it into an existing constrained space.

This is being achieved through a $359 million integrated train, bus, and pedestrian approach to provide spectators with multiple transport options, promoting a cultural shift from reliance on cars, to move up to 50,000 people, or 83 per cent of a capacity crowd, following the end of an event. By applying a "tentacles of movement" philosophy, spectators will be widely dispersed rather than surging together in one direction, ensuring fast and safe transfers and reducing the impacts on nearby residential and environmental areas.

6.8 Ellenbrook Bus Rapid Transit (BRT) – Stage One

The Ellenbrook BRT system includes dedicated transit infrastructure as well as new infrastructure for general traffic to alleviate localised congestion, providing more consistent journey times for local bus services. The BRT will run on a two lane continuous dedicated, grade separated bus transit way from the Ellenbrook Town Centre to Marshall Road, totalling approximately 9km. It will include bus stations at:

- Ellenbrook Town Centre (bus interchange, no parking)
- Gnangara Road (300 Park 'n' Ride bays, with provision for overflow)
- Marshall Road (100 Park 'n' Ride bays)

Grade separation will be provided at:

- Gnangara Road
- Park Street
- Youle-Dean Road

The construction of New Lord Street in the form of a single carriageway linking between Gnangara Road and Reid Highway will provide localised congestion relief ensuring local buses can provide a more consistent journey linking to and from the BRT transit way.

Services will continue beyond the new BRT corridor to reach communities throughout the North East, connecting Ellenbrook directly to Bassendean and Midland rail stations, and to the Morley Activity Centre.

7. A network for 2.7 million people

7.1 The vision

Perth and Peel are rapidly approaching a population of 2.7 million. Several bodies of work have previously identified the public transport network required by this stage. However, as time passes and new data and forecasts are refined, it is appropriate to re-examine previously recommended networks in the context of the draft *Perth and Peel @ 3.5 million* land use data. Therefore, no proposed future projects such as the Yanchep extension, or Thornlie to Cockburn Central Link were simply assumed. As the Forrestfield-Airport Link is a funded and committed project, it was considered as part of the existing network for the purposes of this Plan.

The proposed mass rapid transit network expands and builds on the existing heavy rail network, with targeted extensions to existing lines, as have been identified in previous public transport plans. The East Wanneroo Rail Link is a new railway, proposed to connect the currently under-served North East corridor to the rail network and the current preferred option is outlined below, which will be subject to further work before the alignment is finalised.

By 2.7 million, the first stage between Marshall Road and the Perth CBD (via Morley) is proposed, with later stages to be constructed as required in order to serve future growth areas and to relieve demand pressures on the Joondalup Line.

7.2 Rapid transit

7.2.1 East Wanneroo Rail Link (Stage 1)

East Wanneroo Rail Link (EWRL) is a proposed radial link in Perth's suburban railway system. Required in full by the time the population of Perth reaches 3.5 million, the railway is proposed to fulfil several strategic needs:

- **To connect the under-served north east quadrant to the wider rapid transit network:**

  By connecting the north east quadrant of the city to the wider rail network, significant gains in public transport mode share can be expected. It is expected that a rail link will reduce congestion on the surrounding road network, and relieve pressure on complementary public transport services, such as the 950 Superbus.

- **To relieve pressure off the Joondalup Line, which will reach practical capacity limits:**

  It is expected that, despite significant planned improvements to the capacity of the existing system, the Joondalup Line will be experiencing significant pressure when the city passes a population of 2.7 million. As planned improvements will have lifted the capacity of the suburban system to practical limits with respect to potential trains per hour, the only remaining option to supplement the capacity of the railway is to construct a supporting railway. By connecting the EWRL to the

Joondalup Line as a stage 2 expansion, passengers from the northern extremity of the railway will be afforded a faster and less congested option. By shifting these passengers onto the new railway, capacity is opened to passengers further south down the Joondalup Line.

The north east quadrant is currently not served by rapid transit. The popularity of routes such as the 950 Superbus, highlight a strong demand for fast, reliable public transport in the area. As areas such as Morley continue to grow and develop into strategically important centres, a rapid transit line will become necessary in order to move large numbers of people accessing the area. Surface public transport options will continue to operate, as the EWRL is not intended to fully replace any existing or planned transit line, but rather supplement and relieve overcrowding on such lines.

The long term need for a railway in the north east quadrant has been identified for some time, and work has previously been undertaken on the refinement of alignment options and the modelling of expected patronage for each option. Several potential alignment options were investigated and compared.

All options were found to have inherent advantages and disadvantages. For example, an alignment under Mirrabooka would be more direct, however the length of tunnelling required will be extensive (and therefore more costly). Opportunities for Park ‘n’ Ride and large bus transfer stations would also be limited by the current built up nature of the area. However, an alignment along a major road would likely inhibit opportunities for Transit Oriented Development, particularly if the railway is located in the median. The balancing of such competing interests was considered in the investigation.

As a result of the investigative work to date, the following alignment is preferred. Further more detailed analysis and master planning will be required in coming years to finalise the definition of, and to ultimately protect, a final alignment.

Running along the Joondalup line from Yanchep the alignment branches off from a transfer station between the Butler and Clarkson stations. It then follows the corridors of the Whiteman-Yanchep Highway and Northlink WA, with stations at East Wanneroo, Gnangara Road, and Marshall Road. This alignment would then enter a tunnel just north of Morley Drive to a station in the Morley centre. From there, the railway would travel under Walter Road West to a station at ECU Mt Lawley. A central city station near the existing Perth station complex would connect the railway to the wider rapid transit network. The railway would then connect to the Armadale line, creating extra capacity in that line by removing the inefficient dead end terminus at Perth.

At this point in time, allowance has been made by MRWA for a railway in the median of the Tonkin Highway from Morley Drive northwards past Marshall Road. This allows planning and refinement of options to continue without planned infrastructure (such as bridge piers) constraining the possible alignment of the future railway (Figure 2).

While the relief of the Joondalup Line is not expected to be needed until after the city passes 2.7 million, increasing the reach of the rail network to the north east is expected to be required before this time. Consequently, it is expected that the railway would be delivered in two or more stages, with the first stage from the CBD to a station near Marshall Road, via Morley.

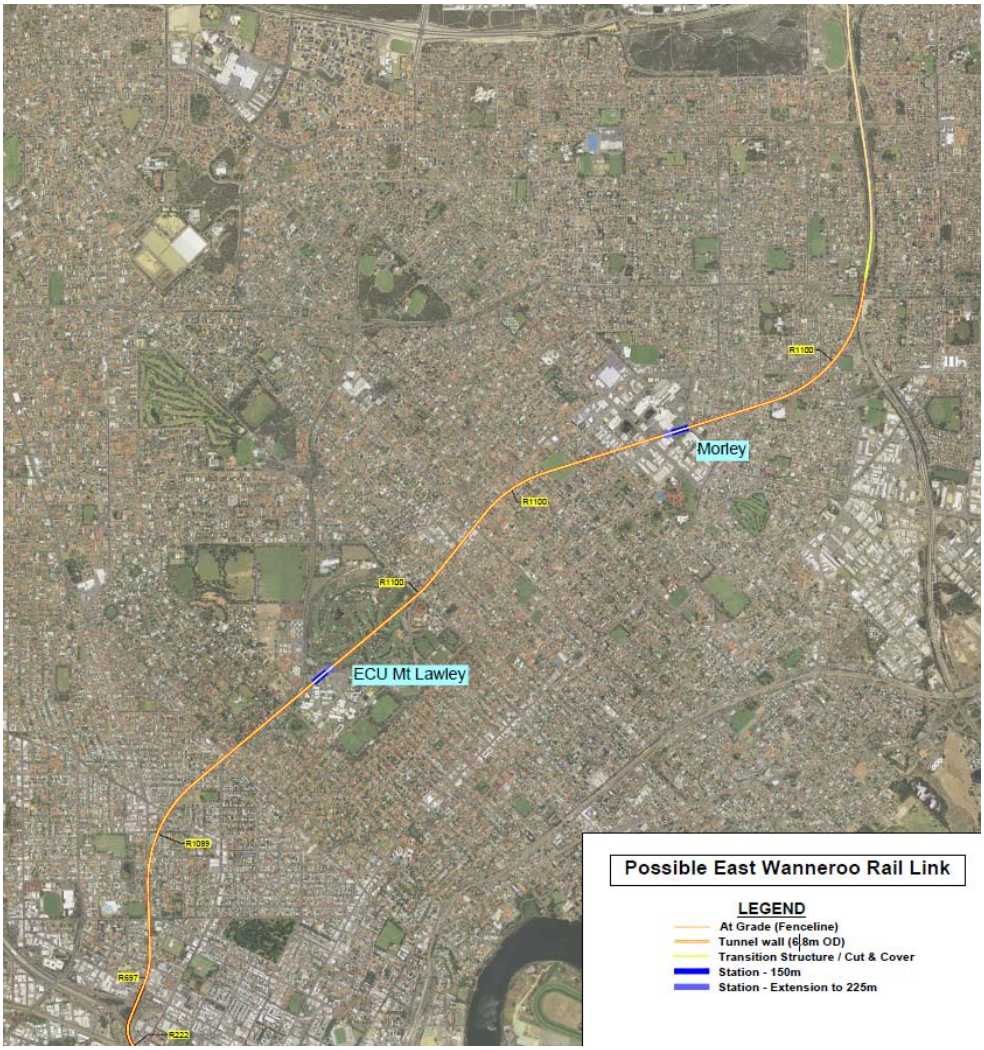


Figure 2: Possible East Wanneroo Rail Link Alignment

7.2.2 Bellevue Extension

The extension of the Midland Line to Bellevue would allow the railway to serve a greater number of people who work or reside east of Roe Highway.

Provision of Park 'n' Ride facilities at Bellevue would relieve pressure on facilities at Midland Station, as well as remove vehicular traffic from the Midland Activity Centre. The access strategy for bus passengers (particularly those arriving from the south) will be a critical future body of work.

Allowance would need to be made for TransWA regional services and the Indian Pacific, with a standard gauge platform at either of the proposed new stations. If a new level crossing is to be created at Cale St, then the existing level crossing at Helena St would need to be removed, to avoid an increase in the number of level crossings in the urban network.

7.2.3 Thornlie Link Extension

The proposed Thornlie Link Extension (TLE), originally proposed in the *South West Metropolitan Railway Master Plan and Appendices* (April 2000) as part of the Kenwick alignment option for the Mandurah Line, is an extension of the existing Thornlie Line. The TLE will deliver 17.5km of new rail line, linking Thornlie Station to Cockburn Station, via two new train stations (Nicholson Road Station and Ranford Road Station). The work will involve duplication of the 3km of existing single track from Beckenham to Thornlie, construction of two new freight tracks with conversion of the existing freight tracks to passenger tracks from Thornlie to Glen Iris, and a 3.5km extension to Cockburn Central Station.

The TLE will predominantly follow the Midland to Kwinana freight line, which will be shifted to the north of the rail corridor. Nicholson Road Station and Ranford Road Station will be built, and modifications will be required at Thornlie Station and Cockburn Central Station to facilitate the new TLE. The TLE will form an integral component of an expanded rail network serving residents in growth areas in the southern suburbs, and provide the first east-west rail connection in Perth's network.

7.2.4 Yanchep Extension

The planned extension of the Joondalup Line to the future major metropolitan strategic centre at Yanchep involves approximately 13.8km of new dual track, including stations at Alkimos, Eglinton and Yanchep. The project is expected to cater for the significant urban growth proposed and already underway in the area, and provides an alternative travel option, helping to mitigate against large numbers of private vehicle trips causing congestion on the road network.

7.3 Semi-rapid transit

7.3.1 Perth Light Rail

By the 2.7 million population horizon, there will be a need for an inner orbital rail link. This should be a road-based Light Rail Transit (LRT) orbital connecting UWA-Queen Elizabeth II (QEII) Medical Centre via the central and eastern CBD, Victoria Park, and Curtin-Bentley to Canning Bridge (a substantial portion of this route was committed as part of the original MAX Light Rail project). This would provide transfer opportunities from the rail-based radial network and the northern corridor at West Perth (with connection to Fremantle), Perth Underground/Central railway stations, the new Perth Busport, the eastern CBD and Canning Bridge. These opportunities for transfers would also provide relief to the congested central CBD stations.

7.4 High Priority Public Transit Corridors

As bus services are progressively developed along the proposed network there will be a need for transit priority along a number of other routes not served by semi-rapid

services. As a result this Plan has identified the requirement for bus priority along key corridors that connect a high number of transit passengers to activity centres and key destinations, including Strategic Centres such as Perth, Stirling, Fremantle, Yanchep, Joondalup and Mandurah, and Specialist Centres such as Murdoch, Curtin University and ECU. Priority will be provided to those major routes connecting to and from the heavy rail network. High Priority Public Transit Corridors are planned along the following routes:

- Whitfords to Joondalup and Warwick
- Marshall Road to Bassendean and Morley
- Scarborough to Stirling
- Central Northern Corridor to the City
- Stirling Highway between Claremont and UWA
- Canning Highway between North Lake Road and Canning Bridge
- Improvements to key sections of the Circle Route
- Murdoch to Canning Vale
- Central Perth City improvements
- Murdoch to Fremantle
- Cannington to Curtin University
- Fremantle to Cockburn Coast
- Armadale to Cockburn
- Baldivis to Warnbro Station

Further details on High Priority Public Transit Corridors can be found within the Road Network Plan.

7.4.1 William Street

William Street between Wellington Street and St Georges Terrace is currently a high density corridor for the bus network, and will continue to grow, serving as a link between the new underground bus station and Elizabeth Quay Busport as well as a central bus hub for Perth centre. A Transit Zone including access for taxis and cyclists is proposed for William Street between Hay Street and Murray Street, which will see this central section of William Street devoid of general traffic, providing a reliable bus journey along this important central city corridor.

7.4.2 Bus access to train stations

As the city grows and builds on the success of the existing network, many bus and train transfer stations will come under pressure in peak periods. With both land and road space at a premium, opportunities to increase the provision of Park ‘n’ Ride bays will be limited. As such, the supporting transit network will need to shoulder the largest share of additional passengers, along with increased levels of walking and cycling. Stations

such as Joondalup, Warwick, Stirling and Mandurah will handle high bus passenger volumes (over 1,500 passengers per hour in one direction by 3.5 million), and will need exclusive bus lanes on approach to stations, to ensure reliability and priority. Additional bays for stopping and layover within station areas will also need to be investigated based on operational requirements.

7.4.3 Charles Street

Once the Charles Street bus bridge has been completed, the resulting improvement in run times and reliability is expected to increase demand for public transport along the Charles Street corridor. To build on this effect, an exclusive bus lane is proposed along Charles Street in the southbound direction. This lane would be in addition to the four existing traffic lanes, and would extend from Vincent Street to at least Angove Street, and likely as far as Walcott Street. It is possible that queue jumps may be an alternative north of Scarborough Beach Road/ Angove Street, but this will be subject to further discussion and modelling.

7.5 Stations and interchanges

7.5.1 Canning Bridge Bus Interchange

A new segregated bus station is proposed at Canning Bridge, to allow for the safe and convenient transfer of passengers between the bus, heavy rail and light rail networks. As a central point of connectivity between bus operations servicing key areas such as Curtin University and the Mandurah Line, investment in public transport infrastructure at this location is key. Supporting long term investments in public transport in this precinct will also be central to realising the Canning Bridge Vision and Activity Centre Plan, which requires a balanced approach to transport and reliance on the realisation of mode share targets that see lower auto-dependency. The proposed bus station has capacity for 16 bus bays (including layovers), and will improve passenger safety transferring between the available mode choices.

7.5.2 Belmont Bus Station

Demand for public transit within the City of Belmont is expected to grow considerably, and will be served largely by a frequent and efficient bus network, with connections to surrounding train stations at Belmont, Oats Street, Bayswater and Maylands. The resulting increase in service will entail a requisite need for a larger bus facility. This would likely need to be off street, to prevent general traffic impacts on bus movements. A location for such a facility has not yet been established, and further work is required to identify a suitable site. However, proximity to the Belmont Forum and facilities proposed in the Faulkner Civic Precinct Masterplan would be a probable requirement.

8. A network for 3.5 million people

8.1 The vision

The public transport network for Perth and Peel at a population of 3.5 million people builds on the enhancements required by a population of 2.7 million, extending and connecting the mass rapid transit network to close gaps in the network. Improved connectivity between lines is emphasised, as passengers are offered multiple routes to reach certain destinations. Without significant investment and alternative options for passengers, the popularity of the Joondalup and Mandurah lines would begin to manifest as severe overcrowding and reliability issues. The EWRL and Stirling to Murdoch Link are therefore proposed to offer attractive alternatives to the existing lines, and draw patronage off the overcrowded sections.

As the Peel region continues to grow, public transport demand will grow to sufficient levels to warrant high quality semi-rapid transit, and relevant links are proposed at this time. Although the need for a second suburban railway through the area is not envisaged by the 3.5 million horizon, failure to reach employment self-containment targets would likely result in more residents seeking to access employment in the inner areas and as a result, may necessitate bringing forward such a project.

8.2 Rapid transit

8.2.1 East Wanneroo Rail Link (Stage 2)

After the city passes a population of 2.7 million, it is expected that the Joondalup Line will be under considerable stress, and a relief line will be required. The current preferred option will see an extension of EWRL to a connection point on the Joondalup Line that will allow trains to divert off the Joondalup Line, freeing up track capacity towards Perth. Further planning will be required before the rail alignment is finalised.

It is expected that passengers travelling on the Joondalup Line from suburbs north of Clarkson through to Yanchep will have a choice of utilising either the Joondalup line or EWRL. In order to successfully attract passengers off the Joondalup Line, EWRL must offer competitive journey times, from door to door. As the railway would be less direct than the Joondalup Line in serving the CBD, it must focus on speed. By operating at a higher speed and with fewer stations than the Joondalup line, EWRL could successfully attract up to 75% of peak hour CBD bound patrons north of Clarkson Station.

In modelling undertaken as part of this project, it is expected that the EWRL could account for over 20,000 CBD bound passengers during the AM peak period. For comparison, that is slightly less than the current all-day patronage on the Midland Line, in both directions.

8.2.2 Stirling - Murdoch Orbital Railway Stages 1 (Stirling to UWA) & 2 (UWA to Murdoch)

The need for a rail-based orbital line linked to selected radials has been identified by PATREC, most of it for completion before the 3.5 million population horizon.

This would link significant activity centres in the near western suburbs, UWA, QEII and the Murdoch Activity Centre, including Fiona Stanley Hospital, St John of God Murdoch private hospital and Murdoch University. By providing opportunities for transfers at Stirling (which are destined mainly to the western suburbs and other destinations on the Fremantle Line), this new orbital route will also provide relief to the critical inner segment of the northern radial line and Perth Underground Station, where capacity will be under most pressure as Perth and Peel approach 3.5 million. It is likely that patronage will be enhanced by opportunistic development, and ongoing spare capacity on the Fremantle Line will provide other opportunities.

There is a strong imperative to ensure the radial network is able to provide a high frequency of service at peak times. However, in the longer term there will also be a growing need for orbital services to provide easier access between major activity centres without transfers through highly patronised CBD stations. The Stirling-Murdoch Orbital should be supplemented by LRT and other road-based links.

It is proposed the Stirling-Murdoch Orbital connect to the Fremantle Line through a redeveloped station at Shenton Park, and proceed to stations serving QEII and UWA. The orbital would continue to Murdoch via Booragoon. The Stirling-Murdoch Orbital would require extensive tunnelling (mostly bored, but partly cut-and-cover), the costs for which are reducing.

Stirling and Shenton Park Stations are preferred transfer points from the Northern and Fremantle lines to this Orbital. A new transfer station could be accommodated at Shenton Park where there is a large area of surplus land (previously the Royal Perth Hospital annexe) soon to be redeveloped. Separate stations should be provided in the QEII medical precinct and UWA. From Stirling to Shenton Park there are opportunities to avoid tunnel boring by cut-and-cover tunnel construction in Pearson Street and Selby Street, around Herdsman Lake and possibly elsewhere.

In the years approaching the 3.5 million population horizon, the indicated peak-hour patronage on this orbital, deduced from inter-zonal travel-to-work boardings, are in the single-digit thousands daily, but PATREC advises that travel on this orbital link would attract significant latent demand for travel along this corridor, which will link the CBD, the growing western extension of the CBD, collaborating research-hospital medical precincts, and the broader research and educational campuses at UWA and Murdoch. There is also potential for development of university-owned land to the west of Shenton Park Station. It is the judgment of PATREC therefore that the Stirling-Murdoch Orbital should be available for use when the Perth and Peel population reaches 3.5 million.

There are alternatives to the route followed by this new orbital. Two have been examined and rejected in favour of the Stirling/Shenton Park/Murdoch link. These include transfer stations at Subiaco (instead of Shenton Park) and at Cockburn or Canning Bridge (instead of Murdoch) and transfer to the radial network in the eastern CBD. PATREC's assessment is that these alternatives would provide less strategically and collaboratively important linkages and at higher cost.

8.2.3 Byford Extension

The extension of the Armadale Line to Byford would extend the reach of the rail network to the south east, and allow the growing community of Byford a direct public transport connection to employment centres in Armadale, Cannington, and Perth. This extension would involve the duplication, upgrading and electrification of approximately 10km of track in an existing right of way.

To support demand from the wider area (including Mundijong), a transit centre (with adequate provision for Park 'n' Ride and bus connections) could be provided north of Thomas Road. Alternatively, the line could be extended directly to the Byford town centre. Several level crossings will need to be removed, particularly in the town centre if the railway extends south of Thomas Road. Due to the large cost of grade separations, the viability of an alternative BRT/LRT system will be thoroughly investigated.

8.3 Semi-rapid transit

8.3.1 Ellenbrook Bus Rapid Transit – Stage Two

Depending on demand, there is the potential to further upgrade the Ellenbrook BRT through the addition of a bus station at Youle-Dean Road (Whiteman Park) and further expansion of park and ride and cycle parking facilities.

New Lord Street could potentially be upgraded to a duel-carriageway for its full length between Gnangara Road and Reid Highway.

8.4 High Priority Public Transit Corridors

8.4.1 Pinjarra-Mandurah (Pinjarra Road)

According to *Perth and Peel @ 3.5 million*, Pinjarra/Ravenswood will become one of the most significant growth areas in the metropolitan area. Consequently, the need for high quality, frequent transit between Pinjarra, Mandurah Station and the Mandurah CBD will become more important. An exclusive bus lane is reserved along Pinjarra Road for this purpose. A bus facility in Pinjarra and Mandurah CBD would be required for layover and turnarounds. It is likely that the Mandurah station bus facility will also require substantial expansion to accommodate this growth.

8.4.2 Maylands Bus Bridge

A bus and cycling bridge is proposed to connect the Maylands peninsula to Rivervale. By connecting the two sides of the river, a raft of new destinations and opportunities are opened up to residents on the peninsula, as well as the growing areas in Rivervale and Belmont. It is expected that such a bridge would bring a cyclist at least 5km closer to destinations across the river, and would save a bus around 8km of travel. Possible connections could be either Tranby Road to Belmont Avenue, or Brighton Road to Clarkson Road. It is expected that upon completion of the link, a new orbital bus route would be able to connect the Glendalough, Maylands and Oats St train stations via

Belmont Forum, and provide residents improved public transport access to opportunities and events on the Burswood peninsula.

8.4.3 Other High Priority Public Transit Corridors

While further analysis is required, the following High Priority Public Transit Corridors are proposed to ensure the appropriate level of on road priority is afforded to buses as required.

- Two Rocks to Yanchep
- Stirling Highway between Claremont and Cottesloe
- Glendalough to Subiaco
- Canning Highway between Fremantle and North Lake Road
- Central Perth City improvements
- Cockburn Coast to Rockingham
- Leach Highway for improved access to Bull Creek Station and Riseley Street
- Rockingham to Warnbro Station
- Connecting Bellevue Station to the surrounding suburbs in the hills
- Providing improved connection to Armadale and Byford Train Stations

8.5 Stations and interchanges

8.5.1 Additional CBD Bus Station

It is likely that by 3.5 million, an additional bus station within the Perth CBD will be required. Further work will be required in consultation with stakeholders to identify an appropriate location.

9. Beyond 3.5 million people

9.1 Rapid Transit

9.1.1 CBD Subway

Perth's suburban railway system carries large volumes of passengers every day from the suburbs to the Perth CBD, so the network has evolved to reflect this. Currently, the task of moving passengers throughout the inner core falls to surface transport, via intermediate stops on the bus and rail network (such as Leederville Station, or a bus stop on St Georges Terrace), as well as Central Area Transit (CAT) buses. By the time the Perth and Peel regions reach 3.5 million, a light rail network will add another dimension to this distribution system.

However, it is important to acknowledge that, as the city grows, pressure will continue to grow on the existing and planned surface transport solutions throughout the CBD and surrounding areas. If the growth of the CBD follows that of comparable cities around the world, then beyond the 3.5 million population horizon all available surface transport options will be experiencing demand pressures close to or at capacity. At this point, it will be necessary to start introducing a grade separated rail system to move large numbers of people short distances across the inner city area, and to facilitate continued intensification of activities in the central sub-region.

Such a mass transit system would be unlike the existing or planned suburban system, with a focus on short journeys in a dense, highly walkable area. Considering this, the characteristics of the suburban radial network (such as rolling stock and station design) should not be simply copied. Choices such as track and loading gauge, Automatic Train Operation, and train length and design can all be assessed and chosen to meet the specific needs of a subway system. The system would require transfer stations located at strategic connections to the suburban rail and bus networks, to facilitate access across the wider city. Passenger access and egress will also be a key consideration.

The creation or extension of a metro subway line would likely act as a catalyst for significant development within the inner city area, surrounding station locations. This is largely due to the improved access to a grade separated, rapid transit system. While dense, inner city development is largely positive for the city, care would have to be taken to strike a balance between the sterilisation of land for rail infrastructure and development that prevents the construction of the system itself.

As an area grows and becomes denser, construction of a grade separated subway system also tends to become more expensive as the cost of acquisition of property, relocation of services and impacts on other infrastructure and traffic all escalate. This can be readily found in the variances in unit costs for subway system construction projects around the world.

Therefore, it is important that a comprehensive dialogue is started with stakeholders in the near to medium term, to decide on the future direction of the city, up to and beyond the 3.5 million horizon. If agreement can be reached amongst stakeholders that a dense and large enough core is in fact desirable (or inevitable), then significant work

would need to be undertaken to investigate matters such as possible alignments, stations and depot locations. This work would have to be closely aligned with the future plans for not only the city, but the rest of the transport network and the metropolitan area as a whole.

If appropriate alignments and locations can be found, then protection of these corridors will become important. By protecting the corridor at an early stage, costs of infrastructure relocation and land acquisition can be minimised, as well as giving the city certainty as to the future of public transport in the city. Strategic acquisitions can be made, to facilitate future implementation, and development opportunities can be fully realised upon completion.

9.1.2 Forrestfield to Kenwick Link and Depot

A rail link between Kenwick and Forrestfield has been proposed, for the purpose of storing and moving trains between rail lines. Further work by the PTA will be required to establish whether there is a foreseeable future need for such a link in the future.

9.1.3 East Wanneroo Rail Link (Stage 3)

By the time Perth's population reaches 2.7 million, Ellenbrook will be serviced by a BRT connecting to Bassendean Station, Midland and the East Wanneroo Rail Link. Beyond the 3.5 million population horizon, there may be sufficient demand to warrant a spur line from the East Wanneroo Rail Link to Ellenbrook, replacing that leg of the BRT.

9.1.4 Bunbury Fast Train

A potential future need for a fast intercity rail connection between Perth and Bunbury has been previously identified, and a reserve has been identified alongside Forrest Highway, south of Pinjarra Road.

Several potential alignments for the section north of Pinjarra/Mandurah to Perth are being considered:

- Upgrade of the Armadale Line. This would include duplication of track, to allow regional and express services to bypass slower suburban services (i.e. the all stops Thornlie Line pattern). Regional services could use the Tonkin Highway extension to connect with Forrest Highway, or continue along the existing freight corridor (with necessary improvements to curvature and track strength) as far as Brunswick.
- Utilise Tonkin Highway median as far as Seaforth, or enter a tunnel prior.
- Utilise the median of Kwinana Freeway and share tracks with the Mandurah Line until Cockburn Station, where regional services enter the Glen Iris tunnel. Track capacity limits on the inner section of the Mandurah Line will require a separate set of tracks for intercity services between Cockburn Central and the Glen Iris tunnel.

- Utilise the median of Kwinana Freeway to approximately Karnup Road, where the railway would head in a north north-east direction, before turning north alongside the extended Nicholson Road. From Armadale Road, the railway would need to run inside a tunnel.

There may also be a need to consider additional heavy rail capacity in the southern metropolitan area beyond the 3.5 million population horizon. A Bunbury Fast Train route would need to be complimentary in this regard.

Until such time, upgrades to the Australind service should be prioritised to improve services and build a solid patronage base, which currently would not justify the investment required to establish a fast train. Further work will need to be undertaken to refine and select an alignment in order to reserve a corridor within the Metropolitan Region Scheme.

9.2 Murdoch to Thornlie Orbital Railway Stages 3 (Murdoch to Thornlie) and 4 (Stirling to Morley)

Ultimately, the Stirling-Murdoch Orbital will continue on to the Armadale Line via Thornlie, and from Stirling to Morley, making a near complete circle.

Additionally, extending the Murdoch to Stirling Orbital Railway through to Morley will provide for connections outside the Perth CBD between the Thornlie/Armadale, Mandurah, Fremantle, Joondalup and East Wanneroo Lines. This will dramatically improve choices to passengers heading to destinations outside the Perth CBD, and will assist in creating a robust and resilient network, capable of absorbing and mitigating disturbances. It will provide improved public transport access to passengers in the northern suburbs of Nollamara, Mirrabooka, Dianella and Noranda.

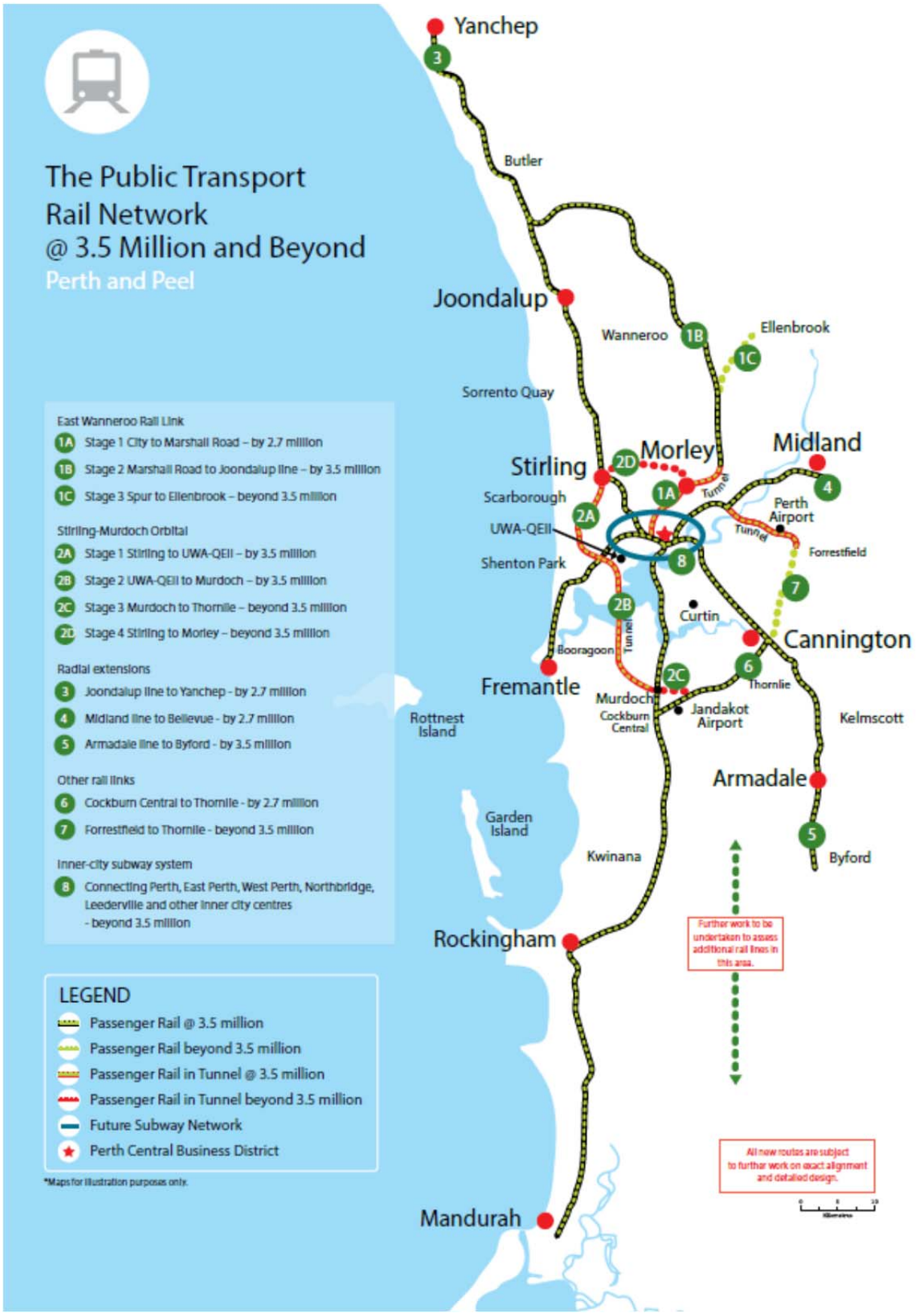


Figure 3: mass transit rail network

10. Complementary measures

Network extensions and transit priority infrastructure form just one part of the overall strategy for establishing an efficient and effective public transport network for Perth and Peel.

10.1 PTA Route Utilisation Strategy

A Route Utilisation Strategy (RUS) is a strategy defined as:

"…the effective and efficient use and development of the capacity available on the network, consistent with the funding that is, or is likely to become, available during the period of the route utilisation strategy ….." (Network Rail)

The RUS process was introduced in the United Kingdom following a Rail Review in 2004 and the Railways Act 2005. As infrastructure owner, Network Rail was required by the Office of Rail Regulation through its Network Licence to establish and maintain a Route Utilisation Strategy (RUS) for each of the network zones.

A growing and spread out city such as Perth places pressures on transport infrastructure with often competing demands for finite levels of funding. The RUS aims to maximise the use of existing assets including the rail infrastructure, rolling stock and train control systems and sets out a framework for future asset development so that the return on investment in terms of moving people to where they want to go is achieved most effectively. Importantly, the underlying premise of PTA's RUS is to achieve greater capacity and to maintain and enhance the reliability of Perth's existing rail network.

PTA has adopted the RUS methodology to develop a plan for the Transperth rail network. The strategy addresses:

- Network capacity and railway service performance
- Train and station capacity, including crowding issues, rolling stock procurement including deployment, train capacity and capability, depot and stabling facilities
- Maintenance and renewals planning to minimise disruption to the network
- Catering for different users of the network
- Opportunities for using new technology
- Opportunities to improve safety

While new compared to the examples in the UK that have been progressively developed over the past decade, the RUS for Perth will provide a strategic vision for the evolution of the rail network through to 2031, complete with a longer term perspective.

The RUS seeks to map out the strategic direction of the railway from a systematic analysis of the future requirements of the network. The RUS attempts to balance capacity and passenger demand, operational performance and cost, whilst addressing the requirements of funders and stakeholders. Where shortfalls in capacity are

identified, the RUS identifies options for addressing them. These options may involve timetabling changes and/or investment in infrastructure.

- The RUS strategy has certain essential purposes, which describe:
  - The output specification for rail infrastructure enhancements and interventions
  - The ways in which capacity could be used more efficiently
  - The development of the High Level Output Specification (HLOS) for Perth

The RUS will therefore:

- Propose options to achieve the most efficient and effective use of the existing rail network and identify cost effective opportunities to improve it
- Enable the PTA to develop an informed renewals, maintenance and enhancements programme in line with WA State Government aspirations and the reasonable requirements of key stakeholders
- Enable local and regional transport plans to reflect a realistic view of the future rail network
- Begin to develop a Rolling Stock Procurement and Cascade Plan

PTA considers the RUS fundamental for the planning of investment for the rail industry up to 2031 and beyond. It utilises input from government-approved documents and from studies carried out by PTA, as well as drawing on best practice from around the world. The recommendations and supporting evidence contained in the RUS will assist decision making by the Government. PTA will use the RUS as a key part of its funding and investment planning. The document will also be used by Transperth, the PTA's service provider, to plan the operation of the train services promoted in the RUS.

10.2 Dynamic Stand Management System / Real Time Tracking System

To improve the utilisation of valuable station real estate in the CBD, it was previously identified that a Dynamic Stand Management System (DSMS) and Real Time Tracking System (RTTS) for the entire Transperth bus fleet will be required. The purpose of the DSMS and RTTS is to enable buses to be allocated to stands on a variable or dynamic basis, to maximise the utility of bus stand space and to ensure passengers are kept fully informed as to which stand their bus services will depart from. The RTTS will provide real time tracking information to facilitate the operation of the DSMS and improve the day-to-day management and quality of bus service delivery. The RTTS will also facilitate the provision of the traffic signal priority to buses that are running late when they travel through intersections to enable greater timetable adherence, improve bus service reliability and to also improve the capacity of the DSMS to manage bus movements within the new Perth Busport.

10.3 Modernisation of signalling and train control infrastructure for capacity uplift

The Perth suburban network is currently controlled by a conventional signalling system with optical lineside signals, fixed length block sections for location of train positions, and Automatic Train Protection (ATP) for additional safety provision. The existing signalling design on the network was found through operational modelling to have a practical capacity limit around 12 trains per hour which is presently operated in peak traffic on the North South Line between Whitfords and Cockburn Central.

The Public Transport Authority is currently investigating the introduction of modern Automatic Train Control (ATC) technology to replace major parts of its signalling and train control infrastructure, particularly the ageing ATP and Train Control systems, over the next 10 to 15 years. ATC allows substantial increase in the capacity limits of the existing signalling system, by replacing lineside signals with driving instructions via a display on the train driver's desk, continuous updates of those instructions, and automatic driving optimisation for trains. The preferred technology for ATC in Perth is Communications Based Train Control (CBTC) which enables doubling of today's train service frequency, subject to the provision of sufficient train sets and supporting infrastructure. ATC will depend on a highly reliable digital data radio network that will be rolled out by 2020 through the government-funded Radio System Replacement project.

The current plan foresees ATC implementation on the North South Line in time for capacity uplift to 15 trains per hour, avoiding investment in modifying existing technology due for replacement. Sequential ATC rollout on the Midland-Fremantle and Armadale Lines facilitates coherent operation of the entire network, allows for capacity uplift to 15 trains per hour and beyond on those lines without further investment in declining legacy systems, and replaces life-expired ATP before its obsolescence can impact services.

10.3.1 C-Series railcars

The C-Series are the proposed new generation electric multiple unit ("EMU") railcars configured with six railcars as a fixed set. The primary advantages over the design of the existing B-Series and A-Series railcars are:

- Up to four doors per car per side and improved interior layout to facilitate better loading/unloading times and increase passenger distribution across the passenger saloons and minimise dwell time at stations
- A planning capacity of 1,000 passengers, compared to 800 passengers for the B-Series and 500 passengers for the A-Series, giving 25% and 100% increases respectively in capacity over the older generation railcars

At 144 metres long and utilising AC power traction motors, they are proposed to be the same length as two coupled B-Series sets, compatible with the PTA passenger rail network infrastructure, and incorporate the latest international performance standards expected of modern rail services.

As the Nowergup depot will need to be upgraded to accommodate the larger trains, a new facility will need to be constructed to undertake heavy maintenance of the B-Series

trains. As the B-Series are planned to be first migrated to the Midland Line, a new depot is planned in Bellevue.

11. The current public transport system

Perth's public transport system has met growing demand better than that of any other Australian capital city. The system is fully integrated between train, bus, and ferry services and the SmartRider electronic ticketing system operates for all modes.

11.1 Overview

Public transport use has increased due to fast, reliable, and frequent bus and train systems with good interchange facilities providing access to stations by both bus and car (Figure 4). Major recent train and bus system improvements have reversed the declining proportion of travel on public transport from the 1960s to the late 1990s. Over the past decade (2005 to 2015), public transport patronage in Perth grew 57 per cent, at a time when the population grew by approximately 32 per cent.

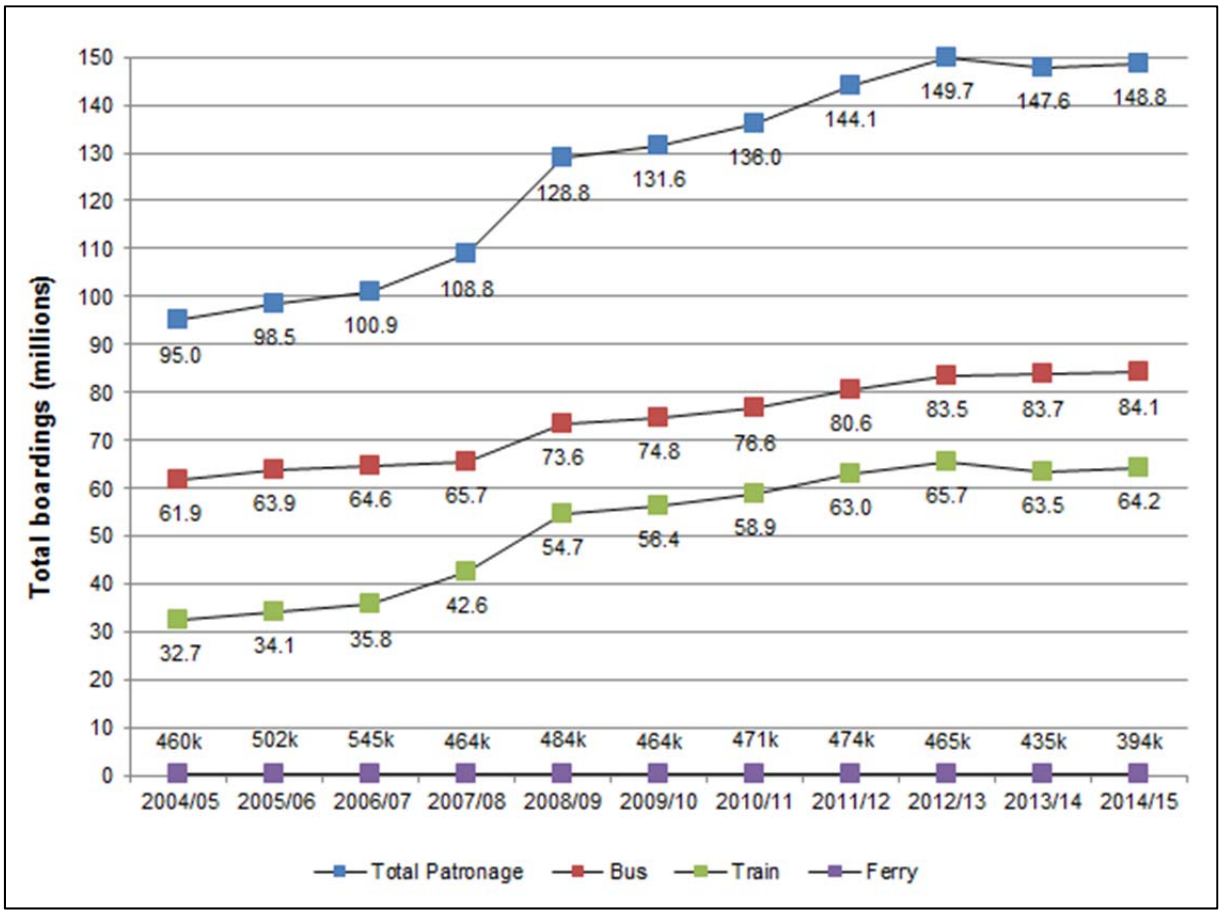
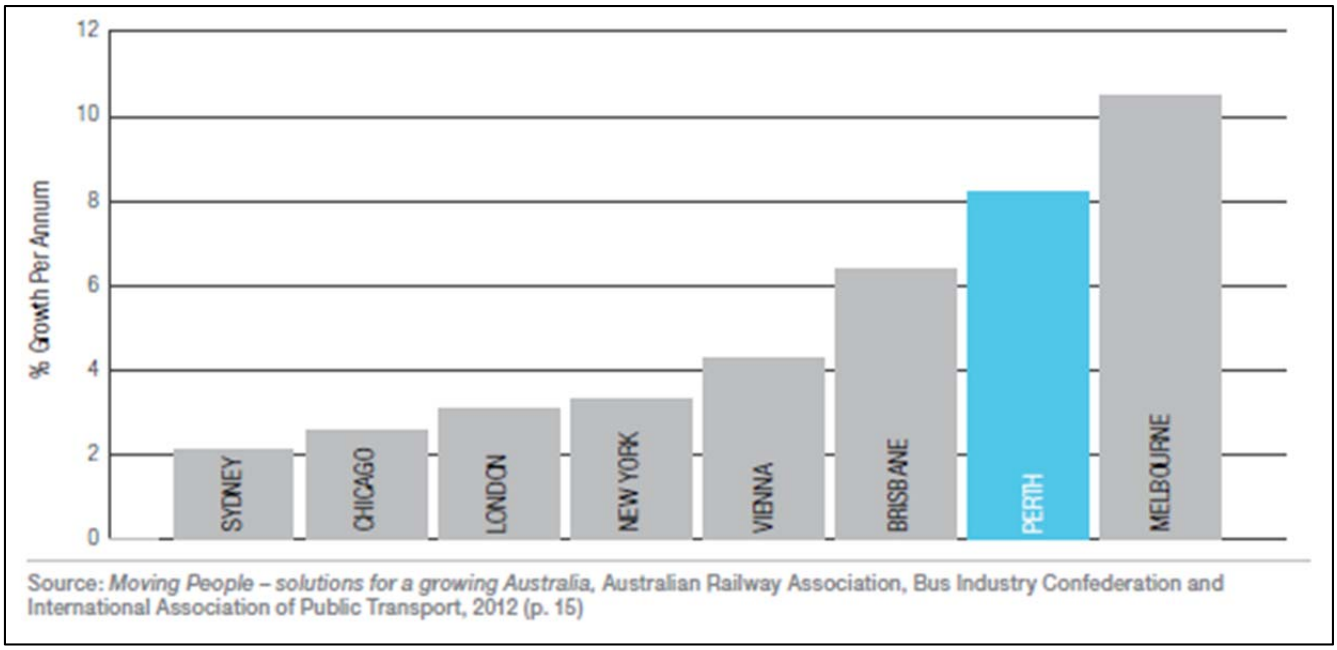


Figure 4: Passenger boardings per year during the past decade (2004/05 – 2014/15)

The network that supports the city is based on rail lines radiating from the central area. The original rail lines (Fremantle, Midland, and Armadale) were built in the late 19th Century. The closely-spaced stations were built when most people walked to public

transport services and development patterns were more concentrated. The Joondalup Line (1993) and the Mandurah Line (2007) are located primarily in freeway reserves with stations further apart than those on the other lines. These stations, which are mainly accessed via feeder buses and park-and-ride, generally cater to much larger catchment areas.

The train network has been expanded from 66 kilometres in the early 1990s to 181 kilometres in 2015. Annual train patronage has increased more than ten-fold from 5.9 million to 64.2 million passengers during the same time. As figure 5 shows, Perth has experienced a growth in rail passengers that is significantly greater than many national and international cities.



Source: *Moving People – solutions for a growing Australia*, Australian Railway Association, Bus Industry Confederation and International Association of Public Transport, 2012 (p. 15)

Figure 5: Percentage growth in rail usage per annum 2004-2008

Over the past decade, bus patronage increased 36 per cent. During the same period, in-service bus kilometres increased from 48.6 million to 65.5 million (35 per cent increase) and the bus fleet grew from 1,030 to 1,430 (39 per cent increase).

This fleet expansion was necessary to provide improved 'line-haul' services in corridors where there are no rail lines to meet demand, to improve feeder bus services to support the expanded train network, to provide new services in outer residential growth areas, and to deliver better distribution services in, and between, strategic centres.

11.2 Strengths and weaknesses

The current public transport system has a number of significant strengths:

- It is fully integrated – people can move easily between trains, buses, and ferries. Decisions on timetabling and routes are made by a central agency, Transperth.
- The fully segregated train system provides a fast, reliable service bypassing congestion on parallel city roads, with service frequencies greater than many other Australian cities.

- The system has been continuously upgraded and extended providing a safe, comfortable, and reliable service.

There are some weaknesses that may leave the current public transport system unable to meet the future challenges it faces. These include:

- Bus services are increasingly vulnerable to delays caused by road congestion.
- The bus system is less legible than rail services with frequencies generally lower than trains in Perth and some bus systems in other Australian cities.
- Some routes are almost at capacity in peak periods and simply operating additional trips is unlikely to provide the capacity and quality of services needed, and may create congestion problems at stops and with traffic.
- The current focus on the Perth CBD does not support cross-suburban connectivity between centres identified in *Perth and Peel @ 3.5 million.*
- The perception that Park 'n' Ride is the dominant means of access to many train stations. While Park 'n' Ride will remain an important option for some passengers, those passengers arriving by bus will continue to dominate at many stations, such as Murdoch.

11.3 Passenger satisfaction

PTA carries out annual customer satisfaction surveys to assess the views of existing passengers on the quality of its services. Bus and train users generally value the same service characteristics:

- They want services that are frequent, on time, and affordable
- They want to be able to travel quickly to their destination
- They want to feel safe and secure

Whilst people generally express high levels of satisfaction with public transport, there are some variations between the modes of transport, bus areas / train lines, and characteristics of the network.

The number of passengers satisfied with the public transport system overall was highest for the CAT bus (96 per cent), followed by the train (92 per cent), and bus (86 per cent). The number of passengers who reported being satisfied with the service varies between the different areas/lines in which the train, bus, or CAT bus services operate (Figure 6).

	Train	Bus	CAT bus
Highest areas for passenger satisfaction	Fremantle line (95%) Armadale line (95%)	950 SuperBus (94%) Joondalup (92%)	Fremantle CAT (97%) Perth CAT (96%)
Lowest areas for passenger satisfaction	Midland line (88%) Mandurah line (90%)	Morley (75%) Midland (76%)	Joondalup CAT (94%)

Figure 6: Percentage of respondents satisfied with overall train, bus, and CAT bus services (2015)

Snapshot figures (2015)

407,600 public transport journeys per day (initial boardings).

57% increase in public transport patronage in the decade since 2004/2005. This has been due to population increases and a rise in the proportion of people using public transport.

43% of public transport trips are made using rail services. This is a significant increase from 10 per cent of trips in 1990.

57% of public transport trips are made using the bus network. Buses provide the majority of transfers to rail services.

92% of train passengers satisfied or very satisfied with services

86% of bus passengers satisfied or very satisfied with services

96% of CAT bus passengers satisfied or very satisfied with services

12. Elements of a public transport system

The public transport system is comprised of many interconnected components. Infrastructure and operations are two critical parts of the system.

12.1 Types and hierarchy of transit services[1]

12.1.1 Hierarchy

Public transport can be differentiated by a number of methods, including the vehicle type, vehicle size, wheel type, or method of propulsion.

However, a more useful distinction is made from the level of priority and segregation afforded to the service. As an example, a tram running in street traffic has more in common with (and will serve largely the same transport task as) a local bus than it does with an efficient and fast light rail system running in its own right of way.

The level of priority and segregation is determined by what right of way (ROW) (*any path or way on which transit vehicles travel*) category the service operates in. There are three defined categories of transit ROW which set the hierarchy for different types of public transport:

> **Category A**: *Fully controlled ROW without (or with fully protected) grade crossings or any legal access by other vehicles or persons; also called "grade-separated," "private," or "exclusive" ROW. It can be a tunnel, aerial, or at grade level.*
>
> **Category B**: *ROW types that are longitudinally physically separated (by kerbs, barriers, grade separation, etc.) from other traffic, but with grade crossings for vehicles and pedestrians, including regular street intersections.*
>
> **Category C**: *Surface streets with mixed traffic. Transit may have preferential treatment, such as reserved but not physically separated lanes, or it may travel in general traffic lanes.*

The three ROW categories lead to three generic levels of transit: Rapid; Semi-Rapid; and Street.

Rapid Transit: ***A generic class of electrically powered guided transit modes that operate exclusively on ROW category A and have high speed, capacity, reliability, and safety.***

Rapid transit is largely characterised by the ability of the line to move large numbers of people in relative speed. This requires a completely segregated right of way, with no mixing with other traffic. Signalised and protected level crossings can occur to facilitate movement across the line, although the transit service always receives full signal

[1] Definitions in this section (shown in italics) are taken from Vukan R. Vuchic (2007). *Urban Transit Systems and Technology*. John Wiley and Sons.

priority. Best practice is for a fully grade separated right of way. Stations are spaced relatively far apart, although this is more reflective of the function of the service (e.g. subways cover shorter distances, with shorter distances between stops than Perth's suburban heavy rail).

Rapid transit has the capacity to move tens of thousands of people per line per direction per hour. Due to the larger vehicle sizes possible, this is generally the domain of heavy rail, although international examples exist of other modes that would qualify. In Perth, the Joondalup and Mandurah lines operate in this space, as do the other heavy rail lines.

Semi-Rapid Transit: ***A generic class of modes utilising mostly ROW category B, but C or A may also be used on some sections.***

Semi-rapid transit is largely characterised by what it is not. The service is afforded a level of priority, but is not fully segregated, nor are the stops spaced very close together. Services connect nodes of varying sizes, and may act as a feeder into a rapid transit line, or be fed itself by street transit. As ridership grows, a service may start to exhibit more characteristics of a rapid transit line (fully segregated ROW, larger and more frequent vehicles). An example of this would be a light rail transit system, running along a corridor segregated from traffic by painted lane dividers.

Street Transit: ***A generic class of transit modes operating on streets with mixed traffic (ROW category C).***

Street transit provides a low speed, high coverage area service. Vehicles run in general traffic, and hence are subject to traffic congestion and signals. Stops are closely spaced together, as accessibility is prioritised over speed of service. This kind of service is not suited to long distances. In Perth, many suburban bus services provide this local service level. Trams are also generally suited to this level of transit.

12.1.2 Descriptive categories

Transit services may also be categorised into broad categories depending upon particular characteristics of the service. Relevant to Perth, these include:

Commuter Transit: Commuter transit is generally characterised by an infrequent daily service, provided over long distances. Commuter transit usually provides a service in peak direction, to and from a central core (e.g. CBD). Service is usually provided by rail or bus, with vehicles usually containing a higher level of amenity for passengers (such as reclining seats or toilets), with less of a focus on vehicular passenger capacity.

The AvonLink service from Northam to Perth best exemplifies this kind of service in WA. The Australind could qualify as commuter transit, although the journey length would normally suggest an intercity service.

Intercity Transit: Intercity services connect multiple metropolitan areas, over large distances (>100km) through largely rural areas. Focus for this service is speed and comfort of journey. In Europe and Asia, this service is becoming the domain of high speed rail, where speeds exceeding 300km/hr are not uncommon. Air services would also be considered intercity transport, although the private nature of operation of providers in Australia would preclude the transit nametag. In WA, TransWA run all intercity services, including the Australind and Prospector.

Short Haul Transit: The Perth CAT buses exemplify short haul transit*, which are low-speed transit services for circulation within small areas, usually with high travel density, such as CBDs, campuses, airports, exhibition grounds, and other major activity centres.*

Waterborne Transit: Waterborne transit is *services over water bodies*, such as the Perth ferry service across the Swan River.

12.1.3 Rail and bus systems

Commonly referenced rail and bus systems include:

- Rail Rapid Transit (RRT), also called Heavy Rail
- Light Rail Transit (LRT) – *a transit mode utilising predominately ROW category B, sometimes A or C, on different network sections*.
- Bus Rapid Transit (BRT) – *bus transit designed as an integrated system, mostly separate ROW (category B or A), preferential treatments at intersections, ITS, and other elements for greater efficiency. Its better performance and stronger image result in greater passenger attraction than regular bus.*
- Regular bus: *Common urban bus routes serving all stops, as distinguished from short haul and express services. This service may use bus priority corridors where appropriate.*

Figure 7 indicates where in the transit hierarchy the different systems are located.

It is noted that the variable system design and performance of transit systems throughout Australia and internationally has created different perceptions of what a particularly named rail or bus system will look like and how it will operate, and where in the transit hierarchy it is located.

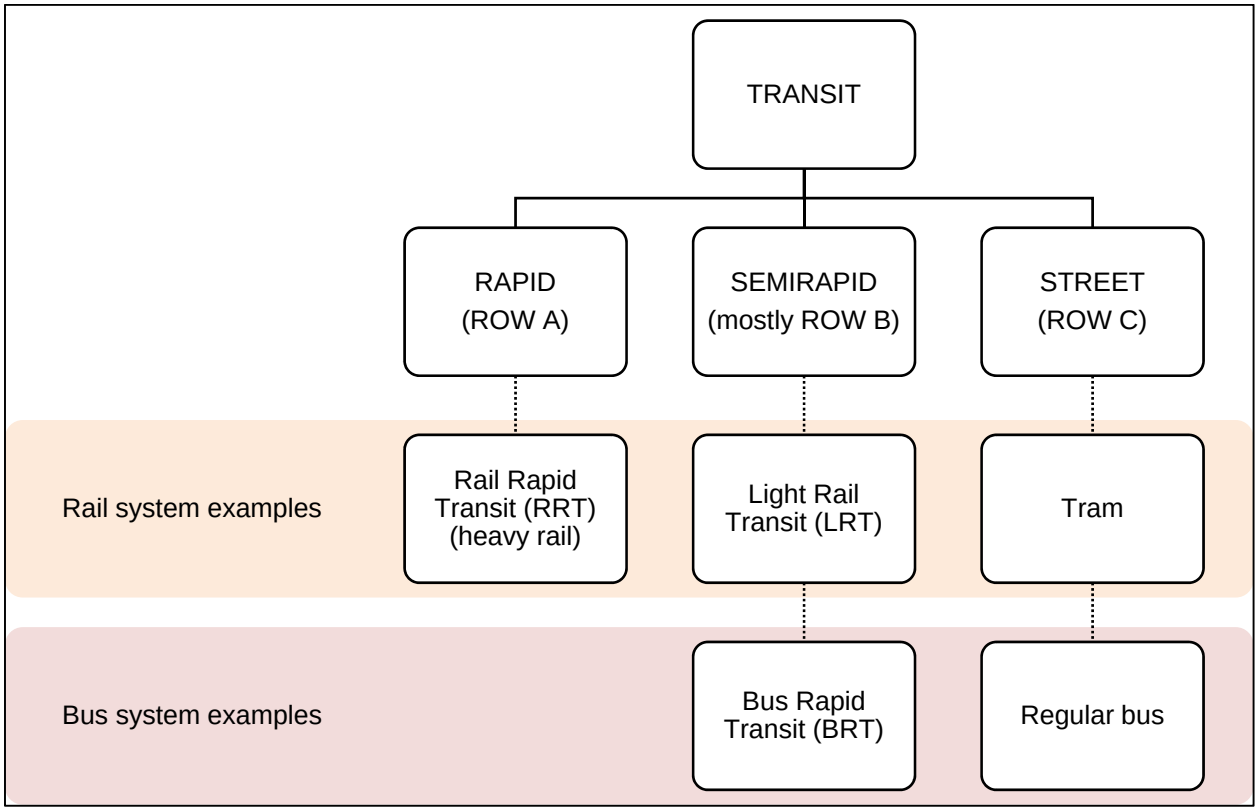


Figure 7: Transit hierarchy

12.2 Infrastructure

12.2.1 High Priority Public Transit Corridors

High Priority Public Transit Corridors, consisting of queue jump lanes, signal priority, or transit lanes, may be created to improve the operating conditions of street transit and semi-rapid transit. These corridors are generally developed to serve a number of different bus routes with higher levels of patronage or where congestion is creating long and unreliable journey times.

Queue jump lanes give priority to transit vehicles at intersections, allowing them to bypass queued traffic and move through the intersection once permitted by the traffic signals. In this capacity, they are an effective and cost efficient (relative to full bus lanes) method of giving priority to transit vehicles on roads where delay at traffic signals can disrupt transit operations. However, their effectiveness is hampered when mid-block traffic creates congestion issues outside of intersection areas, or where traffic queues exceed the length of the queue jump lane. In these circumstances, dedicated bus lanes are preferable, which can be operational all day or only in the peak periods.

Several road corridors have been identified as popular routes for both on road public transport and private automobile travel. These corridors present a potential bottleneck for both networks, and therefore can present a difficult challenge in giving priority to either mode of travel. It is important in such circumstances to remember that the aim of any transport network is to move people or goods, not simply the vehicles themselves. Accordingly, it must be recognised that where priority for public transport is desirable but not easily achievable, that the net benefits of travel time savings or costs of all

systems be the primary metric considered, as well as the environmental and economic benefits of public transport over private vehicle travel.

As a long term strategic document, this Plan does not generally make recommendations as to detailed solutions such as length of queue jumps or whether exclusive bus lanes are justified. However, it is expected that such decisions will be made according to the expected patronage and frequency of service. The PTA's set of guidelines (PTA Guidelines for Bus Priority Figure 8) for bus infrastructure is expected to guide future conversations with MRWA, local governments and other stakeholders.

Bus priority treatment	Desirable Minimum Transit level
Bus gate Bus only link (bus plug) Turning movement ban exemption	≥ 4 bus services during peak hour in each direction
Transit mall	≥ 8 bus services during peak hour in each direction
Queue jump (see Section 4.3.4)	≥ 3,000 passengers per day in both directions, or ≥ 500 passengers during peak hour in both directions, or ≥ 6 bus services during peak hour in peak direction
Installation of traffic signals	Delay to bus movement at non signalised intersection during peak hour ≥ 60 sec (averaged across hour) Installation of traffic signals should not be implemented independently of MRWA warrants for traffic signals.
ITS Active and passive bus priority (see Section 7)	In situations where traffic volume is close to capacity, active and passive bus priority could help to improve traffic flow benefiting bus movement to a Level of Service (LOS) "D" or better
Transit lane (additional lane)	6,000 passengers per day in both directions, or ≥ 1,000 passengers during peak hour in both directions, or ≥ 15 buses during peak hour in peak direction
Transit lane (conversion of existing lane)	9,000 passengers per day in both directions, or ≥ 1,500 passengers during peak hour in both directions, or ≥ 22 buses during peak hour in peak direction These figures are indicative and the important factor is that the impact of the transit Lane is modelled and discussed with MRWA to quantify the impact. Conversion of an existing traffic lane may potentially impact traffic to a greater degree than provision of an additional lane.
Bus Rapid Transit	≥ 10,000 passengers per day in both directions, or ≥ 1,500 passengers during peak hour in both directions, or ≥ 20 buses during peak hour in peak direction

*Indicative guidance only.

Figure 8: PTA Guidelines for Bus Priority

Out of necessity, this Plan primarily focuses on higher order roads under the control of MRWA, although a select few roads under local government control are considered. In the main however, local roads are not considered, and so this document should not be seen as prejudicing conversations and negotiations with local governments regarding corridors not identified as High Priority Public Transit Corridors. It is likely that further corridors will be identified as work continues and reservation reviews are undertaken.

12.2.2 Green bridges

Green bridges are links that cater exclusively for public and active transport modes, such as buses, rail, pedestrians, and cyclists. As such, a green bridge that spans a significant barrier and brings two communities together can act as a major catalyst for increased public transport mode share, as well as encourage active transport. By creating a strong link where public transport does not have to mix with general vehicular traffic, significant travel time savings can be reaped, and reinvested in the network.

Several such bridges have been committed to in the near future, namely the Charles Street Bus Bridge, and the Swan River Pedestrian Bridge (refer to chapter 6 for further details).

13. Methodology and Planning Principles

13.1 Development of the Public Transport Plan

Development began with modelling a base land use and transport network, based largely on the existing system (including committed projects) and enhancements based on the professional judgement of the transit and modelling experts in the project team. The additional enhancements were then coded into the network, along with a raft of alterations to the supporting lower tier network intended to improve access to and patronage of the proposed network.

Developing the network was an iterative process, and the road, transit and modelling teams worked closely together throughout the project. After the models were run, the results were reviewed by the relevant teams, and amendments to the networks were recommended based on demand highlighted in the previous run. As this process continued, the networks approached a point where the expected demand for public transport was adequately met. At this point, the demand for public transport along corridors was self-evident, and the need for priority could be discussed in more detail. After identifying priority corridors for public transport, amendments to the model could once again be made (largely due to improved run times afforded by priority given to public transport).

Whilst effort was made to avoid presupposing the likely vehicle used to carry passengers through certain corridors, factors such as patronage levels influence or determine such choices. For example, if a link is shown to attract patronage beyond what can be reliably carried by either light rail or bus, then heavy rail is the likely solution for the corridor. Conversely, if a corridor needs more stations and attracts a lower patronage, then heavy rail would be inappropriate.

13.2 Network Planning Principles

The Public Transport Network Planning Principles which guided development of the Plan are:

- The network should serve growth corridors and link activity centres with the heavy rail network, supplemented by road-based light rail, bus rapid transit and bus priority services. Beyond the 3.5 million population horizon a subway system will be required in the central area, separate to the heavy rail system.
- New orbital links should be provided for connections between activity centres and the radial network, and to enhance network capacity.
- New radial and orbital links should be provided to enhance network operating robustness.
- New technology should be employed to enhance the travelling experience and lift operating performance (capacity, frequency and/or speed).

- Links to the Perth central area should aim to protect the efficient operation of existing 'through-routing' rail-based services.
- The passenger network should avoid using transport freight corridors so as to preserve space in road reserves for future growth in road freight. Passenger rail tracks and freight rail tracks must remain separate.
- New links should be placed in corridors, provided they will not impact future capacity to accommodate freight vehicles (Principle 6) or compromise the quality of potential future transit oriented development precincts, or otherwise be placed in tunnels.
- New links in the network should strengthen the demand-based network structure aimed at achieving user-friendly high-frequency services, so that passengers can 'turn up and go'.

13.3 Assessing public transport demand

As part of developing *Transport @ 3.5 Million*, patronage forecasting was undertaken by a dedicated modelling team using three separate transport models. The Strategic Transport Evaluation Model (STEM) was utilised, in both its Cube and Emme variants, as well as MRWA's Regional Operations Model (ROM).

It is important to recognise that, when assessing public transport demand through models, each model is bound by unique limitations. With regards to a model such as STEM, local journeys (within a zone) are not captured, and journeys outside the modelled area are manually adjusted, and may not be accurately captured. For example, air passengers are not included in STEM, so patronage on the Forrestfield-Airport Link was lower in STEM than could be expected. The business case for FAL included extensive supplementary analysis work to account for this shortcoming.

13.4 Forecasting travel activity

Public transport is an invaluable aspect of the transport network, and will become even more so by the time Perth and Peel reach a population of 3.5 million. Combining the impact of this doubling in population with an expected doubling of the public transport mode share means the daily public transport boardings effectively quadruple. The daily boardings increase from 480,000 to 2.3 million, comprising a total of 1.4 million individual public transport trips (an average of 1.64 boardings per trip). The rail network is projected to grow considerably, from 190,000 to 930,000 boardings (modelled growth from 2011 to 2050).

Significant growth is proposed in outer activity centres such as Ravenswood and Bullsbrook. This outward shift in employment away from the central sectors has a significant impact on the nature of travel and demand across the network, with significant contra flow movement in the peak periods. This serves to reduce the potential pressure on the network, as contra flow movements consume underutilised resources. Likewise, the placement of trip generators affects the viability of proposed enhancements to the network.

Despite this trend reversal, the Perth CBD will continue to be the largest centre by a significant margin. Considering this and other factors (such as the capacity of the CBD to provide for more automobiles), it is reasonable to assume that the CBD stations will continue to dominate public transport patronage numbers, and the approaches to CBD stations will require continued attention due to crowding.

Major origin-destination (OD) pairs can be a useful tool to understand how proposed enhancements to the network will fare. Figure 9 illustrates the 15 strategic sectors in STEM, and the size of the OD pairs between them, with the relative public transport patronage between two sectors represented by the width of the connector.

While 15 sectors is too coarse to be useful at a modelling level (STEM currently uses over 500 zones, and ROM over 1,000), it is easier to interpret graphically, and significant pairs can be further examined in more detail.

In Figure 9, the whole Perth and Peel region can be seen. Of note is the hub and spoke nature of the desire lines, focusing on the Perth CBD. This (and subsequent testing) reaffirms the notion that the CBD remains the focus for public transport to 3.5 million.

Figure 10 examines the central area in more detail. Again, the Perth CBD dominates, although other centres attract substantial traffic of their own. UWA / QEII is of particular interest, as it attracts trips away from the CBD, in particular from sectors in Osborne Park and Murdoch. Murdoch itself also attracts trips in significant numbers, from a variety of sources. Morley is a strong source of demand and, as of 2016, the only strategic centre in the central area without a mass transit link to the Perth CBD and wider rail network.

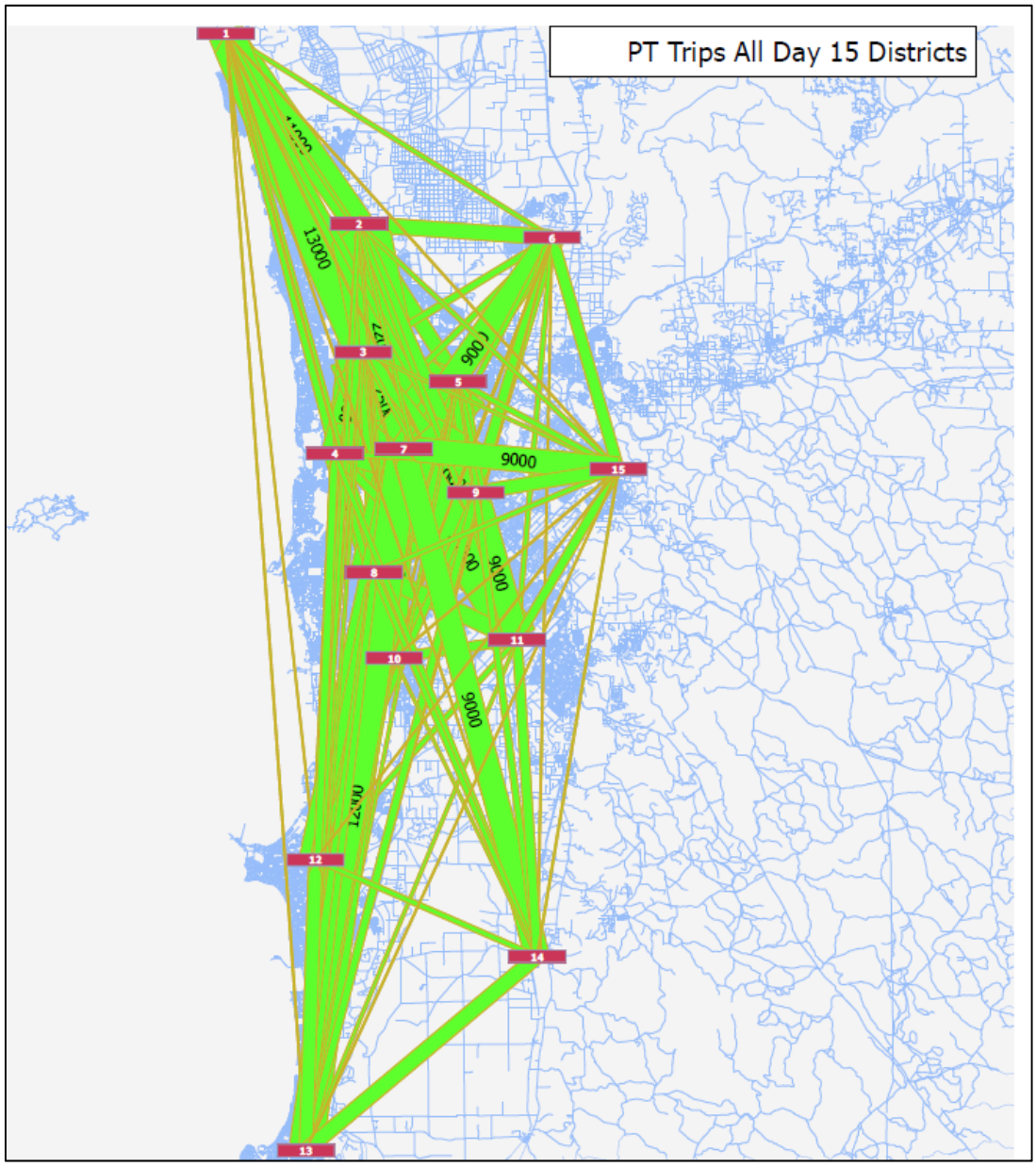


Figure 9: Public transport trips - origin and destination pairs (2050 – EMME STEM)

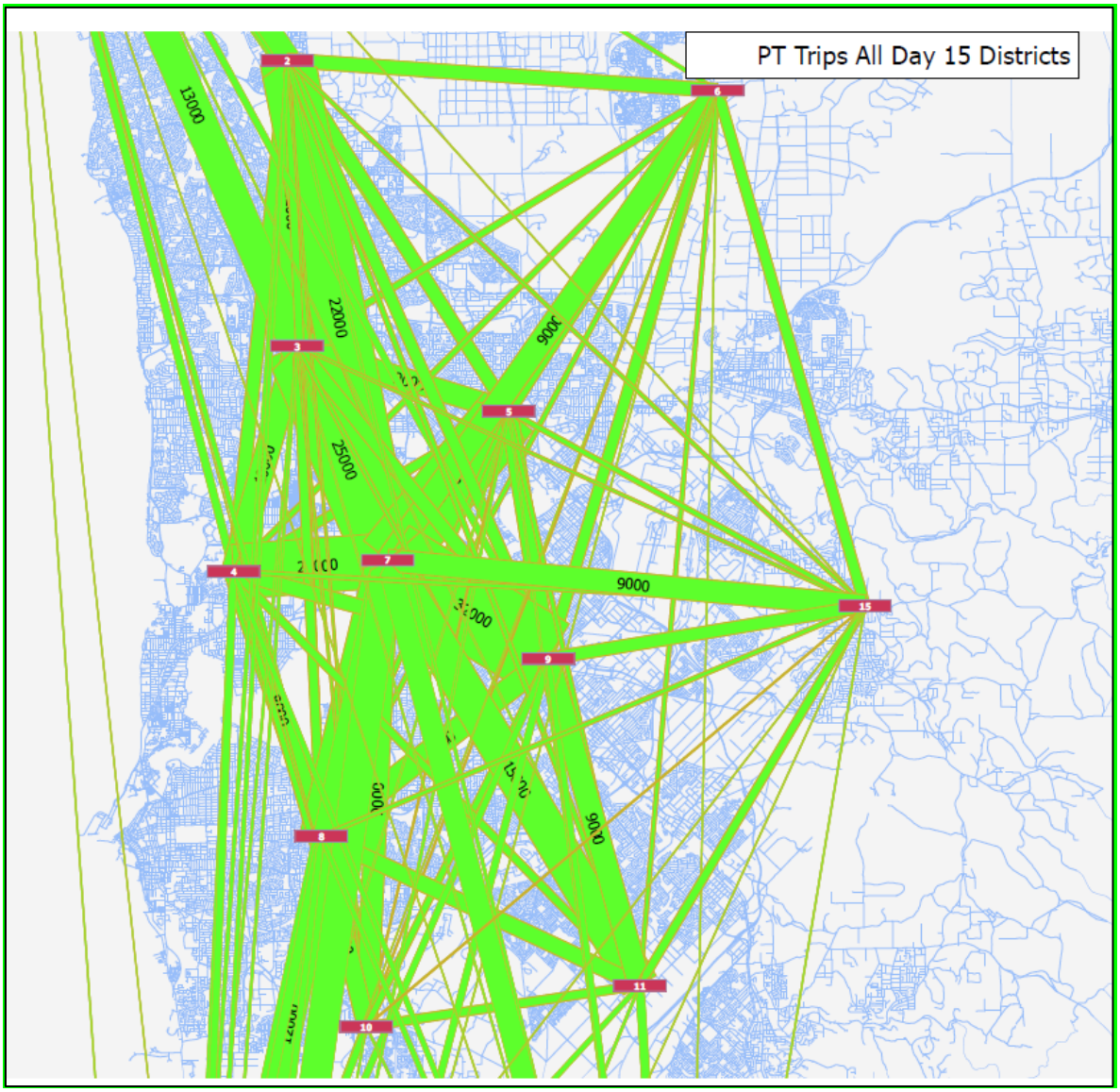


Figure 10: Public transport trips – origin and destination pairs (central area) (2050 – EMME STEM)

The proposed mass transit rail network reflects these desire lines, and can be seen in Figure 3.

13.5 Planning principles for semi-rapid transit

The passenger rail network will form the primary spines of the public transport network. However, as employment locations spread beyond the focus of the Perth CBD, the current planned passenger rail network will not be sufficient to cater for moving large amounts of people to and from all of these other centres.

Being comprised of light rail transit and/or bus rapid transit, a semi-rapid transit system will represent a new tier to Perth's public transport network. A set of overriding principles has been established as a starting point for discussion and to guide the planning process for this level of transit. The principles also discuss 'regular' bus services and the distinction between the two levels of transit.

13.5.1 Headline principles

1. Semi-rapid transit should be a limited stop service.
2. Semi-rapid transit should be afforded priority via grade separation or signal priority where grade separation cannot be achieved.
3. Semi-rapid transit should run in its own, separated corridor, with stations (rather than stops), and be branded differently to 'regular' bus services.
4. Public transport mode share will increase exponentially as congestion levels increase, of this, semi-rapid transit services and regular bus services will also increase (significantly in areas not serviced by the passenger rail network).

13.5.2 Key principles

Supporting the headline principles are key principles covering different aspects of the transit network: infrastructure, connecting activity, operation, and accessibility.

Key principles for network infrastructure are:

- An extensive semi-rapid transit network will connect key origins and destinations at an operating speed equal to the posted speed limit but will be afforded priority
- Bus lanes and/or queue jump lanes will be required at key points on the bus network to provide priority for regular bus services over general traffic to ensure travel time reliability is maintained
- Additional river and rail crossings will be required in the form of transit only or green bridges, similar to the Shenton Park Bus Bridge
- Within the Perth CBD and strategic activity centres, additional layover facilities will be required for both semi-rapid transit and regular bus services
- Semi-rapid transit is preferred on arterial and other high order roads within its own corridor
- Bus lanes can be shared with taxis and motorcycles, but ideally not bicycles.

Key principles for connecting activity are:

- Connections to railway stations will largely be serviced via regular bus services, afforded priority where required. However, where demand exists, semi-rapid transit may be required (e.g. linking Canning Bridge Station and Curtin University).
- Connections to hospitals (not within activity centres) will largely be serviced via regular bus services, afforded priority where required
- Strategic activity centres could have a radial feed in network (distance to be determined by catchment need)
- Other activity centres (such as secondary and district centres) will likely also have a radial feed in network (distance to be determined by catchment need)
- Specialised activity centres (such as airports and universities) would have a very large catchment (whole of Perth). The guiding principle is to ensure an

appropriate level of public transport service connects these centres with the passenger rail network.

- Industrial areas will be serviced via regular bus services, afforded priority where required
- Where possible, semi-rapid transit stations and bus service stops should be located within the heart of an activity centre, not on the fringe or side road

Key principles for operation of the public transport systems are:

- When assessing connections between key destinations, orbital routes should be considered removing the focus and need to enter the CBD
- On-peak frequency for semi-rapid transit of 10 minutes or better
- Off-peak frequency for semi-rapid transit of 15 minutes or better
- On-peak frequency for regular bus services of 15 to 20 minutes
- Off-peak frequency for regular bus services of 30 minutes
- Station spacing for semi-rapid transit to be determined following further investigation
- Stop spacing for regular bus services of 275 metres

Key principles for accessibility to stations/stops are:

- Ensure pedestrian access to all semi-rapid transit stations (via signalised intersection or signalised pedestrian crossing)
- Ensure pedestrian access to all regular bus service stops (via signalised intersection, signalised pedestrian crossing, or uncontrolled crossing locations).

13.5.3 Considerations and challenges

The key principles proposed will provide on-road public transport (semi-rapid or street transit) priority where it is most needed to ensure reliable, on-time running for the public transport network. When connecting to key activity centre destinations and railway stations, it is important for the user to know that their journey will take the same time each day.

When assessing the requirements for on-road public transport priority the following considerations need to be taken into account:

13.5.4 TransPriority Planning

A consistent approach to managing the network is required to balance the competing demands for limited road space. As population and economic activity grow, new challenges are arising in managing the transport network, minimising congestion and mitigating the social, economic and environmental impacts of increased demand on the State's infrastructure.

TransPriority is a tool for managing the many competing demands for limited road space, and requires an understanding of who is using each road corridor. Depending on the time of day, some roads will be given bus priority while other roads will provide an alternative route for through traffic. By ensuring that pedestrians and cyclists have

improved access to activity centres and public transport services, the application of TransPriority can also encourage people to walk and cycle.

13.5.5 Reservation widths

Long term planning needs to be undertaken to ensure that road reservation widths can accommodate the infrastructure required for the competing demands identified in each corridor.

Planning reservation widths within a new (Greenfield) development area can often be easier than within an existing urban area. It is important that when planning on-road public transport systems and the road reservations required to accommodate them, other land use issues are considered and integrated with the design along with the placement of essential infrastructure. In developing areas, such as Ellenbrook, the introduction of permanent semi-rapid infrastructure will give stakeholders, such as local government, local developers, public transport users and new home owners renewed interest and confidence in developing and buying land for housing, recreation and retail opportunities near transit corridors.

The integration of a semi-rapid transit system or street transit priority infrastructure into an existing urban environment is often more challenging. Road reservations have usually already been set and development boundaries clearly defined. This then requires careful design of transport infrastructure along a corridor to minimise required land take and integrate with existing/planned land use. When semi-rapid transit infrastructure or indeed street transit priority is introduced, pre-existing public transport service patterns may need to be rationalised, to ensure a greater level of reliability as passengers expect more from improvements where they already have frequent services.

Prior to introducing a new level of on-road rapid transit service, the function and form of any transit priority (especially within an existing urban environment) will usually be the first considerations. These need to take into account demand from other competing modes and intersection analysis.

13.5.6 Multi – Function Requirements

The vision of a semi-rapid and street transit priority system for Perth is an integrated system of segregated infrastructure, full-time bus lanes and priority intersection treatments connecting strategic centres. However, a short-term (non-segregated) and long-term (fully-segregated) staged approach will see several types of bus priority treatments used. The priority treatments will be used for discrete, more congested sections and busier stop and intersection locations along corridors before an entire connected system can be established. These can take the form of full or part time (peak period) lanes, intersection queue jump treatments or signal priority, with all of these treatments supported by real-time information.

The form of priority chosen will often be affected not only by the public transport demand and the demand of competing modes but also the multifunctional requirements within that corridor such as on-street public parking, residential parking, access requirements, loading zones, and taxi ranks.

13.5.7 Accessibility

Universal accessibility will be one of the most important elements of a quality on-road public transport system. ‘Super stops’ may be introduced for semi-rapid transit at varying scales depending on the location, thus ensuring safe and accessible boarding, alighting and inter-modal transfers. Bus stop access should also be designed to ensure that advances in technology or changes to the fleet can be accommodated, such as future-proofing platform footprints for extra capacity and changes to vehicle technology.

Due to the relatively small size and design of transit corridors, along with limited available land, grade separation is not always feasible or desirable. However, when required, paths, connections, ramps, intersections and signalling will need to ensure that full access standards are met.

13.6 Creation of a robust railway network

The proposed public transport network for *Transport @ 3.5 Million* must be able to operate not only on average or good days, but also when incidents create disturbances, and cause service levels to drop. It is therefore necessary to recognise the importance of network resilience and robustness, and plan the network accordingly.

Railway network robustness can be defined as the ability of a railway network to avoid incidents or withstand them without interruptions to service. A robust network could therefore be seen as ‘strong’ or reliable. Railway network resilience however, can be defined as the ability of a railway network to adapt and recover from an interruption. A resilient network could therefore be seen as flexible or ‘nimble’.

A robust network is therefore not always a resilient network, and vice versa. A network may be susceptible to frequent interruptions, but be practiced at dealing with and minimising the consequences. On the other hand, a network may be exceptionally robust and rarely interrupted, but suffer significantly when the interruptions do occur.

13.6.1 Railway vs. network levels of robustness and resilience

As separate concepts, the design principles to achieve either goal differ slightly. This can be demonstrated at both an individual line group and network level (Figure 11).

	Robustness	Resilience
Railway level	Railway robustness is generally achieved by avoiding potential single points of failure (where possible), and ensuring availability and reliability of all railway components are sufficiently high (as measured by Mean Time To Failure [MTTF] or a similar metric). *Perth example:* Signal lights are designed with multiple globes, to prevent a single bulb failure from causing an interruption. Uninterruptible Power Supplys (UPSs) are used to ensure power remains available to critical equipment. Concrete sleepers and heavy rail are also used to reduce instances of track failure.	Resilience at a railway level can be measured as the ability to make up timetable disturbances through extra capacity, or the ability to operate effectively in a degraded mode. *Perth example:* Perth uses turnbacks and crossovers in strategic locations such as Esplanade and Leederville in order to be able turn or redirect trains back or around blockages. Keeping trains as spares at depots located throughout the system is also a measure to improve resilience.
Network level	At a network level, robustness stems from being able to operate aspects of the network independent of other aspects, so that a disturbance does not permeate throughout the network. *Perth example*: By segregating the central stations of the N/S and E/W line groups, Perth has managed to largely mitigate the risk that an incident in one station will permeate to the other (for example, a broken down train in PUG will not bring down Perth Central, and vice versa. In the same way, separate tracks for the Midland and Armadale lines from Claisebrook to Perth prevent a train failure on one line from affecting the other.	Network resilience is generally achieved through the opposite means to network robustness: by integrating the railway network, so that disturbances can be recovered from faster. *Perth example:* Perth Yard West Crossovers allow trains to pass from the N/S line group to the E/W, and vice versa. Hence, Perth bound trains coming from City West could enter PUG, and continue to Mandurah, if a flood on the Mitchell Freeway prevented the movement of trains. Perth Yard East allows trains to pass from the E/W line group to the Armadale / Thornlie and vice versa. This allows trains coming from Claisebrook to arrive at a different platform in Perth, if the regular platform is blocked by a train.

Figure 11: Design principles for railway and network robustness and resilience, with Perth examples

13.6.2 Planning principles

To achieve network level robustness:

A robust network is a network where disturbances can be effectively isolated, and do not permeate throughout the network. Hence, a robust network is an independent or segregated network. In the context of planning for future railways, separate corridors with independent rolling stock and fixed infrastructure such as stations will prevent incidents from affecting multiple line groups. Interaction between line groups should be limited to pedestrian connections, and central stations should be appropriately segregated where possible, to avoid the possibility of an incident affecting multiple line groups.

To achieve network level resilience:

A resilient network is one that can recover quickly from incidents, or operate in an effective degraded mode. Essential to this is the ability for a train to bypass sections of the network, and so the inter-railway connections become critical. In the context of planning for future railways, connecting corridors wherever possible would help to achieve network resilience.

13.6.3 International case studies

In Europe and the US, railways tend to be largely integrated, and so emphasis is placed on resilience. In Asia, networks emphasize robustness.

An example of network robustness is the JR rail lines at Shinjuku station (Figure 12). JR Shinjuku station is one of the largest and most heavily patronised in the world, accounting for over 750,000 daily boardings. There are several subways and commuter railways that also connect to the station, bringing the total ridership for the station complex to approximately 3.64 million per day across 51 platforms over 3 levels. Despite (or more likely, because of) the very high patronage numbers, the railway system is run with remarkable independence. The track layout below shows many intra-railway switches or crossings (showing railway level resilience), but only a few that connect different lines. Each railway also operates independent rolling stock (similarly coloured according to the line they run on).

An example of a resilient network design (of somewhat comparable size) is Grand Central Station in New York City (Figure 13). As in JR Shinjuku, Grand Central carries 750,000 daily boardings. However, it does so with many more connections between railways, as can be seen below. This remains true even after accounting for the difference of station type, and purpose.

13.6.4 Conclusions

In practice, decisions between network robustness and resilience are complicated and intertwined, and so often railway operators and infrastructure owners strike a balance between the two.

At a railway level, measures to improve robustness and resilience can be complementary, and should be pursued as far as practicable. PTA already follows this line of thinking, with the interworking of several backup systems and crossovers or turnbacks at strategic locations. At a network level however, improving connections

between independent railways at significant cost (and thereafter utilising said connections in part to prove their value) will reduce the robustness of a railway network, and cause disruptions to permeate across the network.

It is therefore recommended at a network design level to only pursue inter railway connections where it is deemed strategically or operationally critical. Parallel and independent railways with bus or pedestrian connections should be considered wherever possible, to ensure a robust network that can deliver acceptable outcomes for passengers, in the event of disturbances.

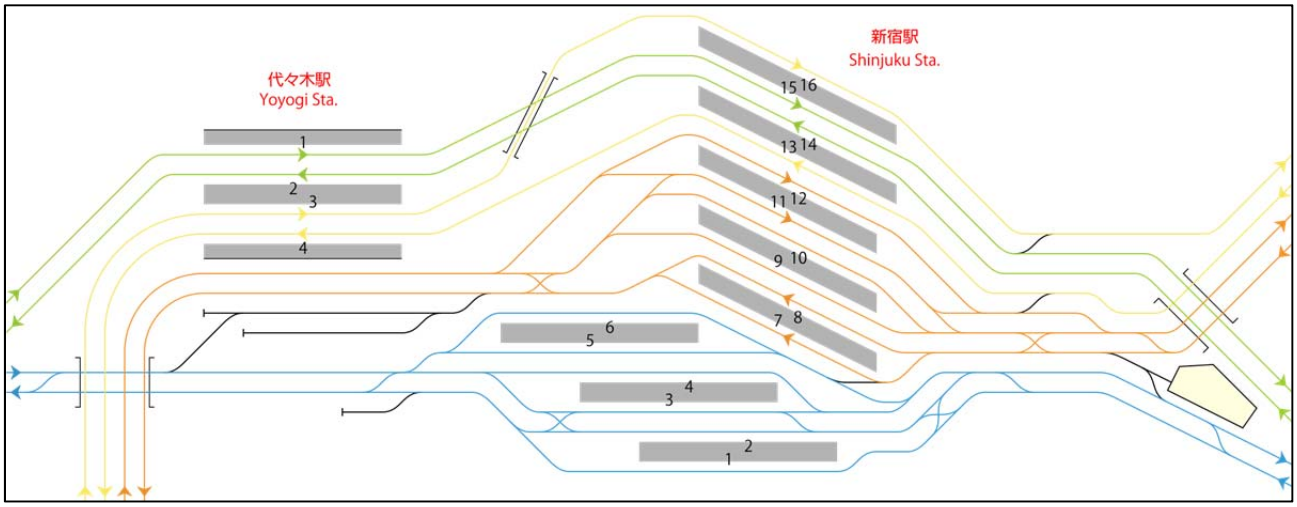


Figure 12: Example network robustness – JR rail lines at Shinjuku Station (source: Wikipedia)

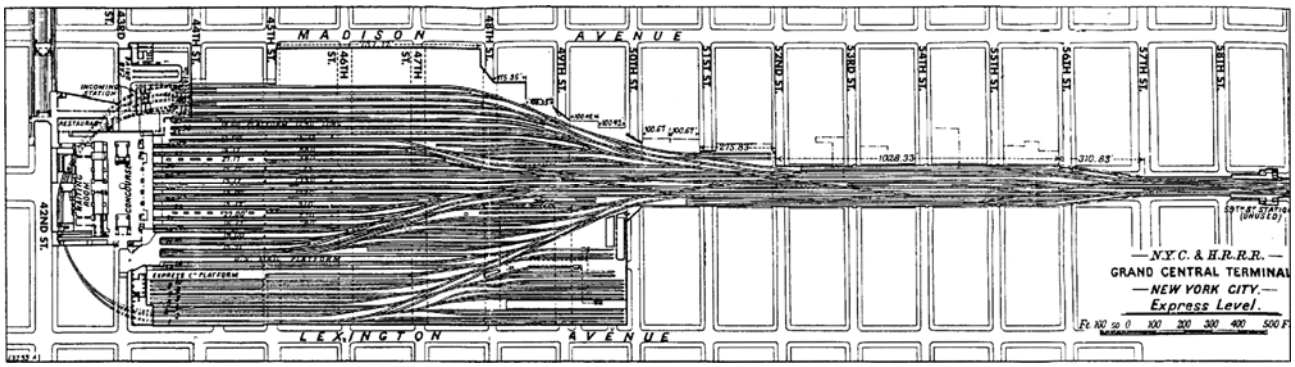


Figure 13: Example network resilience – Grand Central Station, New York City (source: Wikipedia)

14. Public transport outcomes

14.1 Transport modelling results

14.1.1 The network

From 2011 to 2050, the service-kilometres provided by the network increase by 131% and the service-hours increase by 89%. Part of the increase is attributed to the introduction of light rail, although the vast majority results from increases to the bus and heavy rail networks. Refer Figures 14 and 15 for the breakdown of public transport service-kilometres and service-hours respectively.

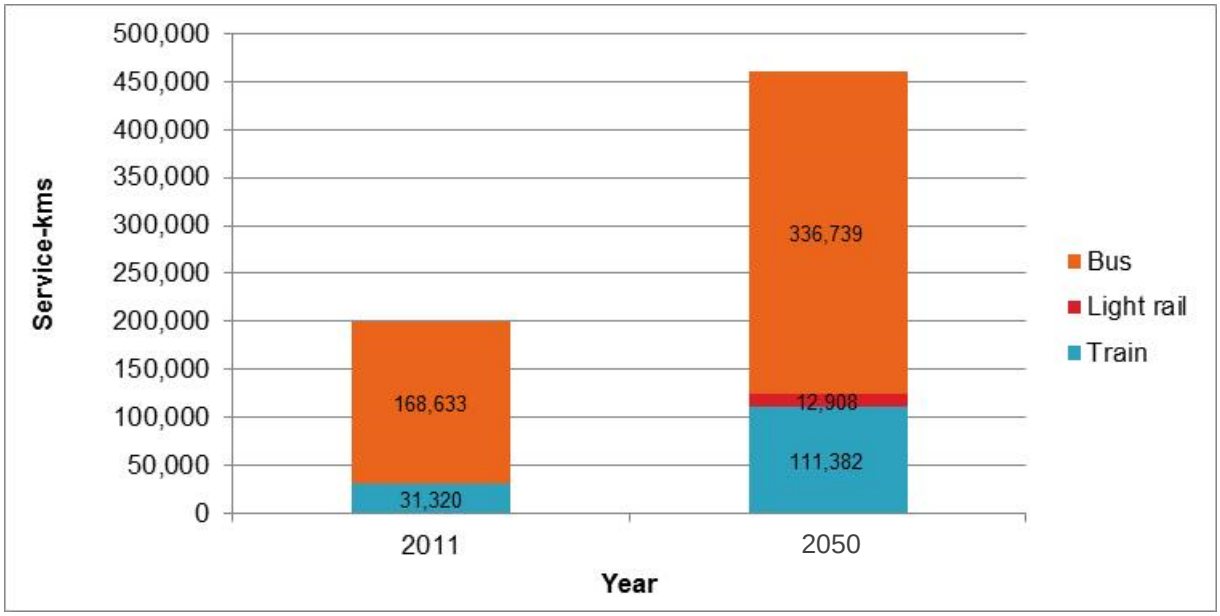


Figure 14: Service-kilometres per day, 2011 and 2050

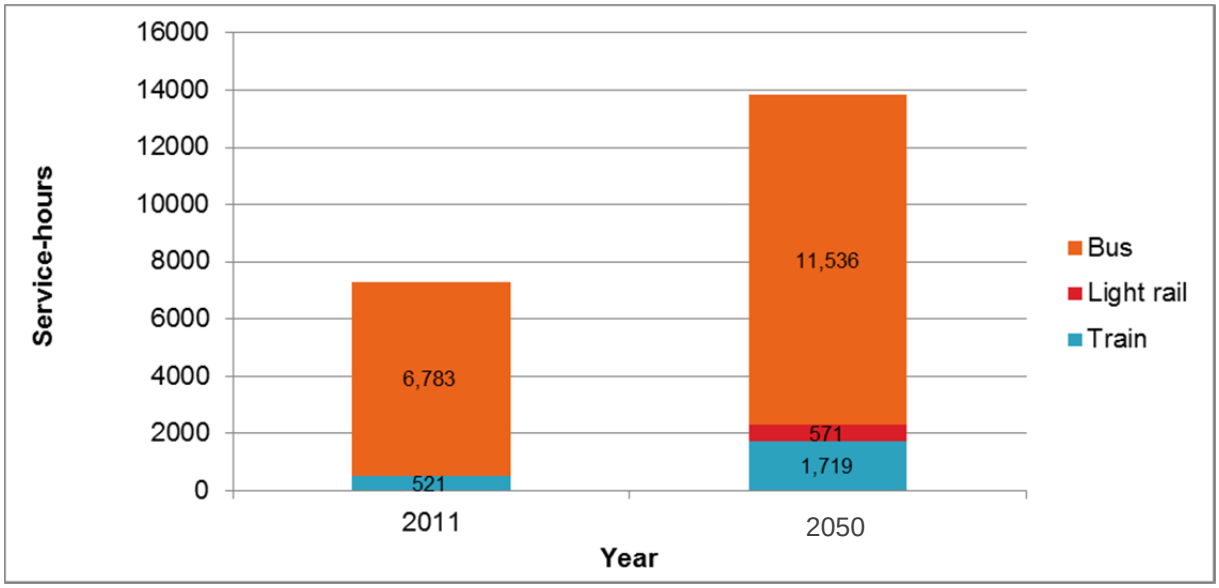


Figure 15: Service-hours per day, 2011 and 2050

14.1.2 Passenger travel

In 2050, the number of public transport trips is expected to be just over three and a half times as high as in 2011. As some trips include transfers, the number of public transport boardings in 2050 is expected to be close to five times as high as in 2011 (the average number of boardings per public transport trip increases from 1.3 in 2011 to 1.64 in 2050). For context, during this time the population is expected to approximately double. Figure 16 illustrates the growth in population, boardings, and trips between 2011 and 2050.

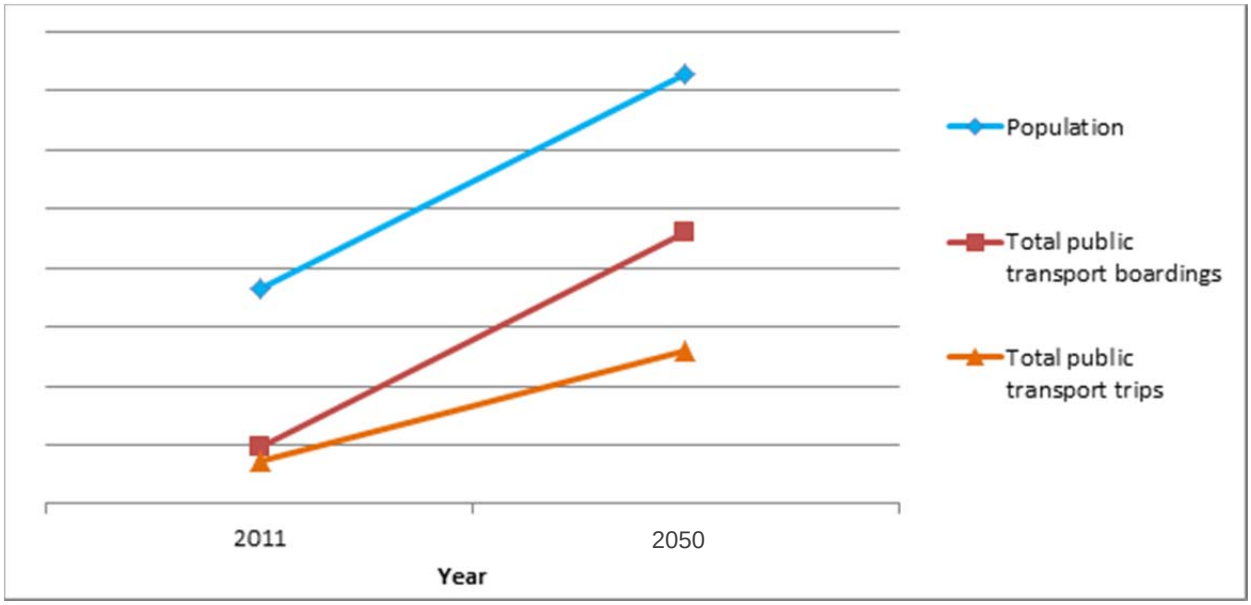


Figure 16: Population, public transport boardings per day, and public transport trips per day, 2011 and 2050

The number of boardings for each public transport mode in 2011 and 2050 is shown in Figure 17. In 2050, the number of train boardings is almost five times as high as in 2011, although the proportion of public transport boardings taking place on the train network remains constant at 40%. The number of bus boardings also increases significantly, with the 2050 boardings being over four times as high as in 2011. However, the proportion of public transport boardings taking place on the bus network decreases from 59% to 52%. In the 2050 scenario, light rail has been introduced and is forecast to make up 7% of the public transport boardings.

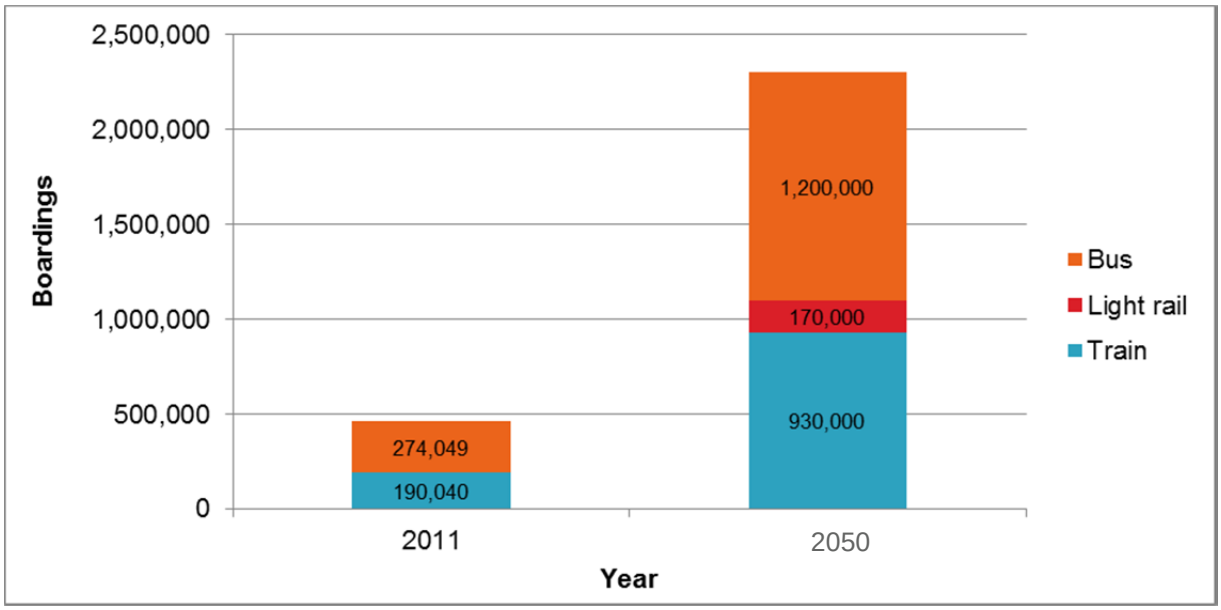


Figure 17: Boardings per day, 2011 and 2050

The passenger-kilometres and passenger-hours modelled in 2011 and 2050 are shown in Figures 18 and 19 respectively, with significant increases occurring over time for both. Whilst travel measured in terms of passenger-kilometres indicates the train network makes up almost 70% of travel both in 2011 and 2050, the time actually spent travelling on the network is more evenly distributed between the train and bus modes. Travel measured in terms of passenger-hours indicates a reasonably even split between train (at 48%) and bus (at 52%) in 2011. In 2050 and with the introduction of light rail, the proportion of passenger-hours spent on the train network increases slightly to 52%, whilst bus drops notably to 42%, with light rail comprising the remaining 6%.

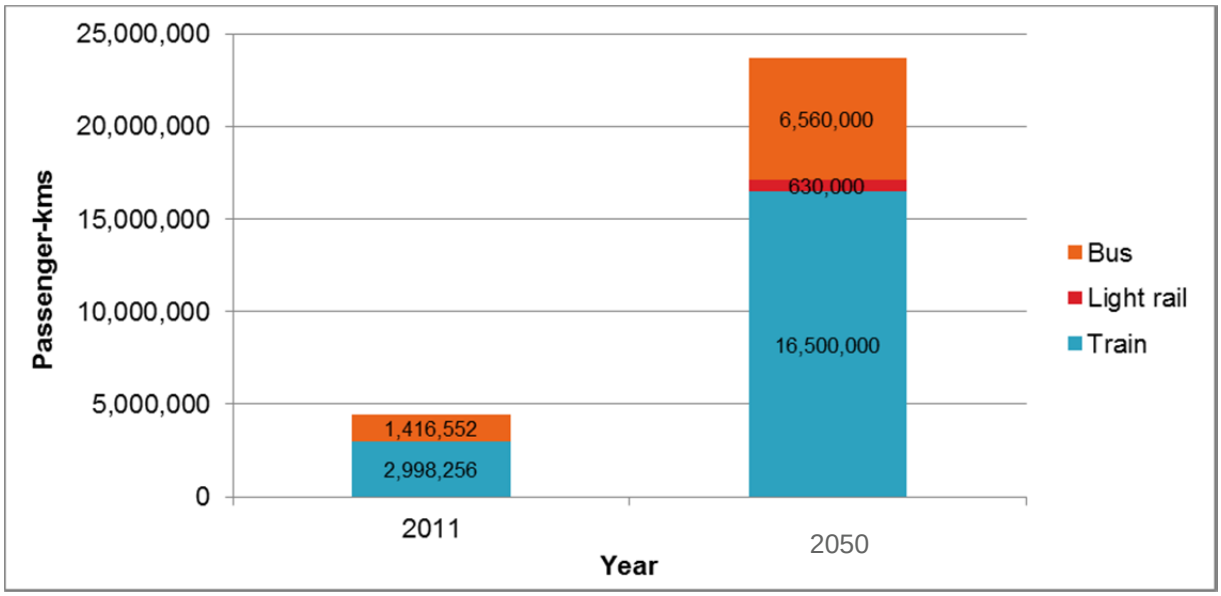


Figure 18: Passenger-kilometres per day, 2011 and 2050

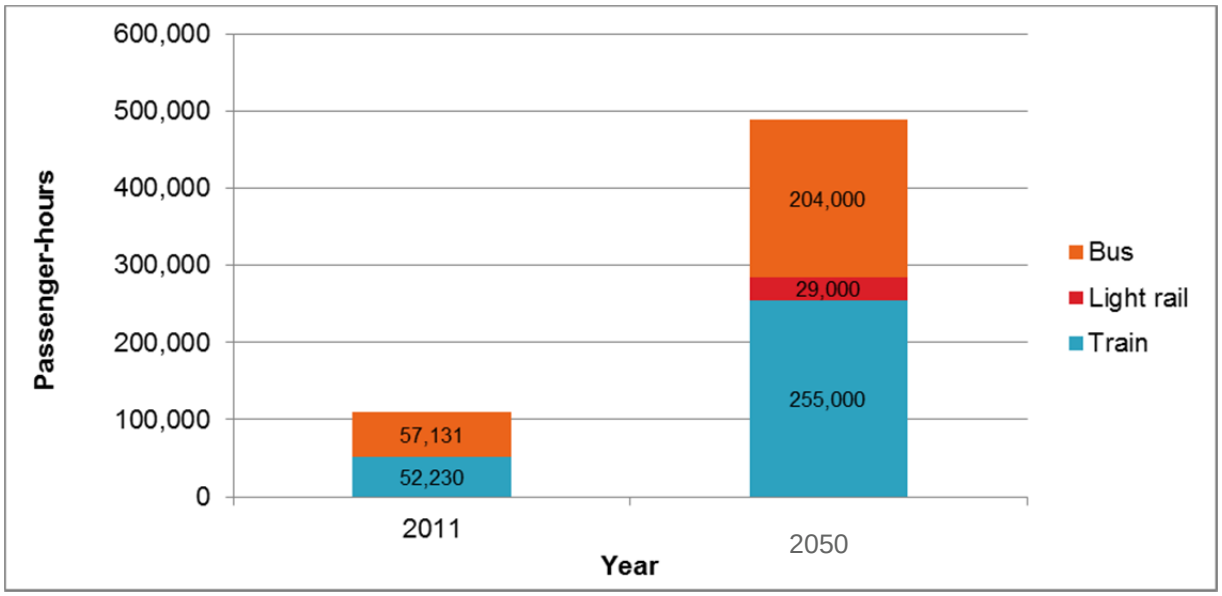


Figure 19: Passenger-hours per day, 2011 and 2050

14.2 Key achievements

14.2.1 Connecting centres

The proposed network connects the strategic centres of Morley, UWA-QEII, and Yanchep to the wider rail network, and creates direct connections between them. As such, the proposed network ensures all strategic centres are directly connected to the suburban rail network. In addition to these links, the supporting network strengthens connections between centres such as Canning Bridge and Belmont.

14.2.2 Creating development opportunities

New mass transit stations at ECU Mt Lawley, Morley, and Yanchep, and a relocated Midland Station, allow significant opportunity for Transit Oriented Development. Care should be taken to ensure precincts surrounding major stations attract appropriate levels of density and become destination stations in their own right, and do not simply become another origin point for morning travel to the Perth CBD.

14.2.3 Managing congestion

Congestion is a symptom of a desirable transport corridor with not enough capacity to support the demand. The proposed network focuses on popular OD pairs, and hence attempts to increase the capacity of said links. Examples include the provision of mass transit to Morley to relieve pressure on the bus network that currently undertakes the transport task. Despite strong growth in public transport patronage across the system, crowding levels on public transport routes are manageable. Road congestion (addressed within the Road Network Plan) is also largely reasonable by today's levels.

14.2.4 Moving people

The proposed network takes advantage of the significant investment planned in the existing rail network (as outlined in the RUS) to dramatically improve the capacity of the mass transit system. This increased capacity is well used, with public transport trips increasing at a higher rate than the population.

14.2.5 Creation of a legible and frequent grid

By focusing frequent services along a grid of strategic corridors, the network aims to be legible and understandable to an inexperienced user. The supporting network involves a number of corridors requiring over 20 buses an hour during peak periods, a level of frequency that is rare in today's network.

The proposed public transport network connects strategic centres, creates development opportunities, helps to manage congestion, moves increased numbers of passengers, and delivers legible and frequent services to users.

---

15. Further work

This Plan represents a substantial body of work undertaken by the Transport Portfolio to understand the public transport needs for the city at 3.5 million people. However significant further work is required to confirm the viability and functionality of the proposed network, and to further prioritise investment.

15.1 Network changes

Further modelling work is proposed as part of the Plan, in order to further assess the credibility of identified alternatives to the proposed network. It is possible that the network will be altered as a result of this modelling work, if the alternatives are shown to be superior to currently recommended network enhancements.

Thorough economic analysis and comparison with alternative solutions has not been undertaken for many proposed enhancements, particularly those proposed after the city has passed 2.7 million. It will be necessary to undertake these bodies of work as required, to ensure value for money outcomes, and an optimised transport system. The results of this further analysis may result in the removal of proposed enhancements, or the addition of alternatives.

Planning always includes a degree of uncertainty, directly related to the length of time being planned. As this project involves long term projections, it follows that the level of uncertainty will be equally high. Such a level of uncertainty can leave original projections vulnerable to criticism and inaccuracy, if left unchecked. It is vital therefore, to continue to refine and update projections as new data or parallel planning work comes to light. *Transport @ 3.5 Million* plan will be reviewed every five years, taking into account revised projections and influential social and technological trends that may impact on the public transport network and services in future.

15.2 Policy and legislation

Policy and legislative issues will need to be identified and addressed to ensure that the urban transport system can continue to support a fast growing city with an expanding rapid transit public transport system.

This Plan recommends new elements of the public transport system, such as LRT and extensive tunnels. Issues surrounding the development of transitways, development of public transport priority infrastructure on local roads, and the protection of underground assets will need to be addressed.

15.3 Transformational projects

LRT networks and systems in most jurisdictions have typically been introduced partly as a measure to address urban accessibility and mobility, but also as a catalyst for urban consolidation and renewal. In this respect, the feasibility of many of these projects has been assisted by financial contributions from the private sector, which has

recognised that light rail brings higher property values and higher desirability for living close by.

Similarly, new and extended heavy rail lines provide a real opportunity to transform the way people move in those areas.

There is real potential for private sector financial contributions from land owners and to secure significantly greater urban densities and localised centre models than have typically been evident in Perth.

Transformational projects will need to be identified and examined for opportunities for:

- A contribution to the capital cost of the projects by the private sector, or a transfer of some of the increased property value.
- Alignment of support from local authorities to achieve a practical network across local government boundaries.
- Higher residential densities and job numbers being secured within a 1 km radius of stations and stops.

15.4 Local government engagement

It is expected that project proposals will be put forward by local government. Where proposed by other proponents, projects will need to demonstrate how they are compatible with the broader network, demonstrate adequate patronage, be consistent with design guidelines and technology to maximise operational flexibility and synergies across the network, and would need to be subject to detailed master planning and a business case.

Consultation with local government will continue to be a key part of delivering the best outcomes for both local residents and the wider community when implementing public transport projects, with priority transit projects delivered through cooperation and agreement with local government authorities where possible.

15.5 Continued integration of public transport and land use plans

Urban form is influenced by transport networks which, in turn, are fundamentally influenced by urban development. Land use planning and transport network planning are intrinsically linked. Implementing this Plan will shape the future of Perth's urban form, and urban development will determine future transit networks. Given the long term planning horizon of *Perth and Peel @ 3.5 million* and this Plan, both plans will need to be revisited as the population of Perth grows and the public transport projects are refined and implemented, to ensure ongoing integration between the two.

Development of *Transport @ 3.5 Million* means that at the highest level of strategic planning there is strong integration between land use plans and transport plans for Perth. This helps to ensure that public transport supports future growth areas and provides connections to areas of strategic importance.

However, this alone will not generate effective integration between land use and public transport. The level of synergy between this Plan and *Perth and Peel @ 3.5 million* also needs to be replicated at all levels of planning and be expanded to consider the urban movement network as a whole. Well-designed and located public transport can act as a catalyst for revitalisation, redevelopment, and intensification of land use. This will only occur where there are land use policies that support more intensive use around key transport nodes and routes.

16. References

[1] Bureau of Infrastructure, Transport and Regional Economics (BITRE), “Traffic and congestion cost trends for Australian capital cities. Information Sheet 74.,” BITRE, Canberra, 2015.

[2] Department of the Environment, “Australian Greenhouse Emissions Information System - State Greenhouse Gas Inventory,” Commonwealth of Australia, 2013. [Online]. Available: http://ageis.climatechange.gov.au/SGGI.aspx. [Accessed 2015].

[3] Department of Planning, “Draft Perth and Peel @ 3.5 million,” Western Australian Planning Commission, Perth, 2015.

[4] Bureau of Infrastructure, Transport and Regional Economics (BITRE), “Population growth, jobs growth and commuting flows in Perth,” BITRE, Canberra, 2010.

17. Appendix A: Acronyms

ATC	Automatic Train Control. Improved signalling technology, comprising an integrated solution of traffic management, ATP & ATO.
ATP	Automatic Train Protection. Safety system that enforces the separation of trains on a railway, to prevent collisions.
ATO	Automatic Train Operation. System used to accelerate and brake trains. Can assist train drivers for improved punctuality, or operate without drivers.
BRT	Bus Rapid Transit. Bus transit designed as an integrated system mostly separate ROW, preferential treatments at intersections, ITS, and other elements for greater efficiency. Its better performance and stronger image result in greater passenger attraction than regular bus.
CBD	Central Business District
CBTC	Communications Based Train Control. Popular technology for high capacity Automatic Train Control.
DSMS	Dynamic Stand Management System. System that automatically allocates stands to transit vehicles approaching a station.
DoT	Department of Transport
LRT	Light Rail Transit. Rail based transit system which can utilise on road corridors, with priority afforded when required. Similar in service level characteristics to BRT.
MRWA	Main Roads Western Australia.
OD	Origin-Destination. An OD pair describes a trip, through the location of the origin and destination points.
PTA	Public Transport Authority (WA)
QEII	Queen Elizabeth II Medical Centre
ROM	Regional Operations Model. Main Roads' transport evaluation and planning model.
ROW	Right of Way. Any path or way on which vehicles travel.
RTTS	Real Time tracking System. GPS based system used to track the location of buses in a network. Used to facilitate DSMS and real time passenger information.
STEM	Strategic Transport Evaluation Model. Transport Portfolio's 4 step macroscopic transport evaluation and planning model
UWA	University of Western Australia

Department of Transport
Public Transport Authority

mainroads
WESTERN AUSTRALIA

Road Network Plan

Transport @ 3.5 Million

July 2016

This page is intentionally blank

Table of Contents

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Background

Previous road network planning for the Perth and Peel regions has been guided by various strategic land use plans, including the *Stephenson-Hepburn Plan*, *Corridor Plan for Perth*, *Metroplan*, *Network City* and *Directions 2031 and Beyond*. The Western Australian Planning Commission recently released the draft *Perth and Peel @ 3.5 Million* strategic land use plan and associated spatial frameworks, which allow for a population of 3.5 million people in Perth and Peel nominally by 2050. In response to this land use, the Transport Portfolio has prepared *Transport @ 3.5 Million,* a plan which responds to the transport needs of a population of 3.5 million people and beyond for Perth and Peel.

Transport @ 3.5 Million, which is fully integrated and considers all transport modes, includes plans for public transport, roads, cycling, freight, and travel demand management. The Road Network Plan covers the higher order road network, including freeways, the road freight network, proposed new river crossings, access to and through the Perth CBD and the arterial network. The plan also provides for on-road public transport priority.

Transport modelling and demand

Transport modeling for *Transport @ 3.5 Million* was undertaken using the Main Roads Regional Operations Model (ROM24) and the Transport Portfolio's Strategic Transport Evaluation Model (STEM). ROM24 was used for the assessment of the Road Network Plan. An iterative process was followed to develop and refine the road network solutions.

The 2050 transport demand for the Road Network Plan was based on the WAPC's draft *Perth and Peel @ 3.5 million* land use scenario which included supporting information relating to housing, population and employment projections. It is a land use with significant population and employment growth provided in the outer metropolitan sub-regions. Expected person trips by mode share during 2050 compared with 2011 values are shown in the following table. The car driver trips represent private car trips.

Mode	2011 STEM	STEM @ 3.5M	% increase	Mode share @ 3.5M
Car driver	3.6 million	6.3 million	75 %	50 %
Car passenger	1.4 million	2.6 million	86 %	21 %
PT	0.4 million	1.4 million	250 %	11 %
Cycle	0.1 million	0.5 million	400 %	4 %
Walk	0.8 million	1.7 million	112 %	14 %
TOTAL	6.3 million	12.5 million	98 %	100 %

The public transport mode share is expected to increase from below 6% to around 11%. Notwithstanding this increase, the road network will carry an extra 2.7 million vehicle trips by 2050. Volumes on the freeway network will increase significantly, as will volumes on key arterial roads, especially those serving new development areas.

Development of the freeway network

The freeway network will continue to serve as the principal high capacity distribution network within and across the metropolitan area, and will be expanded to service increasing demand and development in the outer metropolitan sub-regions. The Mitchell and Kwinana Freeways will form the primary north-south distribution spine, supplemented by a second north-south spine further inland created by Tonkin Highway and Whiteman-Yanchep Highway (WYH). Reid and Roe Highways will form a future inner metropolitan freeway ring, linking Mitchell and Kwinana

Freeways and serving Perth Airport and strategic metropolitan industrial areas. The expanded network will provide additional capacity and substantially improve network resilience. Managed Freeways will be progressively implemented to further improve resilience and provide a productive network that delivers the maximum safety, reliability and sustainability benefits.

Mitchell Freeway will be extended to tie in with Indian Ocean Drive in the north, constructed to freeway standard to Toreopango Avenue by 2050 and ultimately to Indian Ocean Drive. Tonkin Highway will be extended to tie in with the Perth-Darwin National Highway (PDNH) in the north and Forrest Highway at Pinjarra in the south, constructed to freeway standard between PDNH and Mundijong Road by 2050 and ultimately to Forrest Highway. The WYH will link Tonkin Highway with Mitchell Freeway at Pipidinny Road.

The PDNH will be constructed from Tonkin Highway to Great Northern Highway (GNH) at Muchea, and the Perth-Adelaide National Highway (PANH) will be constructed between Midland and Great Eastern Highway at Wooroloo, with freeway standard planned to Gidgegannup by 2050.

The Fremantle Rockingham Controlled Access Highway (FRCAH) will provide high standard connectivity between the important industrial and commercial centres located within the Perth South Western Metropolitan Corridor, serving the Western Trade Coast strategic industrial centre and the Rockingham industry zone. The FRCAH will be constructed to freeway standard between Leach Highway and Kwinana Freeway at Mundijong Road. The FRCAH will link with the proposed Stock Road Tunnel.

Development of the road freight network

Significant expansion of the strategic road freight network will be required to improve connectivity between the city's industrial areas and ports, and to provide linkages out of the metropolitan area serving regional WA and interstate freight transport demand. Freeways that form part of the strategic road freight network include PDNH, PANH, FRCAH, Kwinana Freeway, and Tonkin, Reid and Roe Highways, discussed above.

The PDNH will replace GNH south of Muchea as the primary road freight route to the north west of the state. The PANH will replace the section of Great Eastern Highway between Midland and Wooroloo as the primary road freight link to the Eastern States.

The extensive development planned for the Western Trade Coast, including the establishment of container and general cargo port facilities at the Outer Harbour in Cockburn Sound, will be serviced by the FRCAH, Kwinana Freeway and Tonkin Highway, and a network of east-west arterials linking the Western Trade Coast with the primary north-south distribution network. The east-west arterials, which include Rowley Road, Anketell / Thomas Road and Mundijong Road, will be constructed to 4-lane divided standard.

The Inner Harbour will be serviced by the Perth Freight Link network upgrades, which include the Winterfold Tunnel and upgrades to Stirling Highway and Tydeman Road, providing significantly improved free-flow access into the North Quay container terminals.

The Southern Link Road, which connects Mundijong Road with Brookton and Albany Highways, will be required beyond 2050. It improves access for agricultural and freight traffic travelling from the Great Southern and Central Wheatbelt regions to metropolitan destinations, including the Western Trade Coast.

Proposed new river crossings

The Swan and Canning Rivers form a natural east-west constraint for the predominant north-south transport movements across Perth. The existing road river crossings, especially those in close proximity to the CBD, will be under increased pressure by 2050. The preferred crossing between the Stirling and Narrows Bridges is an extension of Stock Road (the FRCAH) northwards from Leach Highway linking with Stephenson Avenue at Jon Sanders Drive, with an extension tying in to Mitchell Freeway south of Reid Highway. This option will be mainly tunneled, connecting into the freeway network at both ends. The river crossing reduces traffic on the Fremantle and Narrows bridges, and on sections of Mitchell Freeway north of the city. The river crossing significantly improves cross-river opportunities and generates cross-river demand.

A connection between Canning Highway at Berwick Street and Riverside Drive at Plain Street east of the Perth CBD is proposed. This bridge (or tunnel) crossing of the Swan River will significantly improve access to and past the CBD, as discussed below.

District structure planning allows for a future local road connection between Belmont Park on the Burswood Peninsula and Mount Lawley over the Swan River. This connection, which entails a new bridge over the river, links with Summers Street and will carry local traffic, cyclists and pedestrians.

Perth CBD access

Road networks serving the Perth CBD, which will remain WA's commercial and administrative centre for business and government into the future, need to continue operating at acceptable levels of service during peak periods. Modeling shows that east-west and north-south movements across the Perth CBD will be under increased pressure by 2050. The preferred solution is a new road tunnel connecting Riverside Drive at Plain Street with the Narrows Interchange. This link, in combination with the Canning Highway to Riverside Drive bridge (or tunnel), will have numerous benefits. It will substantially improve east-west connectivity for cross-city trips, reduce traffic on Graham Farmer Freeway and east-west city arterials, reduce traffic on Riverside Drive and improve access to the CBD from areas east of the city.

Development of the arterial road network

The arterial road network will be upgraded to accommodate the 2050 demand. This will include road widening, provision of grade separation at high-volume intersections and significant upgrading of at-grade intersections. Further detailed assessment will be required to develop road solutions, especially in constrained urban environments. Arterial networks connecting with the planned freeway network will be created to service new urban areas, which include Alkimos to Two Rocks and East Wanneroo in the North-West sub-region, Bullsbrook in the North-East sub-region, and Mundijong and Ravenswood Riverfront / Pinjarra in the South Metropolitan Peel sub-region.

On-road public transport priority

Transport @ 3.5 Million identifies a network of on-road public transport priority corridors which will contain a range of bus priority measures, including partial bus priority such as signal priority and bus queue jump lanes, and full priority in the form of dedicated bus lanes. As bus passenger volumes increase and bus services are expanded to satisfy the demand, public transport priority measures will be progressively implemented on high-volume routes in these corridors.

Network performance

Considering the increased traffic demand generated by an additional 1.4 million people in Perth and Peel by 2050, the road network will generally service future transport needs at acceptable levels of service. However, critical road links are likely to be constrained by 2050, especially those within the Central sub-region and in close proximity to the Perth CBD, where reservations are constrained and the potential for upgrading is limited. The Mitchell and Kwinana Freeways between the Reid and Roe Highways carry the highest volumes during peak periods. Networks serving the Perth CBD, including sections of Graham Farmer Freeway and the north-south freeway distribution through the CBD, will also carry high volumes.

Various arterial roads, including sections of Marmion Avenue, Wanneroo Road, Ocean Reef Road, Karrinyup Road, Morley Drive, Great Eastern Highway, Orrong Road, Canning Highway, Leach Highway, Ranford Road, Nicholson Road, Albany Highway, Armadale Road, Mandurah Road and Pinjarra Road may experience delay at high-volume intersections, requiring grade separation where feasible to provide adequate capacity.

This plan addresses those issues.

Assumptions and risks

A number of risks exist which could compromise the performance of the 2050 road network. Achieving the *Perth and Peel @ 3.5 Million* land use is a key condition for performance. A different employment distribution with higher employment in the Central sub-region and specifically the Perth CBD was assessed, showing increased demand on roads serving these areas, including Kwinana and Mitchell Freeways. Passenger volumes on the rail lines serving the CBD also increase in that scenario.

The modeling assumes that a public transport mode share of 11% will be achieved by 2050. Public transport systems and Travel Demand Management measures required to achieve this target will need to be delivered.

The Road Network Plan assumes the introduction of a number of new road links to provide additional network capacity and resilience. Examples include Roe 8 extension, the proposed Stock Road river crossing and the east-west CBD link. These road links need to be delivered so as not to change the demand distribution affecting road network performance.

1. INTRODUCTION

1.1. Background

Planning for the road network in the Perth and Peel regions has been guided by strategic land use plans, such as The Stephenson-Hepburn Plan (1955), Corridor Plan for Perth (1970), Metroplan (1990), Network City (2004) and Directions 2031 and Beyond (2010). The Stephenson-Hepburn Plan underpinned the establishment of the statutory Metropolitan Region Scheme in 1963. The long term road reservation requirements have been progressively incorporated into and protected by the Metropolitan Region Scheme (MRS) and Peel Region Scheme (PRS). These earlier plans were based on achieving smaller population and expansion outcomes to that which is now anticipated. The Stephenson-Hepburn plan was designed to accommodate an estimated 1.7 million people in Perth by 2005.

Western Australia has experienced strong economic and population growth which is expected to continue into the future despite the recent down-turn in the State's economy. Over the past twenty years to June 2014, average economic growth of 4.75% has been sustained, well above the national average of 3.3% over the same period. The growth peaked at 7.6% in 2011-12. Although the state economy is transitioning out of large scale resource sector capacity expansion towards new production, future economic growth is forecast to remain steady. Despite the major mining, petroleum and agricultural export industries being located elsewhere in the State, Perth dominates the Western Australian economy by virtue of its role as the administrative centre for business and government.

Significant population growth has accompanied the economic growth. In the ten years to 2011 the population of Greater Perth increased by 26% to 1.84 million people[1], accounting for 78% of the states total population. During this period, Perth recorded the highest growth of all capital cities in Australia. By June 2014, the population of Perth and Peel exceeded two million people.

Strong economic and population growth over the past ten years has increased congestion on the Perth and Peel road networks, increasing travel times along certain routes in the peak period. The Australian Infrastructure Audit, published by Infrastructure Australia in April 2015, examines the drivers of future infrastructure demand, particularly economic and population growth, and considers the future demand for infrastructure across Australia's cities over the next 15 years. Based on assessment undertaken independently by Infrastructure Australia, the audit shows that congestion is the dominant transport challenge in cities and infrastructure networks.

The Western Australian Planning Commission released the draft *Perth and Peel @ 3.5 Million* strategic land use plan and associated spatial framework in 2015. This strategic plan builds on the 2011 *Directions 2031 and Beyond* plan and provides a unified, long-term growth strategy for land use and infrastructure required to support a population of 3.5 million people across Perth and Peel by around 2050. The suite of documents includes planning frameworks for the North-West, North-East, Central and South Metropolitan Peel sub-regions, providing the planning context, planned land use expansion and employment for each sub-region.

Transport @ 3.5 Million aligns with the draft *Perth and Peel @ 3.5 Million* planning frameworks and may need to be updated in line with the WAPC/Department of Planning's finalised planning frameworks as they become available The Road Network Plan is one component of *Transport @ 3.5 Million*.

[1] ABS Catalogue 3218.0, Regional Population Growth, Australia, 2011

1.2. Scope and purpose of the Road Network Plan

The Road Network Plan covers the higher-order road network within the Perth and Peel regions, including Primary Regional Roads (PRR) which include freeways and other primary distributors, as well as Other Regional Roads (ORR) which are roads of regional significance. Other roads that currently, or will in future, perform a strategic function within the Perth and Peel regions and are currently not included in the regional road network, such as important freight routes and public transport routes, are also included.

The Road Network Plan is intended to guide future planning and investment in the regional road network across Perth and Peel regions. The plan identifies future network needs, including the required upgrading and expansion of the road network to ensure that acceptable levels of service and efficiencies for freight, public transport and general traffic are maintained into the future. The plan assesses the need for significant network changes, such as additional river crossings. The plan brings together future road network needs identified in other strategic plans and programs, and provides a strategic assessment of the major improvements planned.

The plan considers two time horizons, 2031 which corresponds with a population of 2.7 million people and 2050 corresponding with a population of around 3.5 million people.

The Road Network Plan materially aligns with the draft *Perth and Peel @ 3.5 million* strategic land use plan. Transport modeling has been undertaken to investigate the demand generated by a population of 3.5 million, and a transport assessment has been undertaken to confirm future road network requirements, including proposed on-road public transport priority routes.

The draft *Perth and Peel @ 3.5 million* strategic land use plan assumes changes in the spatial distribution of population and jobs across the Perth and Peel regions, including a significant increase in employment self-sufficiency in the outer sub-regions. The Road Network Plan comments on the risk of not achieving these targets and the impact on infrastructure requirements.

The plan follows an integrated and iterative approach, considering all transport modes in developing the plan. Various land use scenarios, mass transit scenarios, and on-road public transport scenarios were tested to identify a preferred integrated network solution. An important consideration is on-road public transport, including the need for bus priority.

The extent to which the preferred network solution achieves defined Key Performance Indicators (KPIs) at a network and route level is discussed. This needs to be seen in the context of achieving realistic mode share targets.

2. ROAD NETWORK VISION, OBJECTIVES AND PRINCIPLES

Development of the Road Network Plan is guided by the vision and objectives in *Transport @ 3.5 Million* and Main Roads' strategic direction, *Keeping WA Moving*.

Transport @ 3.5 Million, and therefore the Road Network Plan, are aligned to the *Perth and Peel @ 3.5 Million* planning frameworks.

2.1. Transport @ 3.5 Million

Transport @ 3.5 Million sets the vision for a vibrant, connected and productive Perth. To achieve this vision, the transport network will meet the following objectives:

- Optimise use of the existing network and as it grows
- Integrate with land use and across the public transport, active transport and road networks
- Deliver high frequency, 'turn up and go' mass rapid transit connected with effective public transport feeder services
- Provide a safe, connected, active transport network of primarily off-road cycleways and walkways and
- Maintain a free-flowing freeway and arterial road network for the efficient distribution of people and freight.

These key objectives inform the strategic direction adopted in the Road Network Plan.

2.2. Main Roads Strategic Direction – Keeping WA Moving

Main Roads' strategic direction, *Keeping WA Moving*, enables the organisation to respond to the continuously changing operating environment and sets the direction to take Main Roads into the future, with a 20 to 30-year forward focus. The strategic direction helps Main Roads to achieve its' aspiration statement: *To provide world class outcomes for the customer through a safe, reliable and sustainable road-based transport system*. This aspiration statement captures the ideal future direction for the organisation.

To achieve this aspiration, four key focus areas have been identified: Customers, Movement, Safety and Sustainability.

Customers: Providing a transport network centred on what their customers need and value.

Movement: Improving the mobility of people and efficiency of freight.

Sustainability: Developing a sustainable transport network that meets social, economic and environmental needs.

Safety: Providing improved safety outcomes for all users of the transport network.

Main Roads considers sustainability in all decision-making to ensure that the road transport system is managed, operated and developed to meet the needs of today without compromising the natural, human and financial capital on which future generations will depend.

2.3. Road Network Plan focus areas and objectives

The development of the Road Network Plan is centred around four key focus areas contained in Main Roads' strategic direction, *Keeping WA Moving*: Customers, Movement, Sustainability and Safety. Underpinning these focus areas, the Road Network Plan aims to provide for the planning of a regional road network for the Perth and Peel regions that achieves the following objectives:

- Improved **efficiency / productivity** of the road network
- Improved **road safety**
- Improved **transport integration**
- Improved **amenity**
- Improved **sustainability**
- Improved **network resilience**.

Achieving these objectives will have the following related road network benefits:

- It will transform the way people live, travel and experience Perth
- It will support Perth's development as a hub for business and tourism
- It will unlock economic growth and rejuvenation for future generations
- It will provide world class public spaces, cycling and pedestrian facilities.

These focus areas and objectives have guided the development of the Key Performance Indicators against which the performance of the Road Network Plan is assessed.

2.4. Road network planning principles

Key principles that were applied in developing the Road Network Plan relate to the above objectives and focus areas.

Network efficiency and productivity

The freeway network, which serves as the primary distribution network between urban centres, should continue to operate at acceptable levels of service during peak periods. Road provision should provide a balanced transport outcome, considering heavy rail that provides a parallel service along many of these routes. Traffic congestion management programs should be implemented to address the congestion challenge. This should include progressive implementation of operational efficiency measures, such as Managed Freeways, to maximise network performance.

The strategic road freight network, which connects the city's main industrial centres, should convey freight efficiently and reliably across the metropolitan area, continuing to operate at good levels of service during peak periods and throughout the day.

The lower order regional road network, including urban arterials, should operate at acceptable levels of service during peak periods, providing adequate access to the primary distribution network.

Road safety

The road network should strive to achieve the State's Towards Zero road safety targets through the provision of divided roadways and grade separation where feasible.

Transport integration

The arterial road network should accommodate the appropriate level of on-road public transport priority for high volume public transport routes. The level of public transport priority should provide a balanced network solution with due consideration for both general and public transport vehicles.

Sustainability

Wherever possible, the road network should strive to avoid impacting land that is not already reserved in the Metropolitan Region Scheme. *Transport @ 3.5 Million* promotes sustainable transport outcomes by setting appropriate public and active transport mode share targets. Sustainable road network solutions are achieved by incorporating sustainability assessment through the road planning process.

Network resilience

Adequate resilience should be built into the road network so that it can recover quickly from unplanned events and is adaptable to potential future changes. This will be achieved through adequate network redundancy (suitable alternative routes with spare capacity), network strength (the ability to withstand incidents and changing environment) and collaboration (the ability to communicate with system users).

3. ROAD NETWORK PLAN

The metropolitan road network is vital in keeping people and freight moving for the economic and social prosperity of Western Australia. In 2011, the 1.8 million people living in Perth and Peel carried out 6.3 million trips during a typical weekday, with around 5 million of these being undertaken in cars. While a shift from car trips to non-vehicle public transport and active transport trips (walking and cycling) is expected to occur in time, with a target of 11% public transport and 18% active transport mode share by 2050, car trips will still remain the predominant transport mode into the future.

The vast majority of Perth's freight task is transported by road, with only a small share being contestable by rail. Currently, 85% of all containers passing through Fremantle Port are transported on road. The Western Australian Government is committed to increasing rail freight movements to and from commercial ports. Notwithstanding this initiative, road transport will remain the dominant freight transport mode into the future.

The regional road network within Perth and Peel is made up of the freeway network, and a network of primary and district distributor roads (or highways and urban arterials) of regional significance. The road network accommodates general and commuter traffic, on-road public transport, freight transport, cyclists and pedestrians. Priority networks have been defined to serve on-road public transport, road freight, Restricted Access Vehicles, High Wide Loads and active transport, including cycling and walking.

The Road Network Plan guides future development of and investment in the regional road network for two time horizons: 2031 which corresponds with a population of 2.7 million people and 2050 corresponding with a population of 3.5 million people.

The plan forms part of an integrated transport solution. The proposed road networks for the 2031 and 2050 time horizons were developed in parallel with the mass transit, Light Rail, on-road bus and cycling networks. The plan recognizes the need to increase public and active transport mode shares and considers the balance between road and public transport infrastructure provision, as well as the need for on-road public transport priority.

3.1. Operational efficiency initiatives

The implementation of operational efficiency initiatives is an integral component of a sustainable transport network that meets social, economic and environmental needs. These initiatives improve network efficiency and reliability by optimising network performance. Effective implementation will potentially defer expenditure on major road network expansions.

Through its Congestion Management Program, Main Roads is developing and implementing a range of initiatives to optimise network performance and improve road safety. This will improve traffic flow and reduce travel times. These initiatives may be broadly described as Intelligent Transport Systems (ITS), and include Managed Freeways, improved road network information, and signal optimisation.

3.1.1. Intelligent Transport Systems and Managed Freeways

Intelligent Transport System (ITS) components may be grouped into three areas:

- **Intelligent infrastructure** such as traffic signals on roads, variable messaging signs to alert road users of hazards ahead and freeway ramp signals that work to keep freeways flowing;

- **Smart vehicles** such as automatic crash notification, intelligent speed assist, intelligent cruise control, reverse and forward collision warning, GPS navigational systems, and alcohol ignition interlocks; and
- **Information services** such as next-bus information on your mobile phone, in-car navigation systems receiving current traffic conditions to guide you around congestion hotspots, and the national Intelligent Access Program for trucks.

The Transport Portfolio is committed to progressively incorporating Managed Freeways solutions into the existing and future freeway network. Managed Freeways will, as a minimum, have real-time network monitoring capability and intelligence, and provision for higher order Managed Freeway treatments where needed. These could include coordinated ramp signals, variable speed limits, All-Lane Running and lane-use management. The selection of technology and operational strategies will be driven by the nature of the problems as identified by network analysis based on robust data. Managed Freeways will ensure a productive, resilient freeway network that is capable of delivering the maximum reliability, safety and sustainability benefits to the community. Significant benefits will include reliable travel times, efficient movement of people and freight, and improved safety of all road users, including road workers. Sustainability outcomes will be delivered by reducing congestion, emissions and cost of travel, and deferring or avoiding the need for network expansion.

Managed Freeways will also incorporate improved travel information for road users. This will include real-time information such as travel times, travel speeds and road conditions. The information will enable road users to make better informed travel choices.

3.1.2. Signal optimisation

Traffic signals across the metropolitan network are coordinated using the Sydney Coordinated Adaptive Traffic System (SCATS) with timings based on signal plans which have been set for a specific time of the day and day of the week. Slight changes to signal timings can achieve significant benefits and it is important that timings are adjusted regularly to take account of changing traffic conditions. Main Roads has implemented an ongoing program, the Traffic Signal Timing Reviews, to review and coordinate traffic signals across key metropolitan corridors. These corridors include the heavily trafficked urban arterials such as Great Eastern Highway, Leach Highway, Canning Highway, Stirling Highway, Albany Highway, West Coast Highway, Wanneroo Road, Shepperton Road, Marmion Avenue, Charles Street and South Street. This program has seen marked improvements in travel times of between 1% and 20% during the morning and afternoon peak periods across the network. The need for regular signal optimisation will become an increasing priority as volumes and congestion levels rise into the future.

The conflict between pedestrians and vehicles at heavily trafficked intersections in urban centres causes flow breakdown, increases driver frustration and compromises traffic safety. Main Roads has implemented pedestrian countdown timers at selected intersections, improving intersection efficiency for both pedestrians and motorists. Countdown timers will be progressively introduced, initially targeting intersections with poor performance history.

3.2. Network resilience

Road network resilience refers to the ability of the network to recover from unplanned events and it's adaptability to future changes. Important considerations are the system's stability and speed of recovery. Adequate resilience should be built into the road network so that it can recover quickly from unplanned events which may include high impact low probability events and low impact high probability events. Crashes occurring on the network often result in disruptions, including lane or road closure. Natural hazard events include occasional flooding of the Kwinana Freeway south of the Narrows Bridge. Another aspect of network resilience is the

need to be adaptable to potential future changes in climate patterns, sea levels, travel demands, technologies and lifestyles.

Road network resilience may be achieved through a range of measures including:

Network redundancy – providing suitable alternative routes that have adequate spare capacity in the event of lane or road closures

Diversity – ensuring that alternative transport modes are available in the event of system failure

Adaptability / flexibility – ensuring that the network can adapt to change and responds to lessons learnt

Collaboration – ensuring that the system has the ability to communicate with users to provide traffic and travel advice.

3.3. 2050 Road Network Plan

Key components of the 2050 Road Network Plan include development of the freeway network, development of the road freight network including roads required to service the Western Trade Coast and Outer Harbour, new river crossings, managing access to and movements through the Perth CBD, development of the arterial road network including networks required to service new urban areas, and the provision for on-road public transport priority.

In the outer metropolitan areas which are not intensively developed and have limited built constraints with moderate transport demand, future road reservation requirements for planned roads have typically been adequately provided for within the Metropolitan Region Scheme (MRS). Network solutions generally involve road widening and grade separation within existing road reservations, as well as providing new road links along undeveloped corridors. Reservations still need to be included in the MRS for a number of planned roads, such as the Whiteman-Yanchep Highway (WYH), Tonkin Highway south of Mundijong Road, sections of the Fremantle Rockingham Controlled Access Highway (FRCAH), Neaves Road..

Within the inner metropolitan area, intensive development along existing road corridors, limited space within these corridors, high transport demand and the need to provide high quality public transport services makes network solutions more challenging. In this area more innovative solutions are required, including complex grade separation, tunneling and sharing of road space. Further detailed engineering assessment will be required to confirm the viability of proposed network solutions. Provision for widening along many of these corridors is already accommodated for in the MRS.

The 2050 Road Network Plan is shown in five figures below: Figure 3.1 shows the number of lanes per road section, Figure 3.2 shows additional grade separations by 2050, Figure 3.3 shows the future freeway network, Figure 3.4 shows the road freight network and Figure 3.5 shows road network expansion to 2050.

3.3.1. Development of the freeway and expressway network

The freeway network will continue to serve as the principal high capacity distribution network within and across the metropolitan area. Congestion costs on this network therefore need to be appropriately minimised. The freeways serving urban centres should continue to operate at acceptable levels of service during peak periods. Road provision should deliver a balanced transport outcome, considering that heavy rail runs parallel with sections of these routes. The freeway network serving a strategic freight function should, however, operate at good levels of service in support of the regional and national economy. The progressive implementation of

Intelligent Transport Systems (ITS), including intelligent infrastructure and information systems, will maximise network performance and safety, ensuring network resilience and productivity. The extent of the 2050 freeway network is summarised in Table 3.1. The freeway network for 2050 and beyond is shown in Figure 3.2 and associated additional grade separations in Figure 3.2.

Table 3.1 – Freeway development to 2050

Freeway	Length	Extent
Mitchell Freeway	53.8 km	Perth CBD to Toreopango Avenue
Kwinana Freeway	71.5 km	Perth CBD to Pinjarra Road
Forrest Highway	8.2 km	Pinjarra Road to Greenlands Road
Whiteman-Yanchep Highway	21.4 km	PDNH to Wattle Avenue
Perth-Darwin National Highway	37 km	Tonkin Highway to Muchea
Perth-Adelaide National Highway	20.6 km	Roe Highway to Gidgegannup
Reid Highway	12.2 km	Mitchell Freeway to Roe Highway
Tonkin Highway	54.2 km	PDNH to Mundijong Road
Roe Highway	39.5 km	Reid Highway to Stock Road
Graham Farmer Freeway	6.6 km	Mitchell Freeway to Great Eastern Highway
Fremantle Rockingham Controlled Access Highway	30.7 km	Leach Highway to Kwinana Freeway
Stock Road Tunnel	26.5 km	Leach Highway to Mitchell Freeway
Fremantle Tunnel	5.2 km	Stock Road to Canning Highway
East-West City Link	2.3 km	Riverside Drive to Narrows interchange

The Mitchell and Kwinana Freeways form the primary north-south distribution spine extending the full length of the metropolitan area.

The Mitchell Freeway, which forms the northern section of the freeway spine, is constructed to Burns Beach Road and is currently being extended a further 6 km to Hester Avenue. Long term planning for the progressive extension of the freeway north of Hester Avenue to the MRS boundary has been completed and the required reservation has been included in the MRS. The freeway will connect into Indian Ocean Drive at Wilbinga/Tuart Road approximately 2 km north of the MRS boundary. North of Hester Avenue the freeway is planned to a 6-lane standard with future interchanges at Lukin Drive, Romeo Road, Alkimos Drive, Pipidinny Road, Yanchep Beach Road, Toreopango Avenue, Reef Break Drive and Breakwater Drive. Passenger rail is currently accommodated in the median between the Perth CBD and Lukin Drive just south of Butler Station, with a deviation to serve the Joondalup strategic metropolitan centre. The freeway extension strategy has been based on extending the passenger rail line first followed by the upgrading of parallel routes (Marmion Avenue and Wanneroo Road) and finally progressive extension of the freeway. This approach encourages early take up of the rail line to achieve early patronage and mode share to public transport, and offsets/delays the cost of extending the freeway. Mitchell Freeway is a planned major freight route, providing a northern road freight linkage out of the metropolitan area. By 2050 Mitchell Freeway will be extended to tie in with Indian Ocean Drive north of the metropolitan area, constructed to freeway standard to Toreopango Avenue.

Kwinana Freeway and Forrest Highway form the southern section of Perth's primary north-south freeway spine. Kwinana Freeway has been constructed to its' full extent from the Perth CBD to Pinjarra Road. The freeway has been planned to a 6-lane standard to Mandjoogoordap Drive and to a 4-lane standard between Mandjoogoordap Drive and Pinjarra Road, and the required reservation has been included in the MRS. Kwinana Freeway south of Roe Highway is a strategic freight route, serving the Western Trade Coast and associated industrial areas. Passenger rail is currently accommodated in the median between the Perth CBD and Thomas Road. Forrest Highway extends further south to beyond the metropolitan area, currently planned to 4-lane divided standard.

The Mitchell and Kwinana Freeways between Roe Highway and Ocean Reef Road are predominantly constructed to their ultimate pavement footprint and further widening is constrained by overpass/underpass and pedestrian structures. All-Lane Running (ALR) will be implemented on sections of the freeway, restriping the existing pavement to provide an additional lane per direction and reducing inside and outside shoulder widths. This will necessitate the implementation of Managed Freeways, including lane use management and variable speed limits. Coordinated Ramp Signals will be implemented where network benefits will be achieved.

Reid and Roe Highways will form a future inner metropolitan freeway ring, distributing traffic between Kwinana and Mitchell Freeways. Reid Highway is currently constructed to highway standard with grade separation in places. It is planned to 6-lane freeway standard between Mitchell Freeway and Great Northern Highway, with future grade separation at Erindale Road, Malaga Drive (under construction), Tonkin Highway, Altone Road, Lord Street, West Swan Road and Great Northern Highway. The required road reservation for the current planning has been protected in the MRS. Reid Highway serves as a strategic freight route linking Tonkin Highway with Roe Highway and will be upgraded to its' planned 6-lane freeway standard by 2050, with systems interchanges provided at Mitchell Freeway and Tonkin Highway. If required by demand before 2050, an 8-lane cross-section may be achieved by restriping and implementing ALR.

Roe Highway, which is currently constructed to highway standard between Great Northern and Tonkin Highways, and to freeway standard between Tonkin Highway and Kwinana Freeway, is planned to 6-lane freeway standard. Future grade separation is planned at Great Northern Highway, Toodyay Road (Perth-Adelaide National Highway), Morrison Road, Great Eastern Highway Bypass and Kalamunda Road. Roe Highway serves as a strategic freight route, and the section between the Military Road cross-over north of Bushmead Road and Great Northern Highway forms part of the High Wide Load network. By 2050, Roe Highway will be upgraded to 8-lane freeway standard, requiring the implementation of ALR. Widening between Karel Avenue and Kenwick Link is constrained by a 330kV power transmission line and requires further investigation. The highway will be extended from Kwinana Freeway to Stock Road (the Roe 8 extension), providing a link between Perth's main inland industrial areas such as Kewdale and Welshpool and the Inner and Outer Harbours. The Roe 8 extension, which has been planned to 4-lane freeway standard, will be upgraded to a 6-lane cross-section by 2050 requiring the implementation of ALR. Systems interchanges will be provided at Perth-Adelaide National Highway (PANH), Tonkin Highway, Kwinana Freeway and Stock Road.

Planning is currenty underway to link the Roe 8 extension via the Fremantle Tunnel (between Stock Road and Stirling Highway) and Fremantle Port Connect (Stirling Highway to Port Beach Road) to the Inner Harbour.

Tonkin Highway is currently constructed to highway standard between Reid Highway and Thomas Road, with grade separation currently underway to provide freeway standard between Reid and Roe Highways. By 2050 Tonkin Highway will be extended to tie in with the Perth-Darwin National Highway (PDNH) at Gnangara Road in the north and Forrest Highway at Pinjarra in the south, providing a second north-south distribution spine. Tonkin Highway will take pressure off the Mitchell and Kwinana Freeways. It is a strategic freight route, connecting PDNH with Perth's main industrial areas, including Kewdale, Welshpool and Forrestfield, and providing access to Perth Airport. It will be constructed to freeway standard between the PDNH and Mundijong Road, with systems interchanges provided at Reid Highway and Roe Highway. The section between PDNH and Gosnells Road will be upgraded to an 8-lane cross-section (besides the section through the Leach Highway interchange), requiring the implementation of ALR. Further widening will be required at the Swan River crossing (Redcliffe Bridge) to provide an ultimate 8-lane cross-section with 2-lane and 3-lane collector-distributor roads either side linking Great Eastern Highway and Guildford Road. This will entail the construction of additional river

bridges. The section between Anketell Road and Abernethy Road is part of the High Wide Load network. Planning for the extension of the highway south to Mundijong Road has been completed and the required reservation has been included in the MRS. The planning allows for future grade separation at all connecting roads. The route south of Mundijong Road is yet to be planned and the reservation has not been included in the MRS.

The Perth-Darwin National Highway (Tonkin to Muchea), which is funded for construction, is a new highway which will link Tonkin Highway with Great Northern Highway and Brand Highway at Muchea. This highway will replace the section of Great Northern Highway to Muchea as the primary freight link between the Perth metropolitan area and the north west of the State. Planning for the highway, which is currently in process, provides for a 6-lane freeway standard to The Promenade (Ellenbrook access) and 4-lane freeway standard further north. Grade separation is planned at The Promenade, Stock Road and Neaves Road. The PDNH will be a strategic freight route, improving freight efficiency and reliability.

The Whiteman-Yanchep Highway (WYH) is a planned freeway-standard road linking Tonkin Highway with Mitchell Freeway at Pipidinny Road. The need for a new north-south route serving planned development in the North-West sub-region and providing an alternative to Mitchell Freeway was identified by the North West Corridor Structure Plan Review in 2009 and subsequently endorsed by the WAPC as part of the East Wanneroo Structure Plan in 2010. Planning for the WYH is currently in process. Planning will provide for a 6-lane freeway standard to Neaves Road and 4-lane freeway standard between Neaves Road and Mitchell Freeway. WYH is a planned major freight route, linking industrial areas within the North-West sub-region with Perth's main industrial areas, including Kewdale and Welshpool. By 2050 the WYH will be constructed to freeway standard between Tonkin Highway and Wattle Avenue north of Neaves Road, and to 4-lane highway standard further north to Mitchell Freeway.

Graham Farmer Freeway (GFF) connects Mitchell and Kwinana Freeways with Great Eastern Highway and Orrong Road, operating as a northern bypass of the Perth CBD. Braided ramps will be implemented between Lord Street and East Parade to resolve significant weaving issues between these two roads, allowing vehicles to access GFF directly from Lord Street without having to pass through the heavily trafficked intersections on East Parade.

The Fremantle Rockingham Controlled Access Highway (FRCAH) will provide high standard connectivity between the important industrial and commercial centres located within the Perth South Western Metropolitan Corridor. The FRCAH will serve the Western Trade Coast strategic industrial centre, comprising the Kwinana Industrial Area core, Latitude 32 and the Rockingham industry zone. It will extend from Leach Highway to Kwinana Freeway at Mundijong Road, following the Stock Road and Rockingham Road alignments, and then a new alignment to Kwinana Freeway. It is planned to a 6-lane freeway standard. The required reservation has been included in the MRS to Dixon Road in Rockingham, but the southern section still needs to be included. By 2050 it will be constructed / upgraded to freeway standard, with systems interchanges at Roe Highway and Kwinana Freeway. The FRCAH will connect with the Stock Road river crossing to the north.

The Eastern Corridor Major Roads Study in the mid 1980's recommended a new alignment for the Perth-Adelaide National Highway (PANH) to replace the section of existing Great Eastern Highway (GEH) between Midland and the MRS boundary near Wooroloo as the primary road freight link to the Eastern States. A reservation for this route, known as the "Orange Route", was defined and subsequently gazetted in the MRS in 1994. The alignment lies to the north of existing GEH and generally follows the Toodyay Road corridor, deviating through the Red Hill section and connecting with the discontinued rail reserve at Bakers Hill on GEH. The road will primarily carry long-distance freight traffic, but will also function as an urban arterial route linking future urban development in the Gidgegannup area with Perth. By 2050 the PANH will be constructed between Roe Highway and GEH. The section between Roe Highway and

Gidgegannup will be constructed to 4-lane freeway standard, and the section to GEH as a 4-lane rural highway.

Leach Highway is an important regional freight route, extending from Tonkin Highway at Perth Airport to Fremantle. The section west of Kwinana Freeway is currently the principal freight access route to the Inner Harbour, but will not serve this function once Perth Freight Link has been constructed. Leach Highway has been constructed to its ultimate 6-lane cross-section, besides Shelley Bridge over the Canning River which is constructed to a 4-lane cross-section. Grade separation is provided at Kwinana Freeway, Albany Highway, Abernethy Road and Tonkin Highway. Grade separation is planned at Welshpool Road and Manning Road. By 2050 sections of Leach Highway between Tonkin and Albany Highways will carry over 100,000 vehicles per day. By this time, the planned grade separations at Welshpool Road and Manning Road will be implemented and Shelley Bridge will be duplicated removing the existing traffic signals at Centenary Avenue. This, together with grade separation at Bungaree Road (not yet planned) will upgrade Leach Highway between Tonkin Highway and Shelley Bridge to expressway standard.

Orrong Road extends from Graham Farmer Freeway to Roe Highway and continues as Welshpool Road East to Tonkin Highway. With the future consolidation of Perth airport's terminals at the international terminal site, it provides an important link between the airport and Perth CBD via Leach Highway. Orrong Road is classified as a major freight route, providing access to the Kewdale, Welshpool and Forrestfield industrial areas, playing an important role in the movement of freight in and out of this precinct as well as internally. It is currently constructed to 4-lane divided standard with grade separation at Great Eastern Highway, Leach Highway and Roe Highway. The road is planned to 6-lane divided standard. By 2050 it will carry up to 100,000 vehicles per day and will be upgraded to 6-lane expressway standard between GFF and Roe Highway with rationalisation and grade separation of intersections.

3.3.2. Development of the road freight network

The Perth and Peel @ 3.5 Million spatial plan describes how industry within the metropolitan area will develop to 2050, identifying numerous industrial expansion and investigation areas which will have to be serviced by the transport system. The road freight network will be expanded to improve connectivity between the city's industrial areas and ports, and to provide linkages out of the metropolitan area, serving regional WA and interstate freight transport demand. The road freight network for 2050 and beyond is shown in Figure 3.4.

The freeways that form part of the strategic and major road freight networks are discussed above and include PDNH, PANH, Kwinana and Mitchell Freeways, Tonkin, Roe and Reid Highways, the FRCAH and the WYH. The development of other freight routes by 2050 is discussed below.

In the North-West sub-region, Flynn Drive and Neaves Road will be upgraded to 4-lane divided standard to serve the industrial expansion / investigation areas of Neerabup, Nowergup, Carabooda and Pinjar. In the North-East sub-region, Stock Road will be constructed to 4-lane divided standard, connecting Great Northern Highway with the PDNH, and serving the industrial expansion / investigation areas of North Ellenbrook and South Bullsbrook. With the construction of the PDNH, Great Northern Highway will remain a major freight route carrying High Wide Loads, and will be upgraded to 4-lane divided standard between Roe Highway and Neaves Road.

In the Central sub-region, Perth Freight Link will be constructed to improve road freight access to the Inner Harbour. This entails providing a freeway / expressway standard link between the Roe 8 extension and the container terminals at Fremantle Port's North Quay, with grade separation at all intersections, terminating on Tydeman Road west of Queen Victoria Street. The scope also includes duplicating Stirling Bridge.

In the South Metropolitan Peel sub-region, the Western Trade Coast, which comprises the Kwinana Industrial Area, Australian Marine Complex and Latitude 32 strategic industrial area, will see significant development. This includes establishment of the Outer Harbour in Cockburn Sound. A network of arterial roads will be constructed to provide access to the Western Trade Coast from the primary distribution network. This will include construction of east-west arterials, Rowley, Anketell/Thomas and Mundijong Roads to 4-lane divided standard.

Rowley Road extends from Kwinana Freeway to Tonkin Highway and is currently a local road under local government control. In future, Rowley Road will be the principal freight access route to the proposed new container port facilities in Kwinana. The road will be extended 8km to the west from its existing terminus at Kwinana Freeway to Latitude 32 Industry Zone and then to the coast, connecting with the proposed Outer Harbour container and general cargo port facilities. The road will be constructed within the Rowley Road Transport Corridor which includes provision for freight rail at the western end. Rowley Road is planned to 4-lane divided standard between the Outer Harbour and Kwinana Freeway. Planning for a 4-lane divided standard between Kwinana Freeway and Tonkin Highway is currently in progress. The road is classified as a strategic freight route.

Anketell Road with Thomas Road east of Anketell Road provides a key freight connection between the Western Trade Coast, Kwinana Freeway and Tonkin Highway. The section between Rockingham Road and Kwinana Freeway is currently a designated ORR, while the section between Kwinana Freeway and Thomas Road is a local road under local government control. The road is planned to 4-lane divided standard between Rockingham Road and Kwinana Freeway. Planning for a 4-lane divided standard between Kwinana Freeway and Thomas Road is currently in process. Anketell Road is part of the current High Wide Load network, carrying high wide loads which are imported and exported through the Australian Marine Complex to Tonkin Highway and into the metropolitan area. Anketell Road is classified as a strategic freight route.

Thomas Road with Anketell Road provides a connection between the Western Trade Coast, Kwinana Freeway and Tonkin Highway. The road is constructed to 4-lane divided standard west of Kwinana Freeway, including a short 6-lane section between Kwinana Freeway and Johnson Street. Between Kwinana Freeway and Tonkin Highway it is planned to a 4-lane divided standard. The section west of the Anketell Road intersection is classified as a major freight route, while the section east of the Anketell Road intersection to Tonkin Highway is classified as a strategic freight route and is part of the current High Wide Load network.

Mundijong Road / Watkins Road provides a key freight connection between Kwinana Freeway, Tonkin Highway and South Western Highway. At Kwinana Freeway it connects into the future FRCAH providing a link from the Western Trade Coast to planned industrial areas along Mundijong Road, including North East Baldivis and West Mundijong. At its eastern end, Mundijong Road ties in with the proposed future Southern Link Road, providing an important freight link between the Western Trade Coast and the Great Southern and Central Wheatbelt regions. Mundijong Road provides connectivity to the Kwinana Freeway for commuter and commercial traffic from Mundijong and surrounding areas. Mundijong Road is planned to a 4-lane divided standard. It is classified as a strategic freight route.

Tonkin Highway, which will be extended to tie in with Forrest Highway at Pinjarra in the south, will be classified as a strategic freight route, providing a link between the city's strategic industrial areas and the south west of the State.

The strategic freight network provides linkages out of the metropolitan area to the north (via the PDNH), the east (via Great Eastern Highway), the south west (via Kwinana Freeway / Forrest Highway and Tonkin Highway) and the south east (via Albany and Brookton Highways). As discussed above, the PDNH will be constructed to Muchea and the PANH will replace Great

Eastern Highway as the primary freight access from the east. The preferred access from the south east is via the Welshpool Road East / Canning Road route, providing a link between Brookton Highway and Tonkin and Roe Highways.

3.3.3. The High Wide Load and RAV networks

The existing High Wide Load (HWL) network shown in Figure 4.4 will be modified as follows: the Corridor 3 route along GEH Bypass and Stirling Crescent to Bushmead Road will be replaced with the Abernethy Road extension and Bushmead Road to Stirling Crescent.

Progressive changes to the RAV networks will be required as the road network expands and the heavy vehicle fleet changes including introduction of High Productivity Vehicles. RAV classifications have already been proposed for new roads in the draft *Perth Freight Transport Network Plan*, including Tonkin Highway extension to Mundijong Road, WYH to Neaves Road and the FRCAH. The main additional routes that will require RAV classification include Tonkin Highway extension south of Mundijong Road, WYH north of Neaves Road and the PANH.

3.3.4. River crossings

Proposed new river crossings are discussed in Section 6 and include:

- A crossing linking Stock Road (the FRCAH) at Leach Highway with Stephenson Avenue at Jon Sanders Drive, with a northern extension connecting with Mitchell Freeway south of Reid Highway
- A crossing between Canning Highway at Berwick Street and Riverside Drive at Plain Street
- A crossing between Belmont Park on the Burswood Peninsula and Mount Lawley via Summers Street.

The Stock Road crossing is a significant initiative which serves regional demand and will require detailed planning. This regional road link will be in tunnel for most of its length, with the opportunity for an at-grade solution between Railway Road and Underwood Avenue. It relieves pressure on the existing river crossings and creates cross-river opportunities. Further route planning, transport assessment and detailed engineering investigation and assessment are required.

The Canning Highway to Riverside Drive crossing provides a link between the Perth CBD and areas east of the Swan River, including East Victoria Park, Kensington and Bentley. This proposed bridge over the river, in combination with the proposed east-west CBD link (discussed below) serves CBD-bound and cross-city movements. Further planning and engineering investigation is required.

The proposed Belmont Park to Mount Lawley river crossing has been included in the WAPC-endorsed Burswood Peninsula District Structure Plan. This future 2-lane local road connection will carry local traffic, cyclists and pedestrians.

3.3.5. Perth CBD access

The Perth CBD will remain Western Australia's commercial and administrative centre for business and government, and efficient access into, through and past the CBD must be maintained into the future.

The proposed solution for east-west movements includes a new East-West City Link, running in tunnel between Riverside Drive west of Plain Street and the Narrows Interchange. This link in combination with the Canning Highway to Riverside Drive crossing will improve access to the

CBD from the east, improve cross-city capacity, reduce pressure on Graham Farmer Freeway, the Causeway and various city arterials, and reduce traffic on Riverside Drive, enabling activation of the Perth waterfront.

3.3.6. Roads serving new urban development

Major new urban development areas include Alkimos to Two Rocks and East Wanneroo in the North-West sub-region, Bullsbrook in the North-East sub-region, and Mundijong and Ravenswood Riverfront / Pinjarra in the South Metropolitan Peel sub-region. A network of arterial roads will be provided to service these areas.

3.3.7. Development of other arterial roads

Besides the freeway and road freight network, other important regional roads will be upgraded to service urban expansion and accommodate the increased transport demand. Proposed bus priority measures on the arterial road network are discussed in Section 8.

North-West sub-region

Marmion Avenue is an important north-south regional road to the west of Mitchell Freeway, connecting with West Coast Highway to the south and terminating at the future Yanchep strategic metropolitan centre to the north. The road connects urban centres along the route including Whitfords, Clarkson, Alkimos, Eglington and Yanchep. The road intersects with east-west urban arterials which carry traffic to Mitchell Freeway. Marmion Avenue, which is planned to 4-lane divided standard, has been constructed through to Yanchep Beach Road and will be progressively upgraded to 4-lane divided standard as the urban fringe expands northwards. By 2050 the road will be upgraded to 4-lane divided standard for its full length to the future Yanchep strategic metropolitan centre. The section between Alkimos and Yanchep will carry high demand by 2050 and may require upgrading to 6-lane standard, depending on future peak hour flows. Modelling suggests the intersection with Yanchep Beach Road may need grade separation by 2050.

Wanneroo Road is a north-south regional road, extending from the Perth CBD (via Charles Street) to Yanchep and continues north into the Mid West region as Indian Ocean Drive. North of Reid Highway, Wanneroo Road carries a mix of general, commercial and freight traffic. It connects the industrial areas of Balcatta, Wangara and Neerabup. Wanneroo Road is currently constructed for most of its length to 4-lane divided standard to Joondalup Drive, and 2-lane standard further north with some 4-lane sections. Grade separation is provided at Reid Highway. Wanneroo Road is planned to 4-lane divided standard up to Yanchep National Park north of Pipidinny Road. The section of Wanneroo Road between Reid Highway and Flynn Drive is classified as a major freight route. By 2050 the road will be upgraded to 4-lane divided standard to Pipidinny Road. The section between Ocean Reef Road and Pinjar Road will require upgrading to 6-lanes. Grade separation is planned and will be provided at Hepburn Avenue, Ocean Reef Road and Joondalup Drive. While grade separation is planned at Whitfords Avenue and modelling suggests it may be required by 2050, the preferred road network solution for Whitfords Avenue in the vicinity of Wanneroo Road requires further investigation. Modelling suggests the intersection with Flynn Drive may need grade separation by 2050.

Neerabup Road / Flynn Drive and Neaves Road join to form an important east-west route linking Mitchell Freeway and Wanneroo Road with Great Northern Highway in the North East sub-region. The roads are classified as a major freight route, providing access to the Neerabup industrial area in the west and the future Bullsbrook industrial area and intermodal terminal in the east. Neerabup Road and Flynn Drive are currently ORRs while Neaves Road is a local road under local government control. Flynn Drive connects to Mitchell Freeway and links into an easterly extension of Neerabup Road. The development of Flynn Drive involves a realigned

connection to Wanneroo Road and a new section of road from Old Yanchep Road to Neaves Road. Neaves Road is currently a 2-lane road and planning is underway for future duplication. By 2050 Flynn Drive and Neaves Road will be constructed to 4-lane divided standard, tying in with Neerabup Road in the west. Neaves Road will be extended east of the PDNH, passing over the Millendon Junction Narngulu freight rail line, tying in with Rutland Road. Grade separation will be provided at PDNH and WYH.

Ocean Reef Road and Gnangara Road join to form an important east-west route linking Mitchell Freeway and Wanneroo Road with the future WYH and PDNH. The roads carry general and freight traffic and provide access to the Wangara industrial area. Ocean Reef Road is currently constructed to 4-lane divided urban arterial standard and Gnangara Road as a 2-lane road. Both Ocean Reef Road and Gnangara Road have been planned to 4-lane divided standard. By 2050 Ocean Reef Road and Gnangara Road will be upgraded to 6-lane divided standard to Lord Street, with grade separations at Wanneroo Road, WYH and PDNH. Modelling suggests the intersections with Joondalup Drive, Leonore Road, Badgerup Road and Sydney Road will be under significant pressure and may need grade separation by 2050.

With the extension of Mitchell Freeway, east-west arterial roads will be constructed, linking the freeway with Marmion Avenue and Wanneroo Road. These include Lukin Drive, Romeo Road, Alkimos Drive, Pipidinny Road, Yanchep Beach Road, Toreopango Avenue, Reef Break Drive and Breakwater Drive, most of which will be constructed to 4-lane divided standard.

North-East sub-region

Great Eastern Highway which is a major freight route serving the Hazelmere industrial area, will be upgraded to 6-lane divided standard between Tonkin Highway and Great Eastern Highway Bypass. Great Eastern Highway east of Roe Highway currently serves as the primary road freight link between Perth and the Eastern States. The road carries long-distance freight traffic and also functions as an urban arterial route for development in the eastern corridor of the metropolitan region. Great Eastern Highway east of Roe Highway is classified as a strategic freight route. As discussed above, the future PANH will replace the section of Great Eastern Highway to Bakers Hill as the primary road freight link to the Eastern States.

Abernethy Road, which is a major freight route serving the Kewdale and Forrestfield industrial areas, will be upgraded to 4-lane divided standard between Tonkin Highway and Great Eastern Highway Bypass. This section forms part of the HWL route.

Lloyd Street will be extended from Clayton Street to meet with Abernethy Road at Great Eastern Highway Bypass, providing a north-south link between the Midland centre, the Hazelmere industrial area and industrial precincts in the vicinity of the airport. The section of Lloyd Street between Great Eastern Highway Bypass and Bushmead Road forms part of the future HWL network.

Central sub-region

Wanneroo Road is constructed to 6-lane divided standard between Reid Highway and Balcatta Road and to 4-lane standard to Charles Street. Modelling suggests the intersection with Morley Drive may require grade separation by 2050, while the intersections with Beach Road and Balcatta Road may also need to be considered for grade separation.

Curtin Avenue, West Coast Highway and Marmion Avenue is an important north-south regional route running along the coast, connecting Fremantle with the North-West sub-region. Recent planning provides for the connection of Stirling Highway with Curtin Avenue in North Fremantle, reinforcing the regional function of this route. Curtin Avenue becomes West Coast Highway at Servetus Street, and the route continues as Marmion Avenue north of Reid Highway. Curtin Avenue is for most of its length a 2-lane road and planning is required to enable upgrading to a

4-lane divided regional road standard. West Coast Highway is constructed for most of its length to 4-lane divided standard, with a 2-lane section between Rochdale Road and Alfred Road. It is planned to 4-lane divided standard. Curtin Avenue and West Coast Highway are classified as a major freight route and form part of the northerly freight route from the Fremantle Inner Harbour to the northern suburbs. By 2050 Curtin Avenue will be extended over the Fremantle rail line to link with Stirling Highway at Queen Victoria Avenue, including grade separation at this intersection. Curtin Avenue will be upgraded to 4-lane divided standard for its full length to West Coast Highway. The remaining 2-lane section on West Coast Highway between Alfred and Rochdale Roads will be upgraded to 4-lane divided standard.

Orrong Road is discussed in Section 3.3.1.

Shepperton Road extends from the Causeway, connecting with Albany Highway at Welshpool Road. Shepperton Road and Albany Highway form a major south east radial route linking the Perth metropolitan area with regional areas to the south of the state. Shepperton Road (Causeway to Welshpool Road) carries mainly commuter and commercial traffic and has been constructed for most of its length to 4-lane undivided standard. Shepperton Road will be upgraded to 6-lane divided standard. Modelling suggests the intersection with Welshpool Road will carry high volumes by 2050.

Albany Highway, between Welshpool Road and Roe Highway, carries commuter and commercial traffic serving the surrounding urban and abutting commercial developments. Between Welshpool Road and Leach Highway it has been constructed to 4-lane undivided standard with grade separation at Leach Highway, and is planned to 6-lane standard to Kenwick Link, north of Roe Highway. Between Leach Highway and Kenwick Link it has been constructed to its ultimate 6-lane cross-section. By 2050 the section between Welshpool Road and Leach Highway will be upgraded to 6-lane divided standard, tying in with the existing 6-lane section to the south. Modelling suggests the intersection with Nicholson Road may need grade separation by 2050.

Karrinyup Road / Morley Drive connect West Coast Highway with Tonkin Highway, serving adjacent urban and commercial development. The roads connect and provide access to the Stirling and Morley strategic metropolitan centres. Karrinyup Road and Morley Drive are constructed to their planned 4-lane divided standard for most of their length, with grade separation at Mitchell Freeway. Modelling suggests the intersections with Wanneroo Road and Alexander Drive may need grade separation by 2050.

Scarborough Beach Road connects West Coast Highway with Charles Street, providing access to the Osborne Park industrial area and Stirling strategic metropolitan centre. The road carries high volumes of commercial traffic through the commercial and industrial centres. West of Mitchell Freeway, Scarborough Beach Road is constructed to 4-lane undivided standard for most of its length, passing under Mitchell Freeway with no connection. It is planned to 6-lane standard between Main Street and St Brigids Terrace, allowing for 4 general traffic lanes and 2 bus lanes in the median. Between St Brigids Terrace and Hinderwell Street the existing 4-lane cross-section will be reconfigured to accommodate 2 general traffic lanes and 2 bus lanes in the median. By 2050 this planning will be implemented, with two existing traffic lanes converted to dedicated bus lanes between Stephenson Avenue and Odin Road, and between St Brigids Terrace and Hinderwell Streets. Modelling suggests the intersection with Stephenson Highway may need grade separation by 2050.

Guildford Road is a regional road extending from the Perth CBD (via East Parade), connecting via James and East Streets with Great Eastern Highway at Guildford. It links the Perth CBD with the Midland strategic metropolitan centre, carrying a mix of general and commercial traffic. Guildford Road is constructed to its ultimate 4-lane undivided standard to the Swan River with a 2-lane river crossing. By 2050 the river crossing will be duplicated, providing a 4-lane cross-section.

Stirling Highway is an important regional road connecting with Mounts Bay Road at Hampden Road and extending to Fremantle, providing a link between the Perth central area, the UWA-QEII specialised centre and Fremantle strategic metropolitan centre. It carries a mix of general and commercial traffic, serving urban areas and abutting commercial development. It is currently constructed to 4-lane undivided standard for most of its length. While a reservation of approximately 80m has been included in the MRS, further upgrading is constrained by existing development. Bus priority measures will be introduced at intersections.

Canning Highway extends from the Causeway to Fremantle, providing an important link between Perth CBD and the Fremantle strategic metropolitan centre. It carries a mix of general and commercial traffic, serving various activity centres including Canning Bridge and Booragoon. East of Kwinana Freeway it is constructed to 4-lane undivided standard and is planned to a 6-lane divided standard to the Victoria Park transfer station, including dedicated bus lanes. 2050 modelling suggests these lanes are not required as bus lanes. West of the freeway Canning Highway is constructed to 4-lane divided standard to Preston Point Road, and 4-lane undivided standard to Fremantle. Planning for the section between Kwinana Freeway and Riseley Street has been recently reviewed, allowing for duck-and-dive grade separation at Sleat Road, Reynolds Road and Riseley Street, providing four centre lanes for through traffic and four adjacent lanes for local traffic which will be implemented by 2050. West of Riseley Street it is planned to 4-lane standard with bus priority at major intersections.

Leach Highway is discussed in Section 3.3.1.

South Street is an important east-west regional road extending from Roe Highway to Hampton Road and South Terrace in Fremantle. It provides access to the Murdoch specialised centre, including Fiona Stanley Hospital and Murdoch University from Kwinana Freeway. It is constructed to its ultimate 6-lane divided standard between Roe Highway and Kwinana Freeway and for most of its length between Kwinana Freeway and Stock Road. Peak period bus lanes are provided between Roe Highway and Kwinana Freeway. Grade separation is provided at Roe Highway and Kwinana Freeway. West of Stock Road it is constructed to 4-lane standard to Carrington Street and as a 2-lane road further west. West of Stock Road to Davies Street it is planned to a 4-lane cross-section with bus priority (queue jump lanes) at intersections. By 2050 South Street will be upgraded to 6-lane divided standard for its full length to Hampton Road in Fremantle. This will include dedicated bus lanes west of Discovery Way. West of the former Fremantle Eastern Bypass (Wood Street) the reservation is constrained. Achieving the desired standard will have significant impact on heritage buildings and feasibility is being investigated.

South Metropolitan Peel sub-region

Cockburn Road serves as a coastal link between the Fremantle area and the Western Trade Coast, providing local access to the Australian Marine Complex from Russell and Rowley Roads. It is classified as a major freight route between Russell Road and Rockingham Road. This section has been planned to 4-lane divided standard and may be upgraded to this standard if required by demand generated by the Outer Harbour.

Rockingham Road / Patterson Road are classified as a strategic freight route linking with Cockburn Road and the FRCAH and serving the Western Trade Coast. Once the FRCAH has been constructed, Rockingham Road will terminate in the north at Rowley Road. The roads are constructed to their ultimate 4-lane divided standard.

South Western Highway is a high speed, inter-regional route extending from Armadale to Albany via Bunbury. Sections are constructed to a 4-lane divided standard through Armadale and Byford, and to 2-lane rural highway standard further south. It is planned to 4-lane divided rural highway standard to Pinjarra Road. It is an important freight route which services the mining and agricultural industries as well as carrying tourist and commuter traffic, and is

classified as a major freight route south of Armadale Road. By 2050 South Western Highway will be upgraded to 4-lane divided standard to Mundijong Road.

Albany Highway is a major south east radial route linking the Perth metropolitan area with the regional centre of Albany on the south coast. Between Roe Highway and Tonkin Highway, Albany Highway carries mainly commuter and commercial traffic, servicing the surrounding urban and abutting commercial development, including the Maddington secondary centre. The section of Albany Highway that runs parallel with Kenwick Link is constructed to its ultimate 4-lane divided standard, while Kenwick Link is planned to 6-lane divided standard. The section between Kelvin Road and Mills Road West has been constructed to it ultimate 4-lane divided standard. By 2050 Albany Highway will be upgraded to its planned 6-lane divided standard between Kenwick Link and Kelvin Road. The planned Albany Highway realignment following Mills Road West will be constructed to 4-lane divided standard, while existing Albany Highway between Mills Road West and Ferres Drive through the Gosnells town centre will be downgraded to two lanes for general traffic. South of Tonkin Highway, Albany Highway is a strategic freight route carrying regional and freight traffic, planned to 4-lane divided standard to South Western Highway, and to 2-lane rural highway standard beyond, with a 4-lane section up Bedfordale Hill.

Armadale Road is an important commuter and freight route, linking the Cockburn secondary centre at Kwinana Freeway with the Armadale strategic metropolitan centre, Tonkin Highway and Albany Highway. It connects with North Lake Road (via Midgegooroo Avenue) and Beeliar Drive to provide regional connections to Fremantle. It is currently constructed to 4-lane divided standard between Kwinana Freeway and Tapper Road, and at the eastern end between Anstey Road and South Western Highway. Armadale Road is planned to 6-lane divided standard between Kwinana Freeway and Tonkin Highway. The network configuration at Kwinana Freeway and connectivity with North Lake Road are under review. It is a major freight route, providing access to the Forrestdale industrial areas. By 2050 Armadale Road will be upgraded to 6-lane divided standard from east of Tapper Road to Tonkin Highway. The *North Lake Road* connection with Kwinana Freeway will be constructed, including grade separation at Solomon and Tapper Roads.

Safety Bay Road is currently constructed to 4-lane standard. Modelling suggests the intersections with Baldivis Road, Nairn Drive and Mandurah Road will carry high volumes by 2050.

Mandjoogoordap Drive currently serves as the primary access to Mandurah from Kwinana Freeway, linking with Mandurah Road at its southern end, constructed to its ultimate 4-lane divided standard with rail in the median. By 2050 it will be extended east to link with Tonkin Highway extension.

Greenlands Road provides the link between the future Tonkin Highway extension and Forrest Highway at Pinjarra. It is currently a 2-lane road, planned to a 4-lane divided standard, providing access to the future West Pinjarra industrial area. By 2050 it will be upgraded to 4-lane divided standard between Forrest Highway and Tonkin Highway and classified as a strategic freight route.

Pinjarra Road will be upgraded to 6-lane divided standard. Modelling suggests the intersections with Mandurah Road and Old Mandurah Road will carry high volumes by 2050.

Lakes Road is an important commuter and freight route, linking Kwinana Freeway with South Western Highway. The road links Mandurah with future industrial and residential developments east of Kwinana Freeway, including North Dandalup and the Nambeelup industrial area. Lakes Road is currently a 2-lane road under local government control, planned to a 4-lane divided standard east of Forrest Highway to Tonkin Highway. It is classified as a major freight route. By

2050 it will be upgraded to 4-lane divided standard between Kwinana Freeway and Tonkin Highway extension.

3.3.8. On-road public transport

On-road public transport, which is discussed in Section 8, is grouped into three distinct network categories. Semi-rapid transit provides the highest level of priority and includes Bus Rapid Transit (BRT) and Light Rail (LRT). Public transport priority corridors provide the next level of priority, with measures including dedicated bus lanes and bus priority at signals. Street transit has no priority and runs within the general traffic stream.

Semi-rapid transit services include the Ellenbrook BRT and the UWA to Canning Bridge LRT (via the CBD). A network of public transport priority corridors has been defined and the proposed bus priority measures are discussed in Section 8.

3.3.9. Assumptions and risks

The 2050 road network is designed to accommodate the transport demand generated by the *Perth and Peel @ 3.5 Million* land use, with increased public transport and active transport mode shares. This land use achieves high Employment Self Sufficiency (ESS) in the outer metropolitan areas, with the share of total jobs in the Central sub-region dropping from 64% in 2011 to 48% by 2050. The main risks which could negatively impact the future performance of the road network are:

- Not achieving the employment distribution contained in the *Perth and Peel @ 3.5 Million* land use
- Not achieving the target public and active transport mode shares
- Not obtaining the necessary planning approvals for planned new road infrastructure, including the Roe 8 Extension, the WYH, the Tonkin extension, the southern section of the FRCAH and potential new river crossings.

A different employment distribution has the potential to compromise the operation of the 2050 road network. Higher employment within the Central sub-region and specifically the Perth CBD will increase demand on roads serving these areas, including the Kwinana and Mitchell Freeways which are constrained with limited ability to increase capacity.

The plan assumes that the public transport mode share will increase to 11% by 2050, with active transport increasing to around 18%. A risk exists that the public transport systems required to achieve these targets are not delivered.

The modelled 2050 transport demand assumes that new road links will provide additional capacity, relieving pressure on adjacent parallel routes. Typical examples are the Roe 8 extension relieving pressure on Leach Highway and South Street, Tonkin Highway extension to Pinjarra relieving pressure on Kwinana Freeway and the WYH relieving pressure on Mitchell Freeway. A risk exists that these road links will not proceed, changing the demand distribution and potentially affecting the achievability of on-road public transport priority.

3.3.10. Summary of road network expansion requirements

Expansion that is required to achieve the 2050 road network is shown by road section in Figure 3.5.

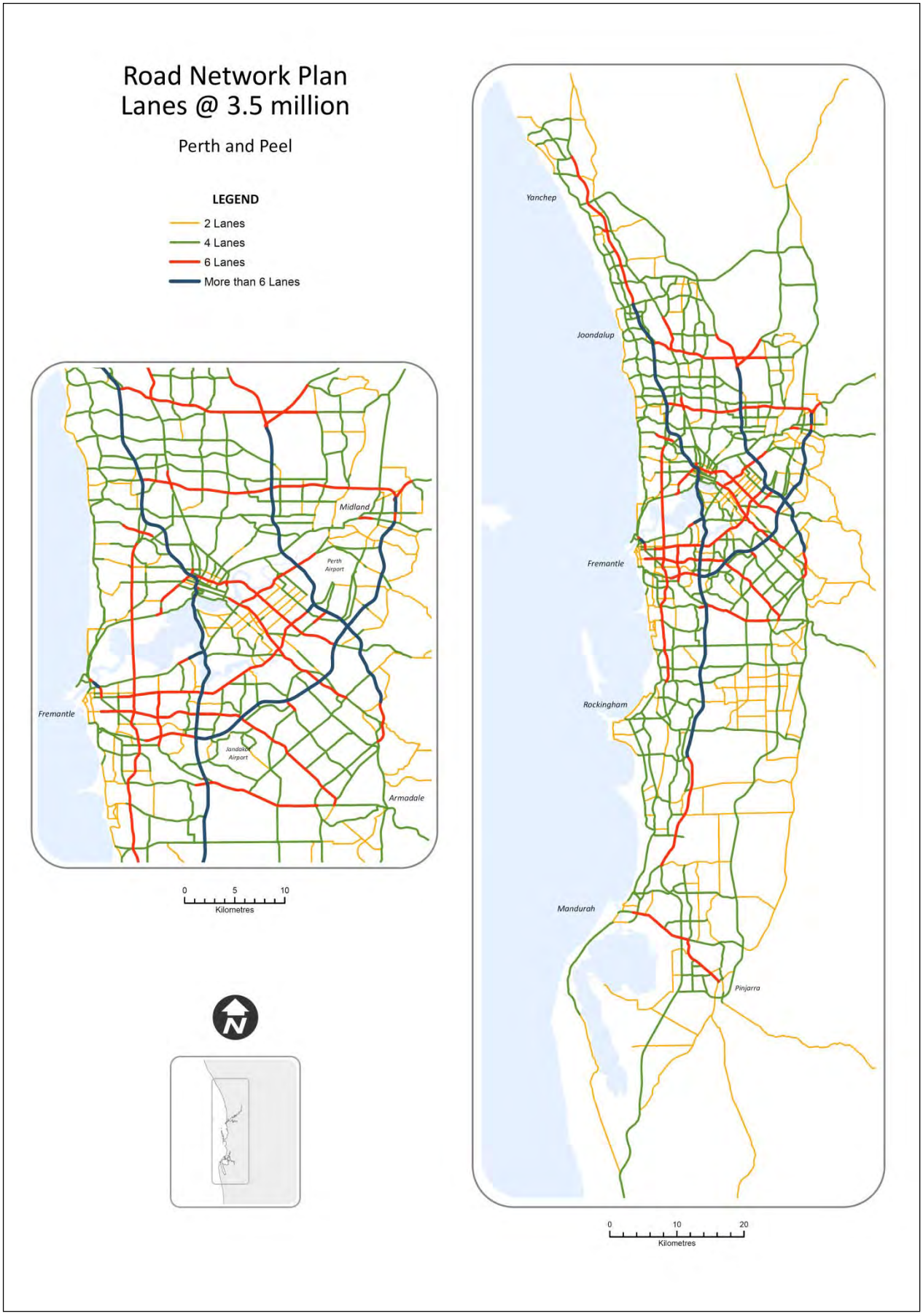


Figure 3.1 – 2050 lane requirements

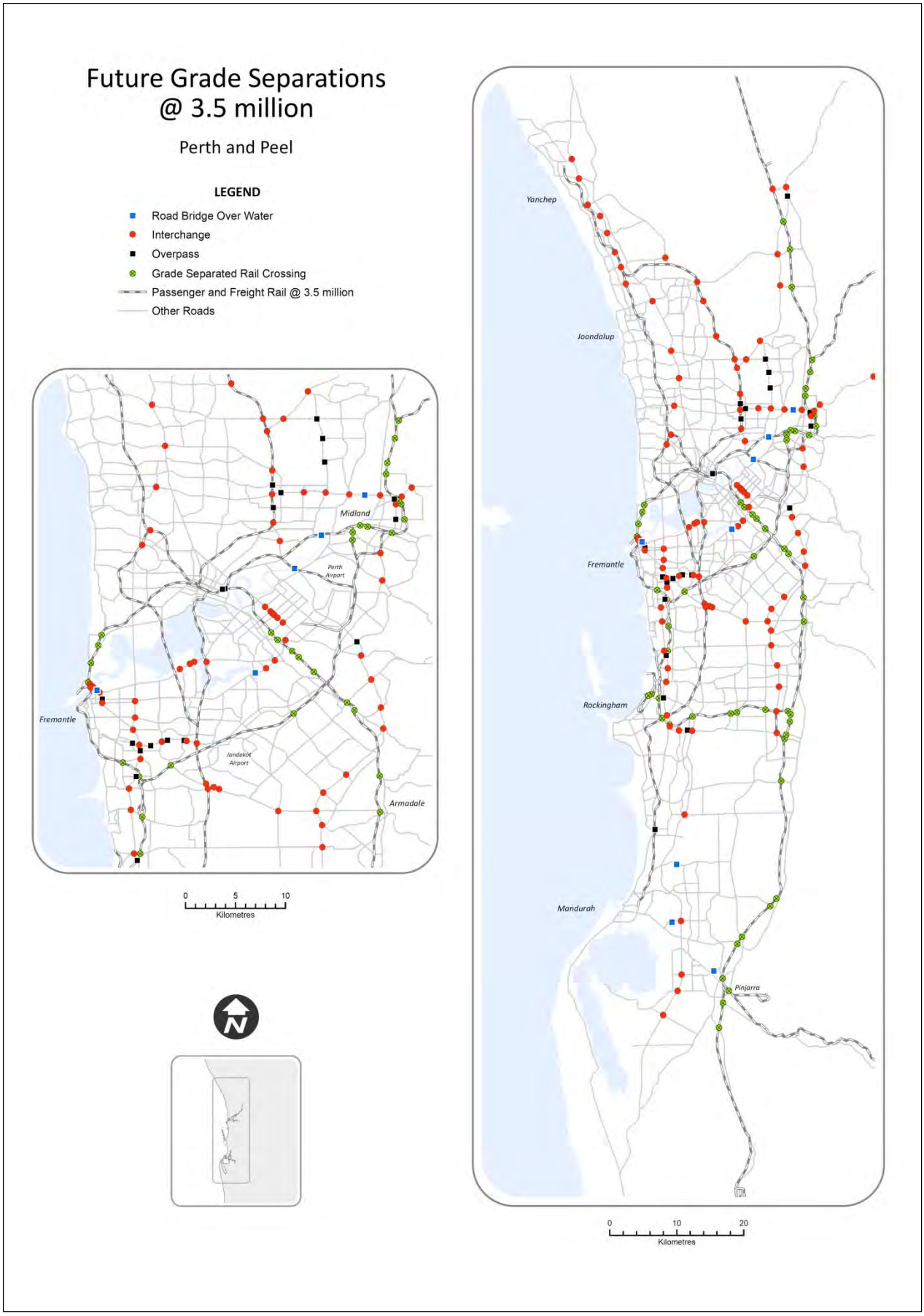


Figure 3.2 – 2050 grade separations

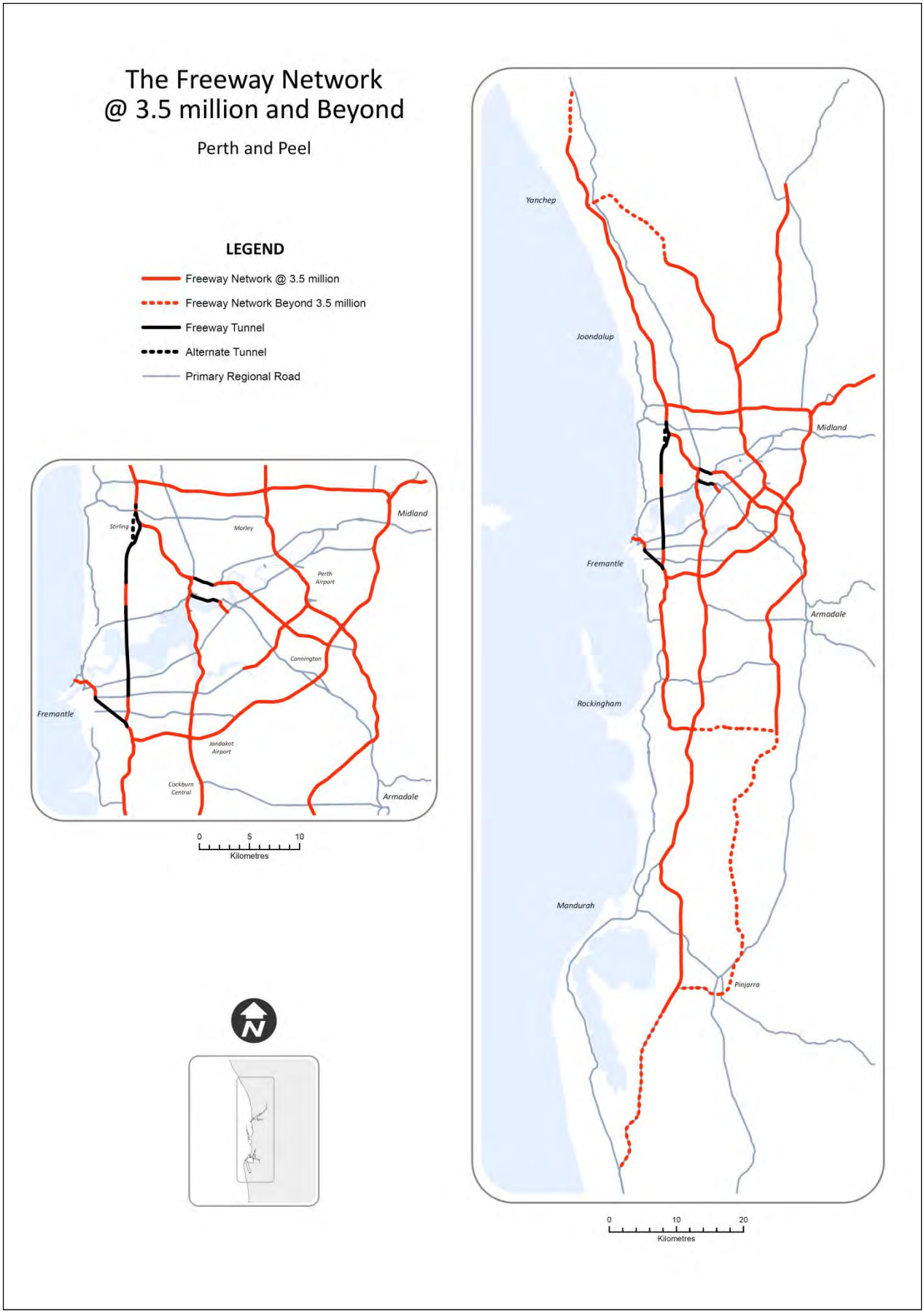


Figure 3.3 – Freeway network, 2050 and beyond

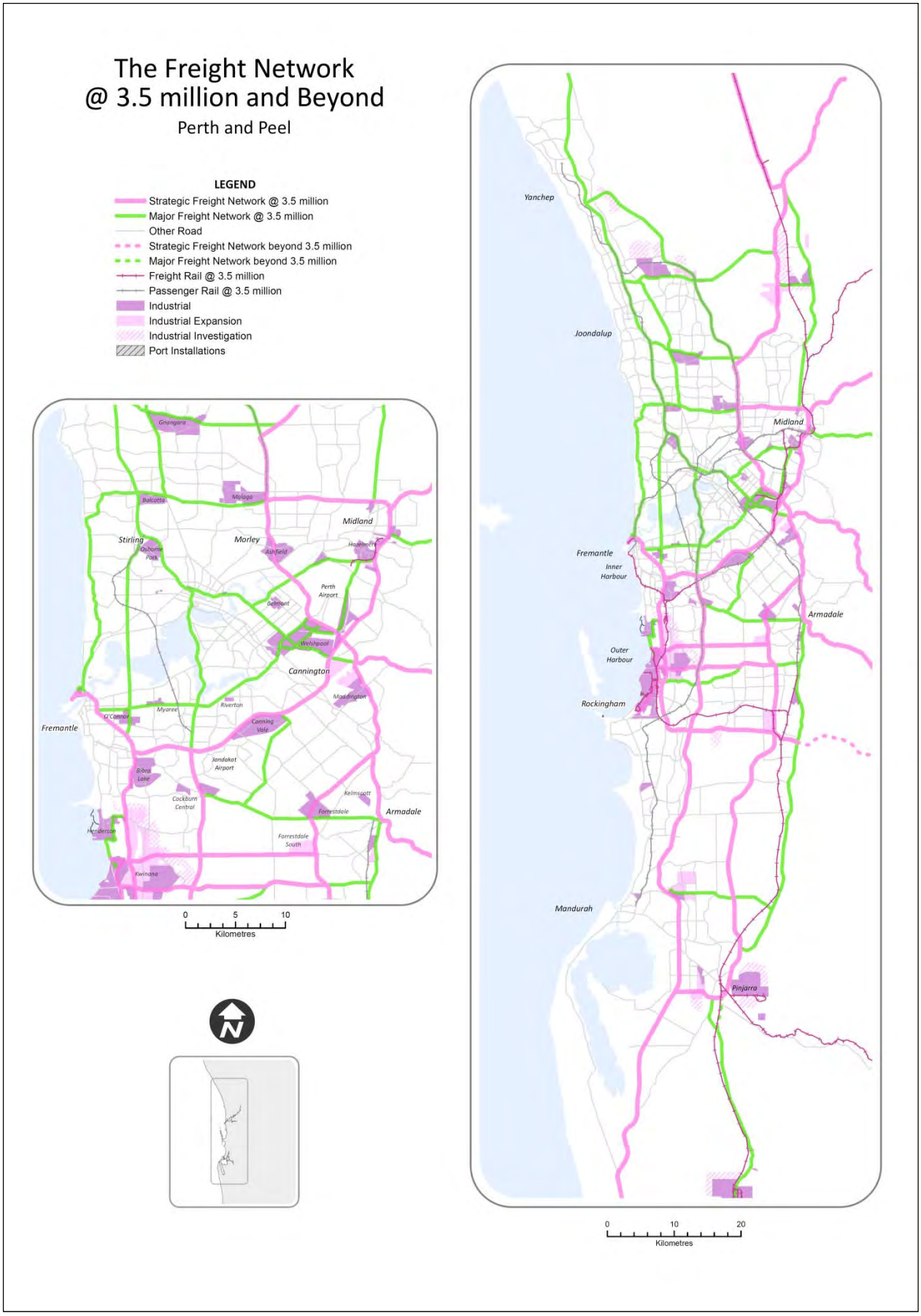


Figure 3.4 – Road freight network, 2050 and beyond

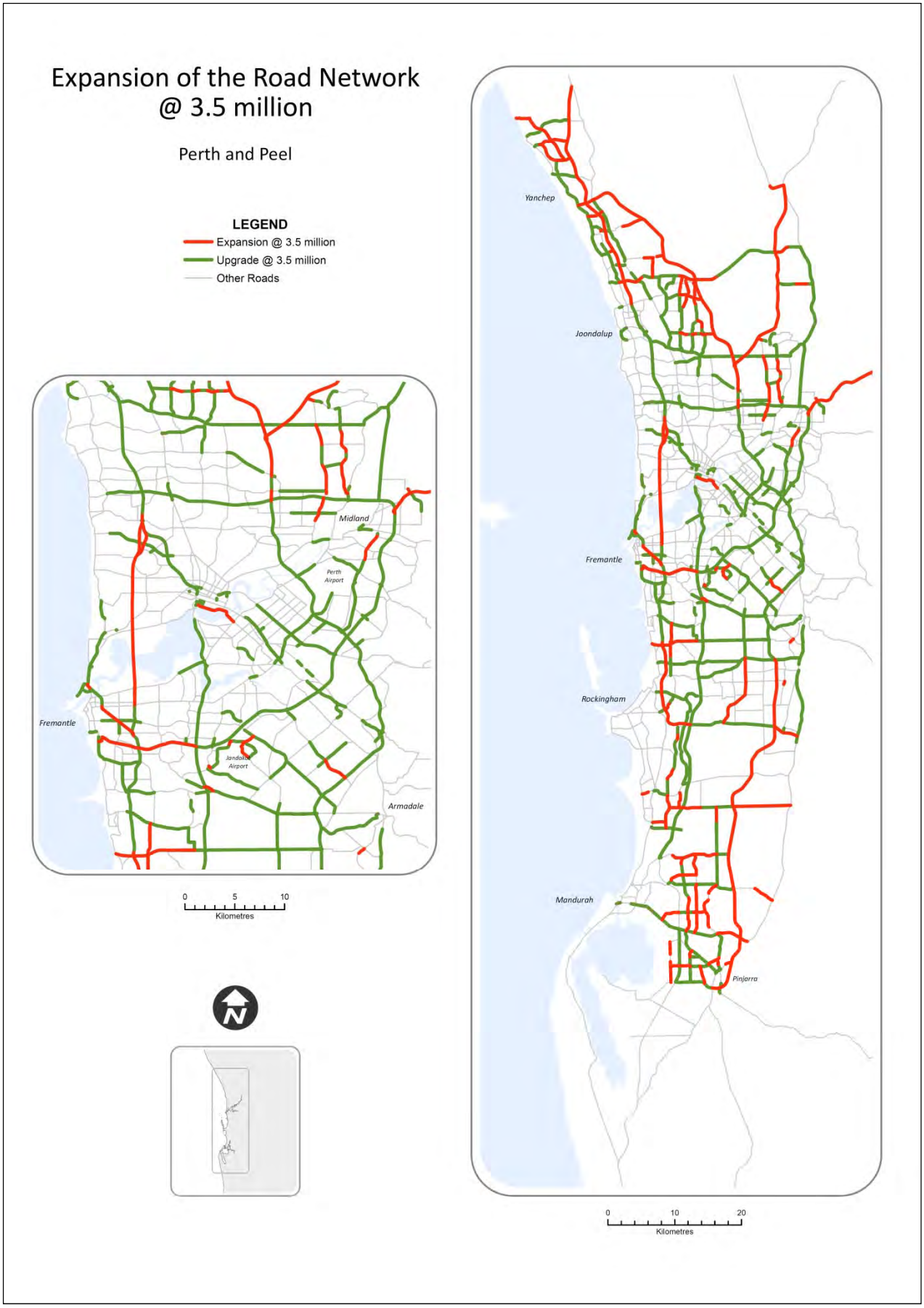


Figure 3.5 – Expansion of the road network to 2050

3.4. Road network beyond 2050

In the absence of any land use information beyond 2050, a view has been taken on how the network may develop in the longer term. A network beyond 2050 would include expansion of the freeway, road freight and arterial networks, including further grade separation at key intersections as required by demand. The on-road public transport networks would also be expanded to satisfy increasing bus passenger demand.

3.4.1. Development of the freeway network

The freeway network beyond 2050 is shown in Figure 3.3. The expansion beyond 2050 does not allow for new freeway links, but rather the upgrading of existing road sections to freeway standard. These include Mitchell Freeway between Toreopango Avenue and Breakwater Drive (possibly Indian Ocean Drive), WYH between Wattle Avenue and Mitchell Freeway, and Tonkin Highway between Mundijong Road and Forrest Highway.

Operational efficiency measures will be progressively implemented across the freeway network, including Managed Freeways and improved road network information.

3.4.2. Development of the road freight network

The road freight network beyond 2050 is shown in Figure 3.4. The Southern Link Road, which has been the subject of many previous studies and is currently a long-term planning proposal, has been included as a long term strategic freight route. The proposed route connects Mundijong Road at South Western Highway with Brookton Highway and Albany Highway. The Southern Link Road aims to provide improved access for agricultural and freight traffic travelling from the Great Southern and Central Wheatbelt regions to metropolitan destinations, in particular the proposed Kwinana Quay and the Kwinana Industrial Area, via Mundijong Road and the FRCAH.

With the upgrading of Tonkin Highway to freeway standard past Pinjarra, the existing South Western Highway intersection on Tonkin Highway will be converted to an overpass. An interchange will be provided on Tonkin Highway to the east and a new road link constructed tying in with South Western Highway to the south, with this link serving as the major freight route connection to South Western Highway.

3.4.3. Development of the arterial network and bus priority

Further modeling will be required to define the expansion of the arterial road network, including bus priority requirements, once land use is available which shows development areas beyond 2050.

4. CURRENT REGIONAL ROAD NETWORK PLANNING

4.1. Road network administrative classification

Roads within the Perth metropolitan area are defined based on their administration arrangements and function. There are three major types of management arrangement and function.

Primary Regional Road (PRRs): PRRs are administered and managed by Main Roads and include freeways and other primary distributors. They are the most important of the roads of regional significance in the planned road network, and are currently, or proposed to be declared as State Roads under the Main Roads Act 1930. The reservations required for the future expansion of the PRR network have been protected within the MRS.

Other Regional Roads (ORRs): ORRs are Local Government roads and are administered by the Department of Planning. These are roads of regional significance in the planned road network. ORRs provide the second tier of the regional road network to PRRs. ORRs are typically district distributor type roads, attracting through-traffic away from local roads. Traffic volumes on ORRs would normally be expected to be higher than volumes on the highest level local roads.

Local Government Roads (LGRs): These are roads that are administered and managed by Local Government. They typically include local distributors and local access streets.

4.2. Long-term road network planning

The Stephenson-Hepburn Plan (1955) underpinned the establishment of the statutory Metropolitan Region Scheme in 1963. The plan was designed to accommodate an estimated 1.7 million people in Perth by 2005. The long term reservation requirements for the planned regional road network, including Primary Regional Roads (PRR) and Other Regional Roads (ORR) have been progressively incorporated into and protected by the Metropolitan Region Scheme (MRS) and Peel Region Scheme (PRS). A review of the road reservations in these schemes will be required to incorporate new roads identified in the Road Network Plan.

4.3. Road funding

Funding for the planning, construction, maintenance and operation of the regional and local road networks within the Perth and Peel regions is obtained primarily from vehicle licence fees raised under the *Road Traffic Act 1974*, from State Consolidated Revenues and from Commonwealth grants and contributions.

The local road network is managed and funded by Local Government, with funding assistance from the State and Commonwealth governments. Currently, through the State Road Funds to Local Government Agreement, 27% of the estimated annual vehicle licence fees is allocated to Local Government roads.

Where land development contributes to or causes the need for new or upgraded road infrastructure, local government collects development contribution levies from proponents through approved development contributions plans to assist with the provision of this road infrastructure. The *Planning and Environment Act 1987* allows for development contributions to be provided through the planning scheme amendment process, the planning permit process or the building permit process.

4.4. Road hierarchy

The Perth and Peel road hierarchy, which is shown in Figure 4.1, defines the role of roads within the network. Ensuring consistency with the intended and predominate purpose of each road type within the hierarchy is essential in managing the future increase in transport demand. Roads within urban areas are classified as: Primary Distributors, District Distributors (A and B), Local Distributors and Access Roads.

The Primary Distributor network (State Roads[2]) "provide for major regional and inter-regional traffic movement and carries large volumes of generally fast moving traffic". The Primary Distributor network includes strategic inter-city, freight and tourist routes. Protecting and limiting access to Primary Distributors enables a high performing State Road network system. This network is managed by Main Roads Western Australia.

Other roads within the hierarchy perform important roles across the network by distributing traffic locally, but with a reduced capacity. Important road hierarchy types include District Distributor 'A' and 'B', which carry traffic between industrial, commercial and residential areas, and typically connect to the Primary Distributor network. This network is managed by Local Government. Other road hierarchy types perform different but complimentary roles. Local Distributors carry traffic within an urban cell while Access Roads allow for direct property access.

4.5. Road freight network

The principal road freight network connects the city's main industrial centres, including the ports, airports, intermodal rail freight terminals and major industrial lands. The extent and classification of the network was redefined through the work undertaken to prepare the Perth Freight Transport Network Plan. The network is divided into a two-tier classification system comprising strategic and major freight routes, shown in Figure 4.2.

Criteria for including routes in the network were:

- Significant existing and forecast volumes of freight relative to other transport routes
- Designation as an existing or future heavy vehicle route operating under the Restricted Access Vehicle regime
- Strategic functionality within the overall network – for example, contribution to connectivity between ports, intermodal terminals and other major freight origins and destinations
- Overall suitability of the road infrastructure to support both existing and forecast freight volumes
- Existing or potential future routes recognised under the National Land Transport Network.

Within the metropolitan area, the strategic network includes the primary distribution network (Tonkin Highway, Reid Highway, Roe Highway, Kwinana Freeway and the FRCAH) as well as east-west routes linking Tonkin Highway, Kwinana Freeway and the FRCAH with the Western Trade Coast (Rowley Road, Anketell Road and Mundijong Road). The strategic freight network provides linkages out of the metropolitan area to the north (via Perth-Darwin National Highway), the east (via Great Eastern Highway), the south (via Kwinana Freeway / Forrest Highway) and the south east (via Albany and Brookton Highways).

[2] Declared Roads" under the Main Roads Act ('highways' and 'main roads')

4.6. RAV network and Over Size Over Mass (OSOM) loads

The Road Traffic Regulations (Vehicle Standard) 2002 together with the Road Traffic Rules (Vehicle Standard) specify that Heavy Vehicle permits are required for loads and/or vehicles exceeding any of the following dimensions: 19m length, 4.3m height, 2.5m width and 42.5 tonnes gross mass. Any vehicle, or vehicle plus load, that exceeds any of the above dimensions is considered to be an Over-Size Over-Mass load. These vehicles are classified as Restricted Access Vehicles (RAVs). Main Roads has created a system of RAV networks and regulates access of RAV vehicles to these networks via a system of notices and permits.

The proposed 2031 RAV network, developed as part of the Perth Freight Transport Network Plan within the Perth and Peel regions is shown in Figure 4.3. The main change to the existing network by 2031 entails expansion of the RAV 7 network (carrying vehicles up to 36.5m in length) to provide for distribution between metropolitan industrial areas and the Western Trade Coast, as well as distribution to the north and south out of the metropolitan area.

4.7. High Wide Load network

High Wide Loads (HWLs) are oversized loads which have dimensions equal to, nominally, 8m high by 8m wide and a net mass of 200 tonnes. The HWL network has a clearance envelope of 10m high by 10m wide, excluding electrical clearance requirements.

Main Roads has established a HWL network that serves the metropolitan area and provides linkages out of the metropolitan area. The HWL network is shown in Figure 4.4. HWLs are imported and exported through the Australian Marine Complex on the Western Trade Coast. Access into the metropolitan area is provided via Anketell Road and Tonkin Highway to the north and Rockingham Road to the south. Linkages out of the metropolitan area are provided by Roe Highway / Great Northern Highway to the north, Great Eastern Highway to the west and Mandurah Road to the south.

While the State has recently invested a significant amount of resources to identify and establish an appropriate HWL network in the metropolitan area, there is a broader need to protect and where necessary further develop a strategic network of HWL routes across the metropolitan area and regional Western Australia, including an extension to the South West.

4.8. On-road public transport

The bus network consists of line-haul services in corridors that are not serviced by rail and an extensive network of feeder bus services that supports the rail network. Bus priority measures have been implemented across the network and include partial bus priority (for example bus queue jump lanes at intersections) and full bus priority as dedicated bus lanes. Dedicated facilities have been provided along various road sections, including:

- **North of Perth CBD:** Alexander / Reid underpass bus lanes, Malaga / Reid underpass bus lanes, Glendalough Station freeway bus on-ramp, Alexander Drive bus queue-jumps, Beaufort Street bus lanes, Shenton Park bus bridge
- **Perth CBD and approaches:** Kwinana Freeway bus lanes, Causeway bus lanes, Shepperton Road bus lane, Beaufort Street bus lanes, Roe Street busway, St Georges Terrace bus lanes, William Street bus lanes
- **South of Perth CBD:** Great Eastern Highway bus lanes, Manning Road / Lawson Street bus lane, Centenery Avenue bus queue-jumps, Albany Highway / Nicholson Road bus lanes, South Street bus lanes, Jaggs Way bus lane, Barry Marshall Parade bus lanes,

Hampton Road bus lanes, Beeliar Drive bus underpass, Rockingham City Centre bus facilities.

The on-road public transport network developed for *Transport @ 3.5 Million* is discussed in Section 8.

4.9. Active transport network

An extensive network of cycle and pedestrian facilities has been progressively provided across the Perth and Peel regions. The cycle network developed for *Transport @ 3.5 Million* is discussed in Section 9.

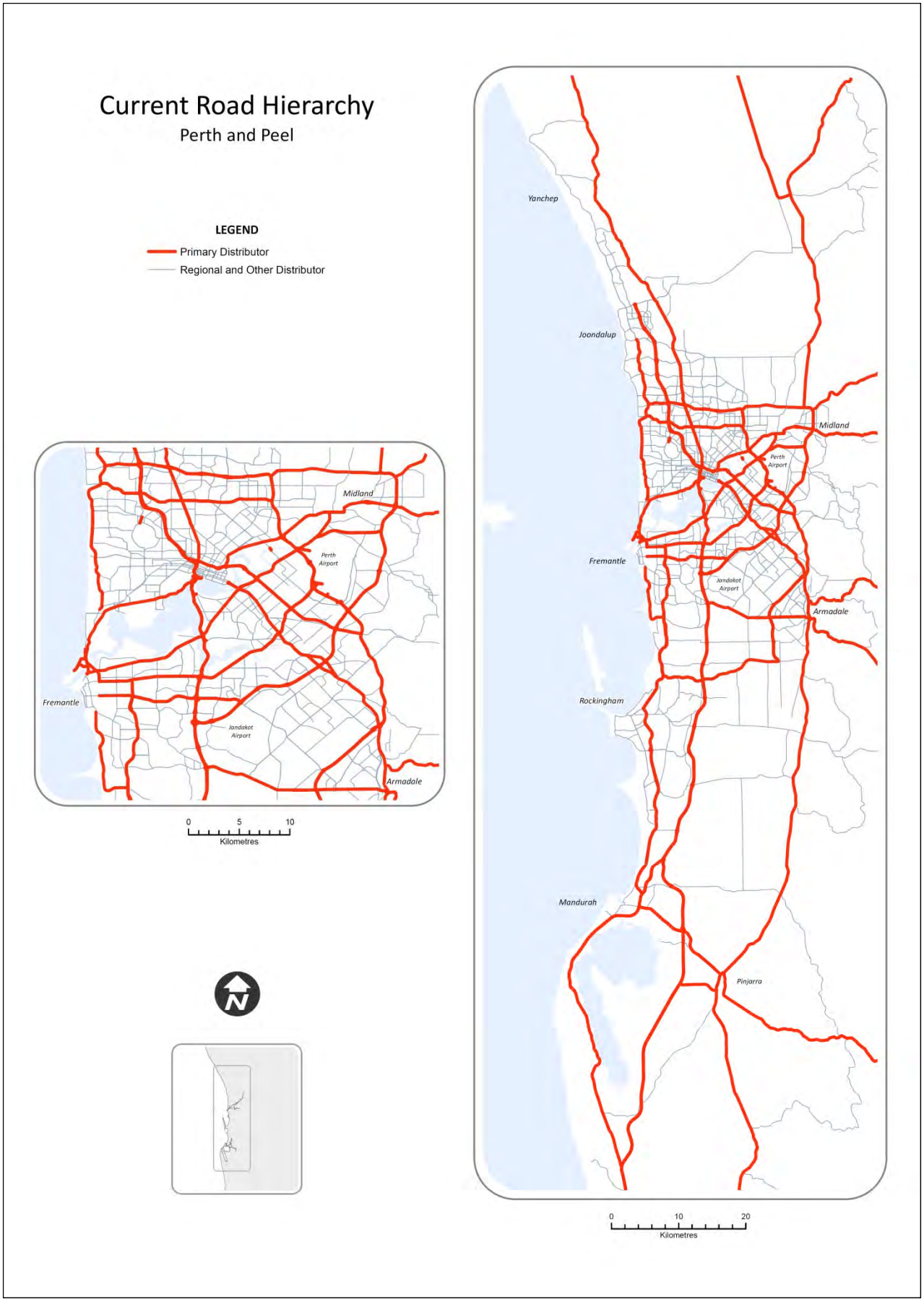


Figure 4.1 – Perth and Peel road hierarchy

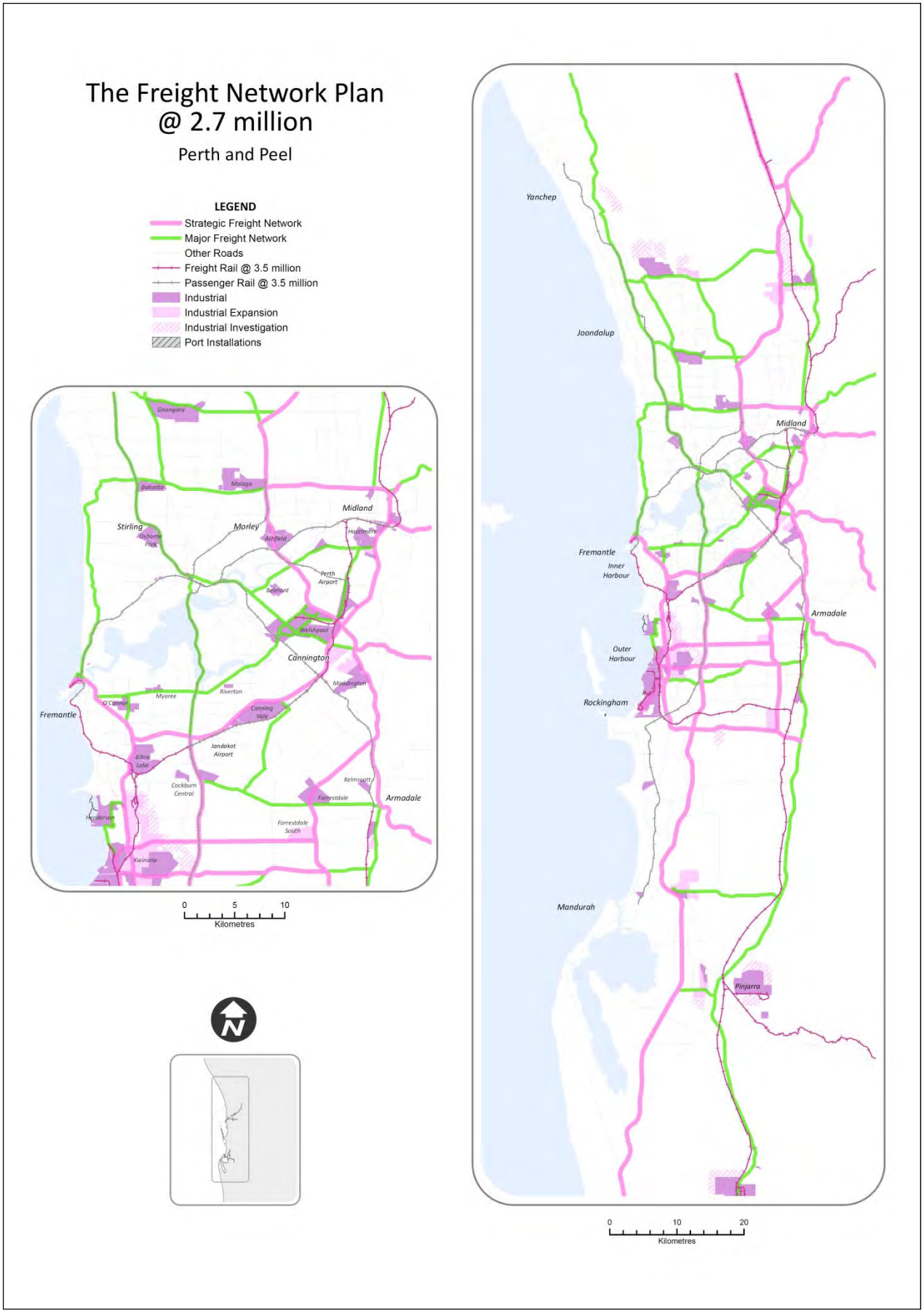


Figure 4.2 – Principal future road freight network (2031)

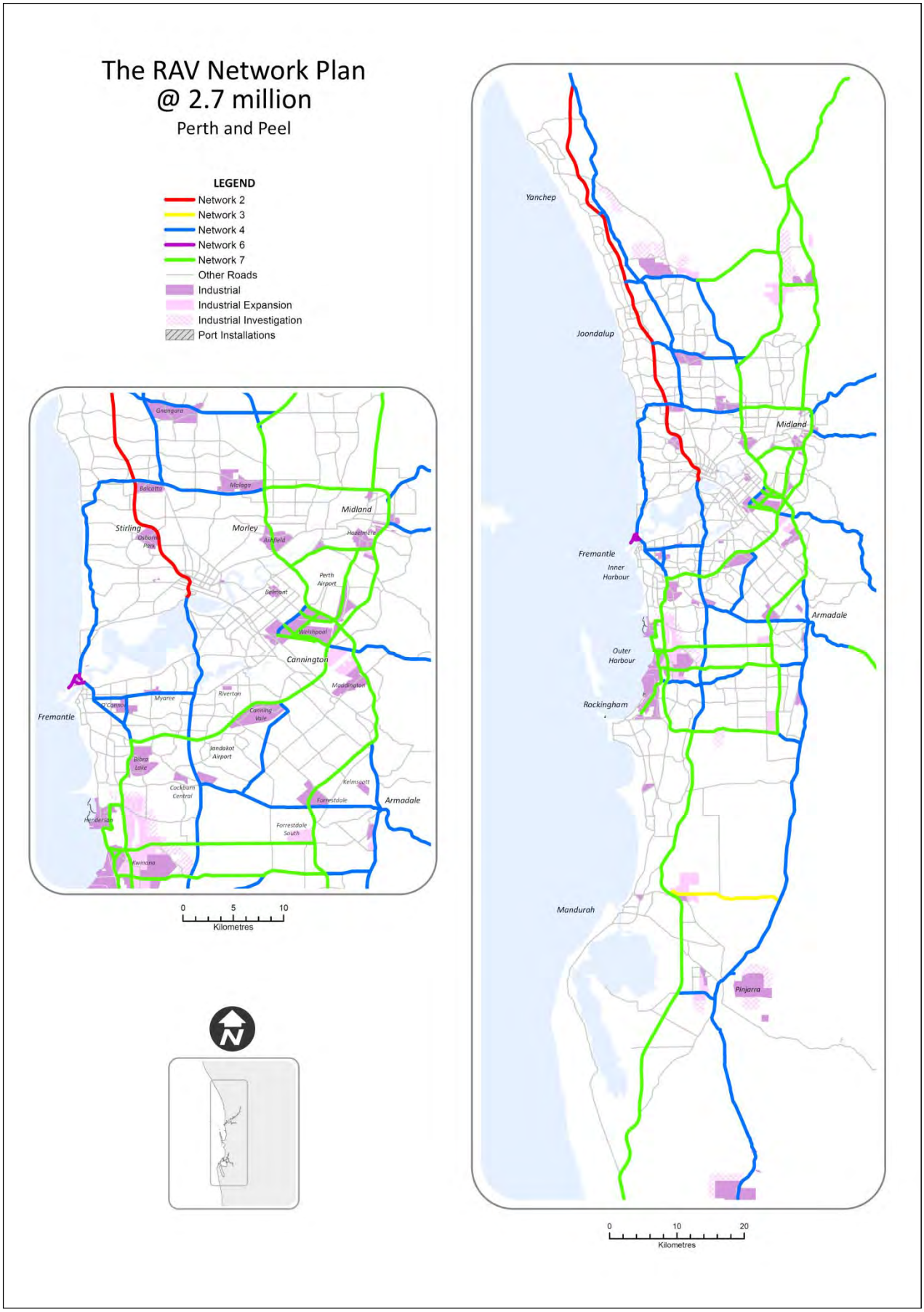


Figure 4.3 – Future (2031) RAV Network

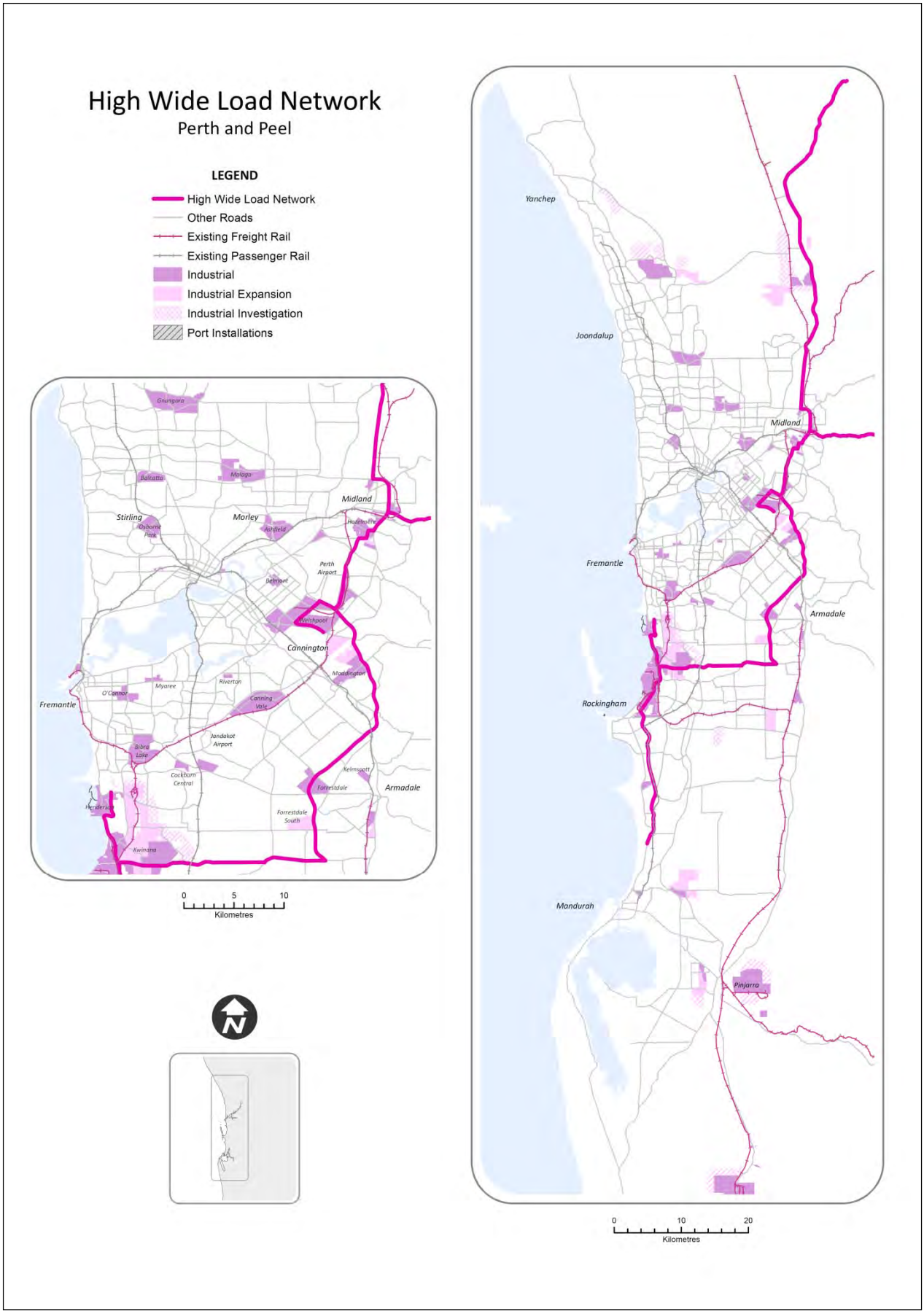


Figure 4.4 – High Wide Load Networks

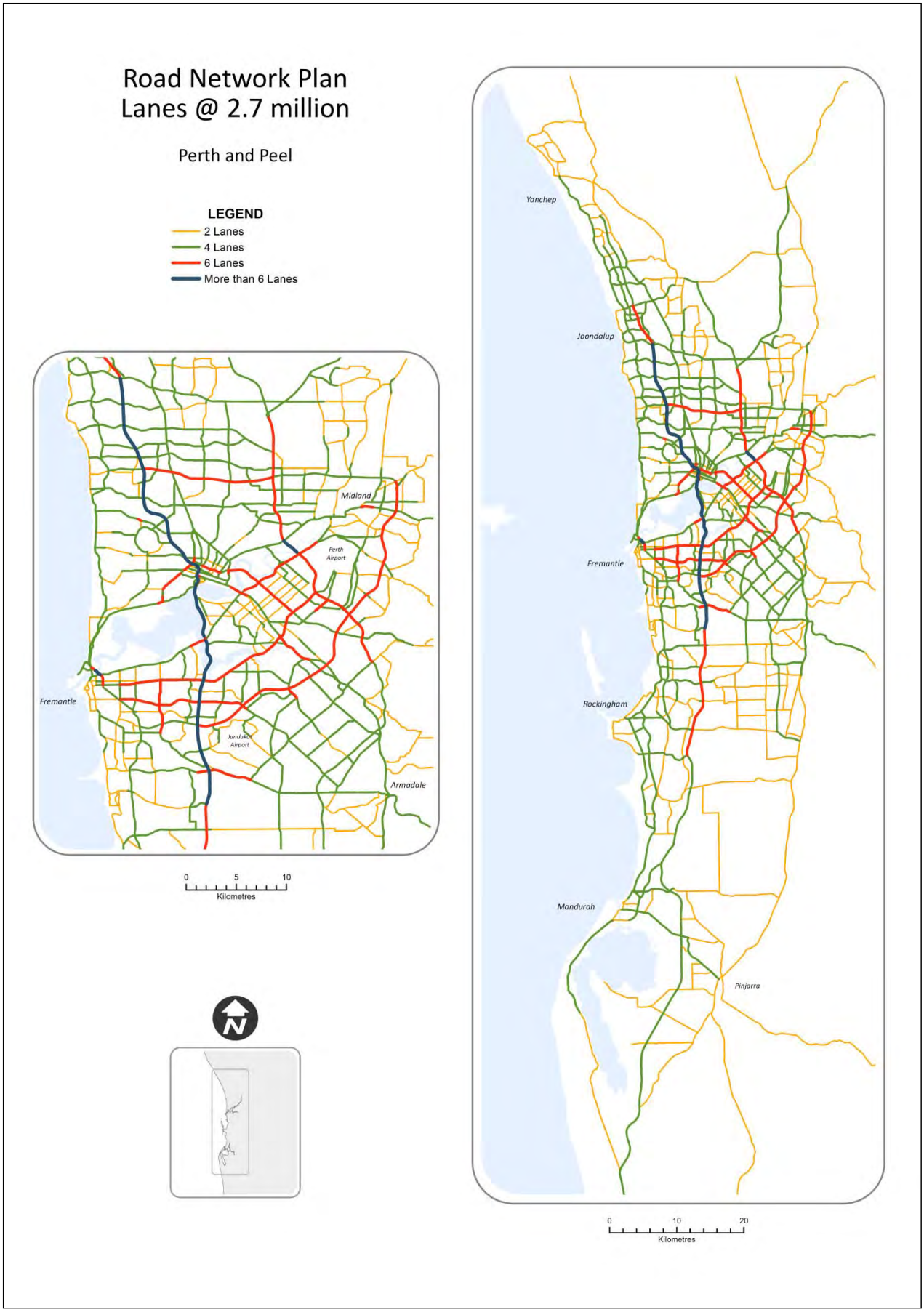


Figure 4.5 – 2031 Road Network Plan

5. TRANSPORT DEMAND

5.1. Current demand and trends

5.1.1. Mode shares

The observed transport mode share results from three household surveys conducted in Perth between 1976 and 2006 are summarised in Table 5.1. The surveys show the dominance of the car as the preferred transport option, accounting for 82% of all person trips during the 2003-06 Perth And Regions Travel Survey (PARTS).

Table 5.1 – Observed overall mode share – 1976, 1986 and 2003-06

Travel survey	Car Driver	Car Passenger	Public Transport	Bicycle	Walk all the way	Other
1976 HIS	52.3%	19.7%	8.0%	3.1%	16.3%	0.7%
1986 HIS	60.8%	14.3%	6.9%	5.1%	11.3%	1.6%
2003-06 PARTS	58.2%	24.1%	4.9%	1.7%	11.1%	-

Detailed analysis of Transperth patronage data[3] shows that public transport mode share increased from a low of 4.2% in 1998-99 to 5.6% in 2012-13. For the financial year 2013-14 Transperth reported the first decline in patronage in 15 years, recording a mode share of 5.4%.

The Journey-to-Work census data provides an additional perspective on mode share, with a large percentage of Journey-to-Work trips occurring during peak periods. Observed mode shares during the 1991 and 2011 census are shown in Table 5.2.

Table 5.2 – Observed mode share – Journey-to-Work Census data

Travel mode	1991	2011
Car Driver (incl. motorcycle)	75%	76%
Car Passenger (incl. taxi pax)	10%	6%
Public Transport	10%	13%
Bicycle	2%	2%
Walk all the way	3%	2%
Other	1%	1%

During 2011 the car accounted for 82% of all Journey-to-Work trips, with car occupancy decreasing significantly from 1991. Public transport mode share increased from 10% during 1991 to 13% by 2011 and is more than double that for all trip purposes combined. There is evidence to suggest that the number of cycling trips has increased but this has not yet been captured in a major household travel survey.

5.1.2. Road network

Current daily traffic volumes on the road network, sourced from Main Roads' traffic counting programs, are shown in Figure 5.1. The principal distribution network carries high volumes, especially through the inner city area and at river crossings. The Kwinana, Mitchell and Graham Farmer Freeways service the Perth CBD which is by far the largest employment centre within the metropolitan area, providing in the order of 130,800 jobs and attracting commuter trips from the greater metropolitan area.

[3] Hugo Wildermuth, Current Daily Public Transport Usage – What is the Right Number, March 2010 (updated)

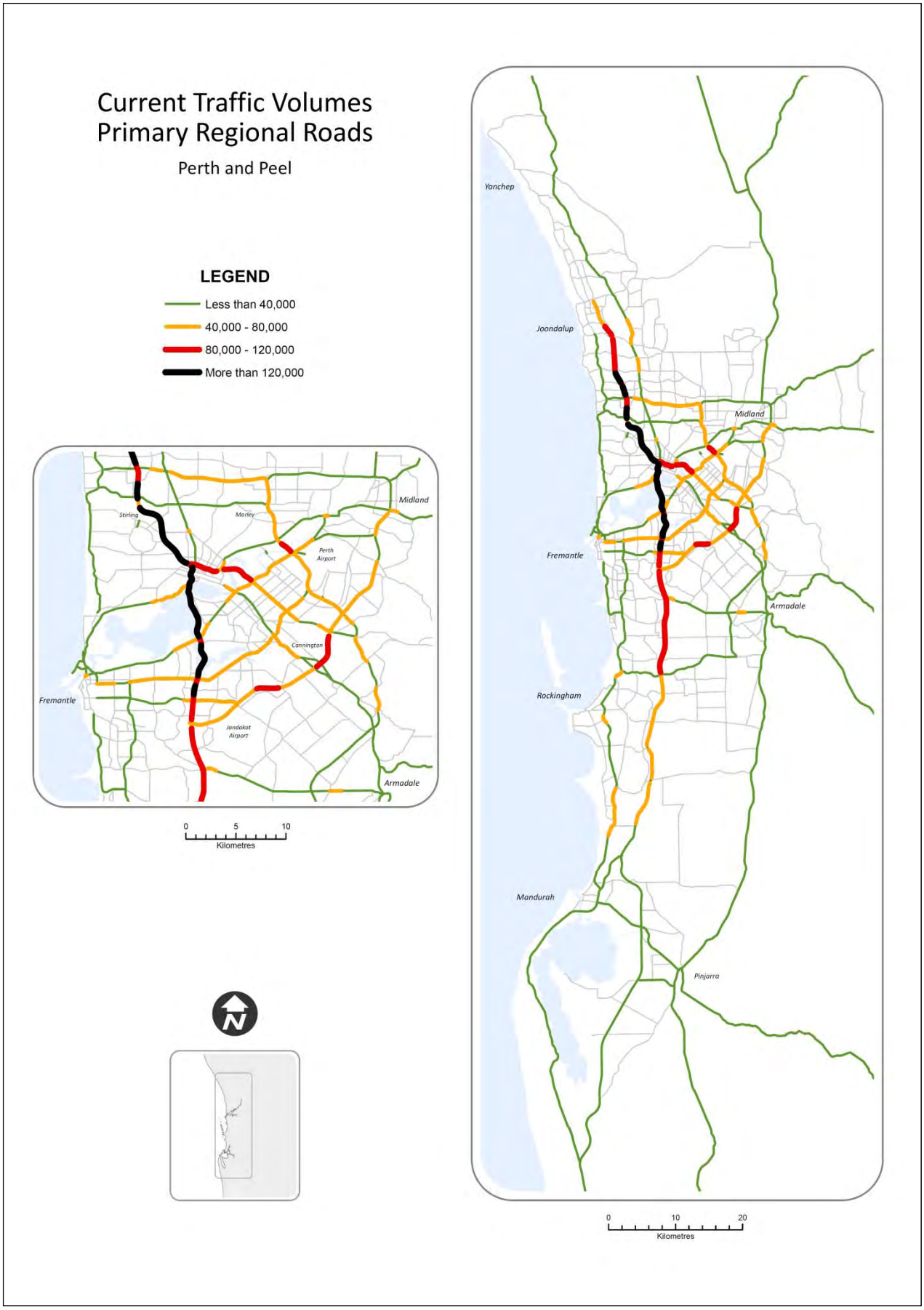


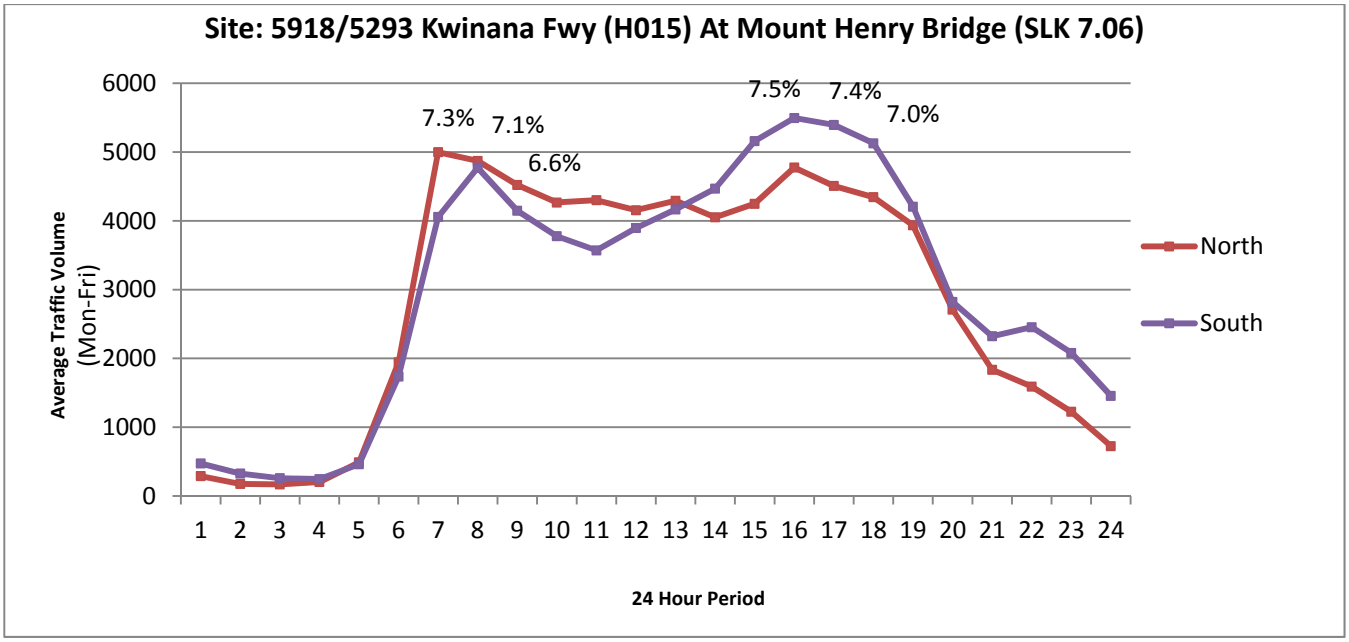
Figure 5.1 – Current volumes on the road network

Kwinana Freeway north of Russell Road carries over 100,000 vehicles per day, increasing to 130,000 vehicles per day north of Canning Highway, with 190,000 vehicles crossing the Narrows Bridge. Mitchell Freeway south of Whitfords Avenue carries over 100,000 vehicles per day, increasing to over 160,000 vehicles per day south of Powis Street. Graham Farmer Freeway carries in the order of 110,000 vehicles per day through the Northbridge Tunnel and across the Swan River at the Windan Bridge. The section of Great Eastern Highway between the Graham Farmer Freeway and Tonkin Highway is also heavily trafficked, carrying up to 70,000 vehicles per day.

Volumes on Tonkin, Reid and Roe Highways are significant but not as high. Demand on Tonkin Highway peaks in the vicinity of the Airport and surrounding industrial areas, with 90,000 vehicles per day crossing the Swan River at the Redcliffe Bridge.

The weekday hourly distribution of traffic varies across the network. The morning peak hour occurs earlier in the outer metropolitan areas, with the afternoon peak hour occurring later. The percentage of daily traffic travelling during the peak hour also varies, influenced by the function and location of the route as well as the level of congestion that is being experienced. On heavily trafficked sections such as Kwinana Freeway between Roe Highway and the Perth CBD, peak hour directional volumes are around 7.5% of daily flow. Peak hour directional volumes on Mitchell Freeway vary between 7.5% and 9% of daily flow. On the southern sections of Tonkin Highway, peak hour volumes are as high as 13%, reducing to 9% between Roe and Reid Highways.

The hourly distribution of traffic on Kwinana Freeway at Mount Henry Bridge and on Mitchell Freeway at Hepburn Avenue is shown in Figure 5.2. By contrast, the hourly distribution on Tonkin Highway north of Champion Drive and Collier Road is shown in Figure 5.3.



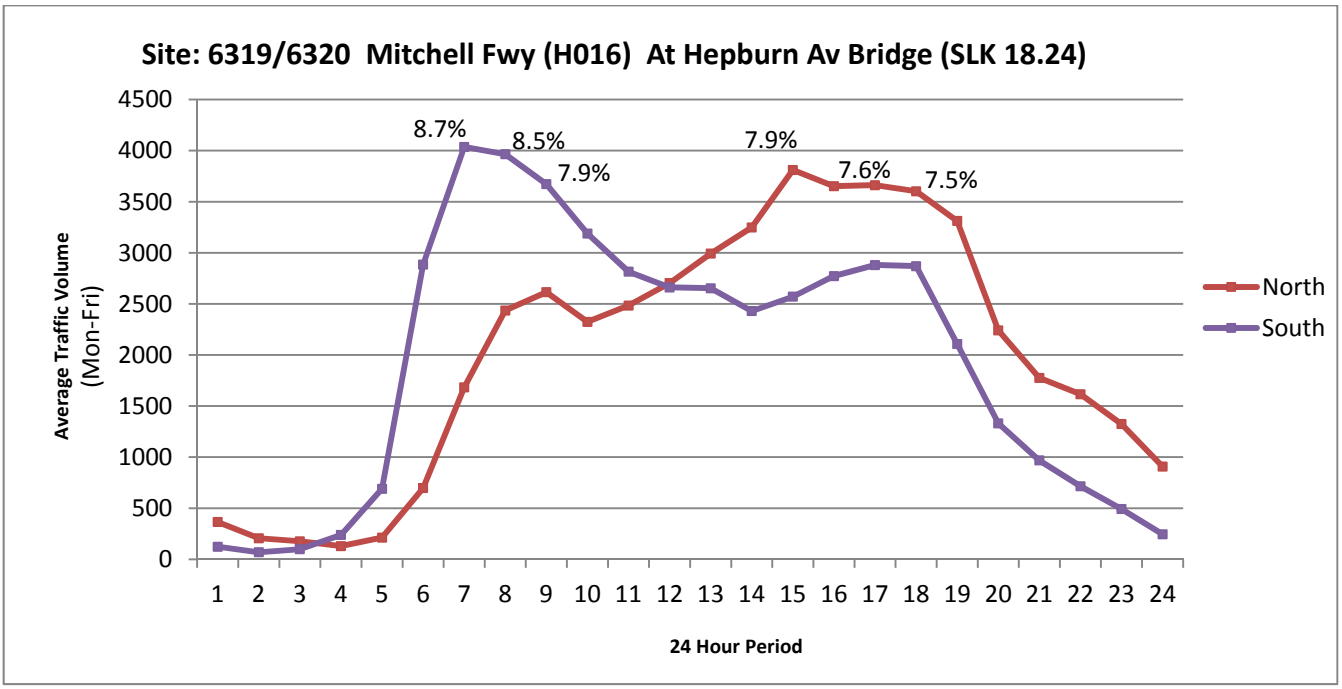
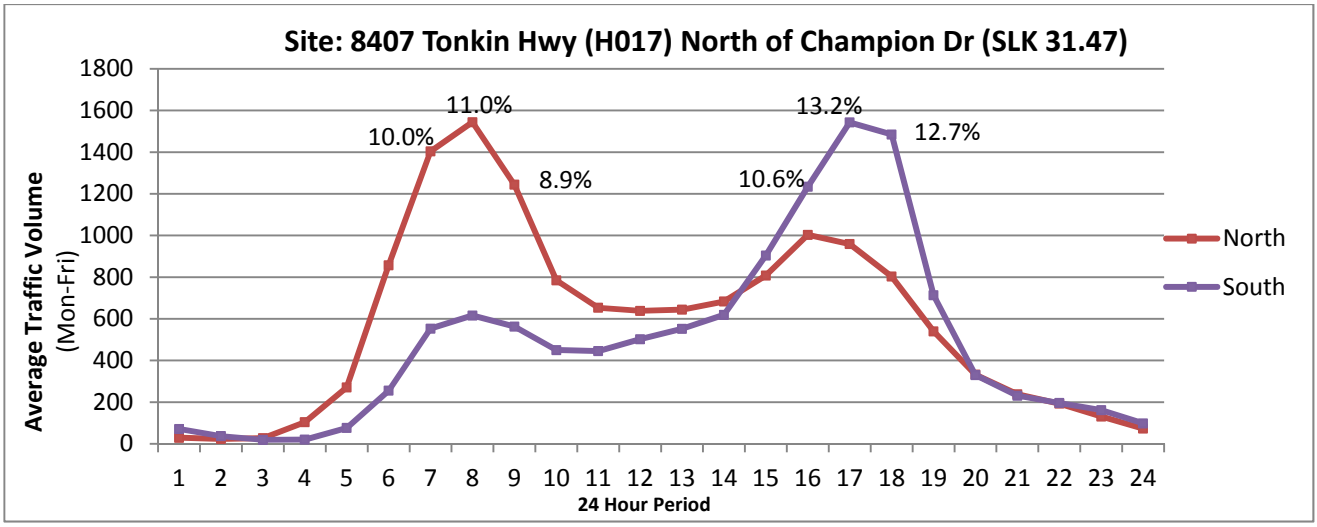


Figure 5.2 – Hourly traffic distribution – Kwinana and Mitchell Freeways



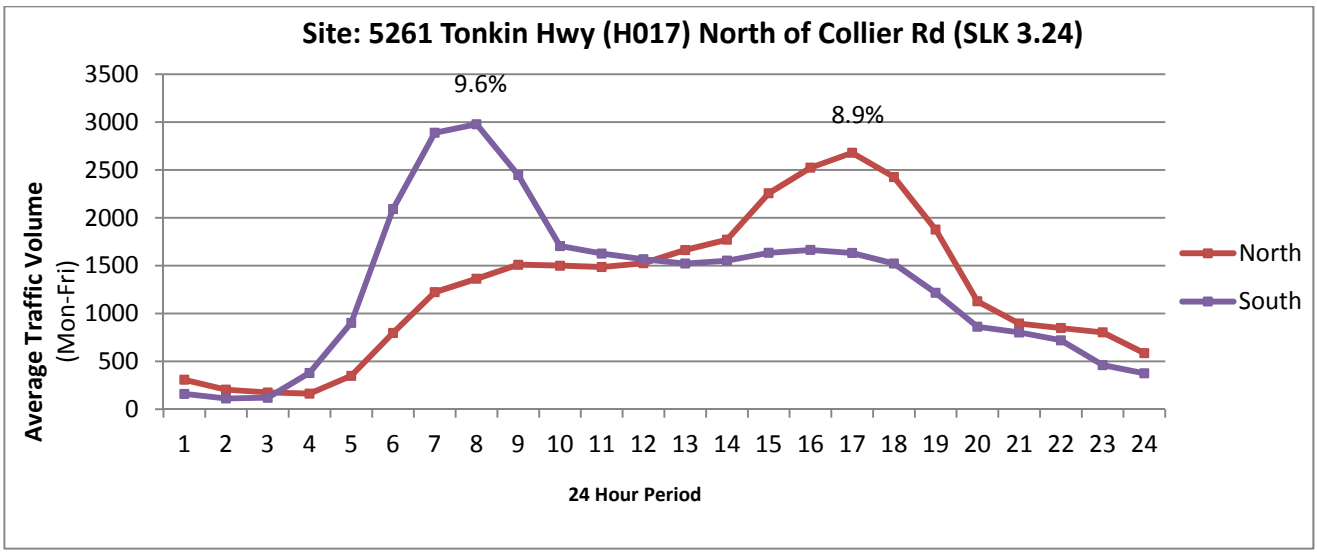
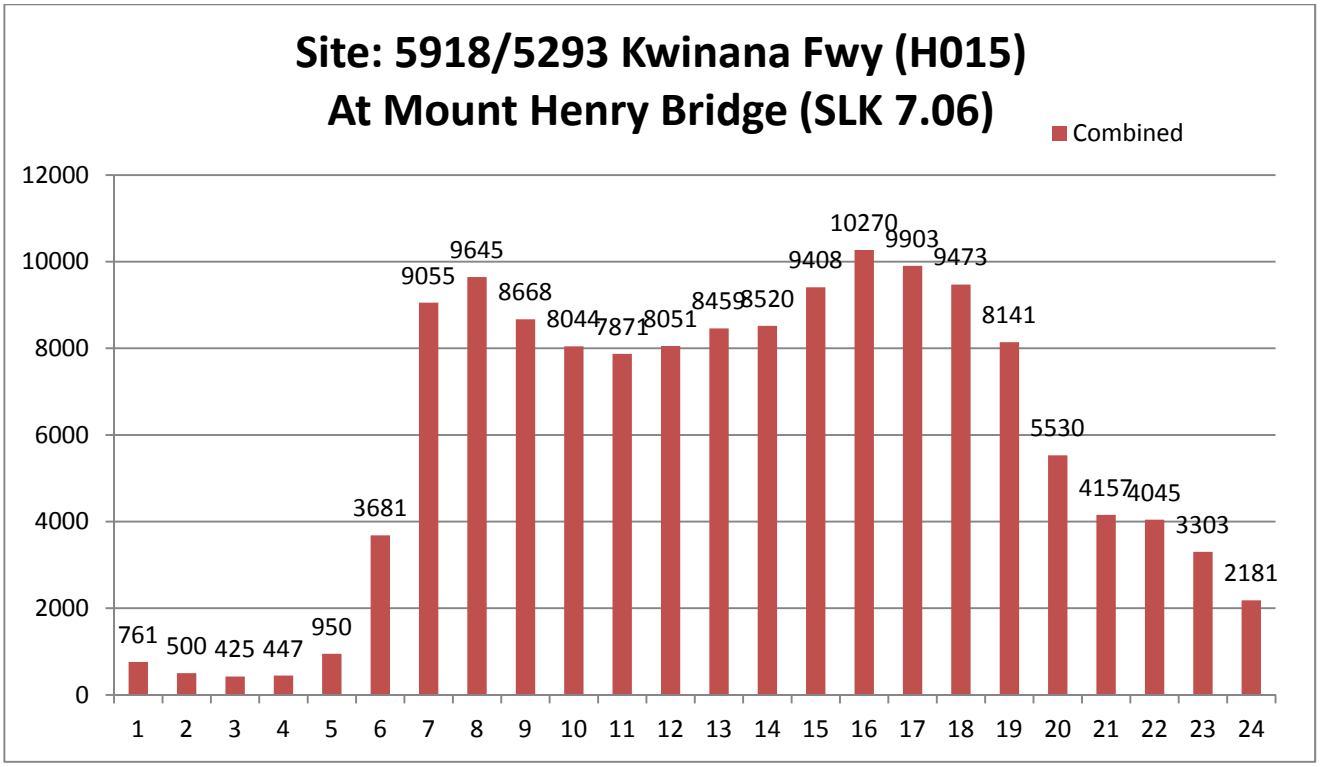


Figure 5.3 – Hourly traffic distribution – Tonkin Highway

Figure 5.4 shows that Kwinana and Mitchell Freeways carry high volumes across the day, with volumes outside of the peaks dropping by less than 20%.



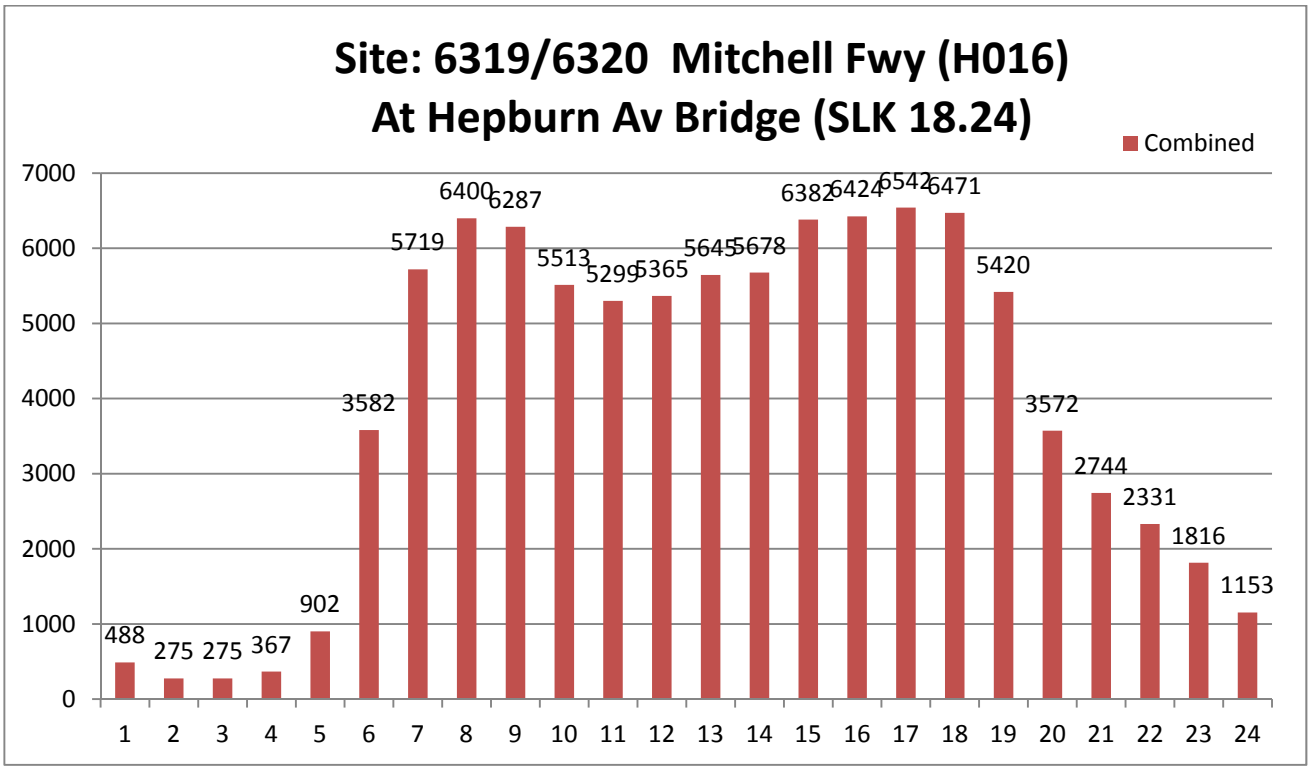


Figure 5.4 – Hourly traffic distribution – Tonkin Highway

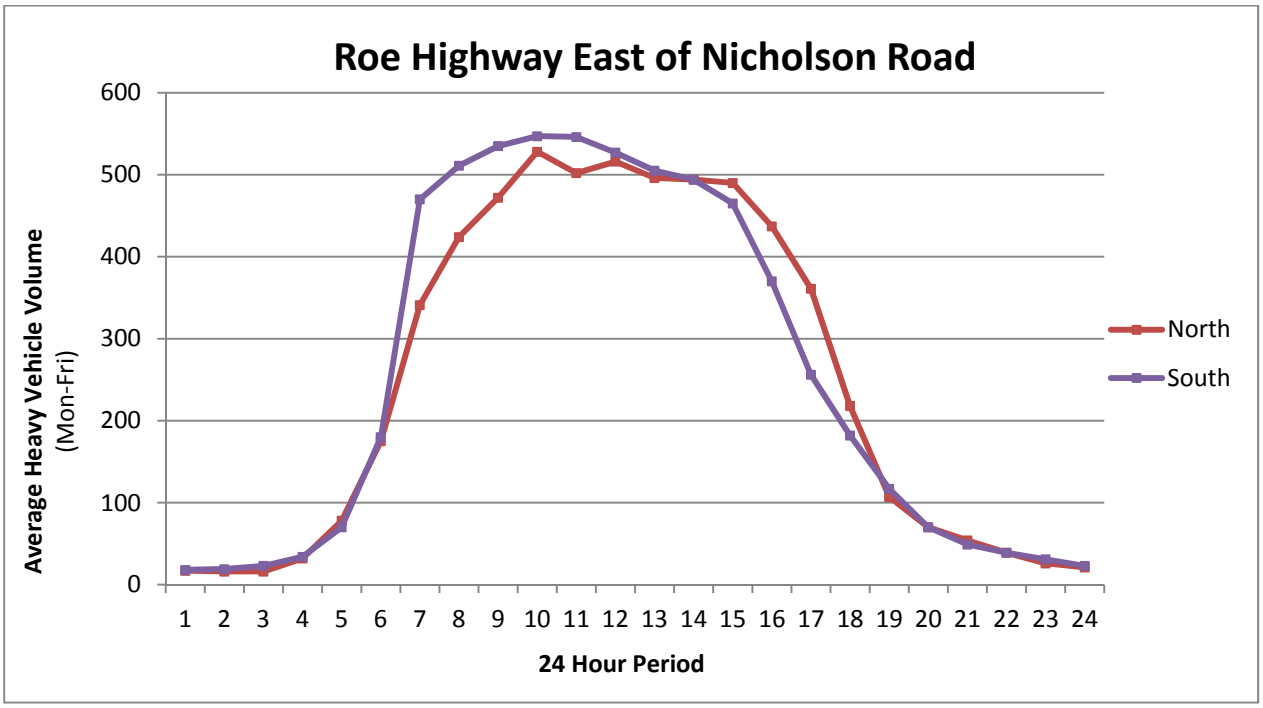
The freight centres that generate the majority of Perth's heavy freight movements include the industrial precincts of Kewdale, Forrestfield, Welshpool and Hazelmere, and the port precincts of Fremantle and the Kwinana Industrial Area. Most of these precincts, and the associated transport, warehousing and logistics sectors, are serviced by intermodal terminals. A limited number of strategic freight routes, including Roe Highway, Kwinana Freeway, Leach Highway and Stock Road carry the majority of road freight between these centres.

Roe Highway and Leach Highway provide the main road freight linkage between the Inner Harbour and the key industrial areas within the metropolitan area. Trade in containers at the Inner Harbour has performed strongly in recent years. Between 2002 and 2014 trade growth averaged 6.6% per annum[4], with the North Quay container terminals handling 743,000 twenty foot equivalent units (TEU) in 2014-15. During this period truck numbers grew by 5.1% per annum. During 2014, the container terminals generated approximately 3,000 container trucks and 1,000 other heavy vehicles per day.

Roe Highway between Tonkin Highway and Kwinana Freeway currently carries 60,000 to 90,000 vehicles per day. The section east of Nicholson Road carries in the order of 75,000 vehicles per day with 12,000 heavy vehicles (16%), 35% of which are large heavy vehicles (Austroads Classes 9 to 12). Kwinana Freeway south of Roe Highway also carries significant freight volumes, around 12,000 heavy vehicles per day (11.5%), 30% of which are large heavy vehicles. Leach Highway west of Stock Road currently carries 33,000 vehicles a day with 4,300 heavy vehicles (13%), 50% of which are large heavy vehicles.

The hourly distribution of heavy vehicle traffic on Roe Highway east of Nicholson Road and Leach Highway west of Stock Road is shown in Figure 5.5. Along Roe Highway hourly volumes are reasonably consistent throughout the day from around 8am, with little variation in directional flow and lower volumes during the afternoon commuter peak. While total hourly volumes along Leach Highway are also reasonably consistent throughout the day, a higher westbound movement during the morning reversing in the early afternoon is shown, mainly due to the demand profile at the Inner Harbour.

[4] North Quay Truck Survey 2014, Fremantle Ports



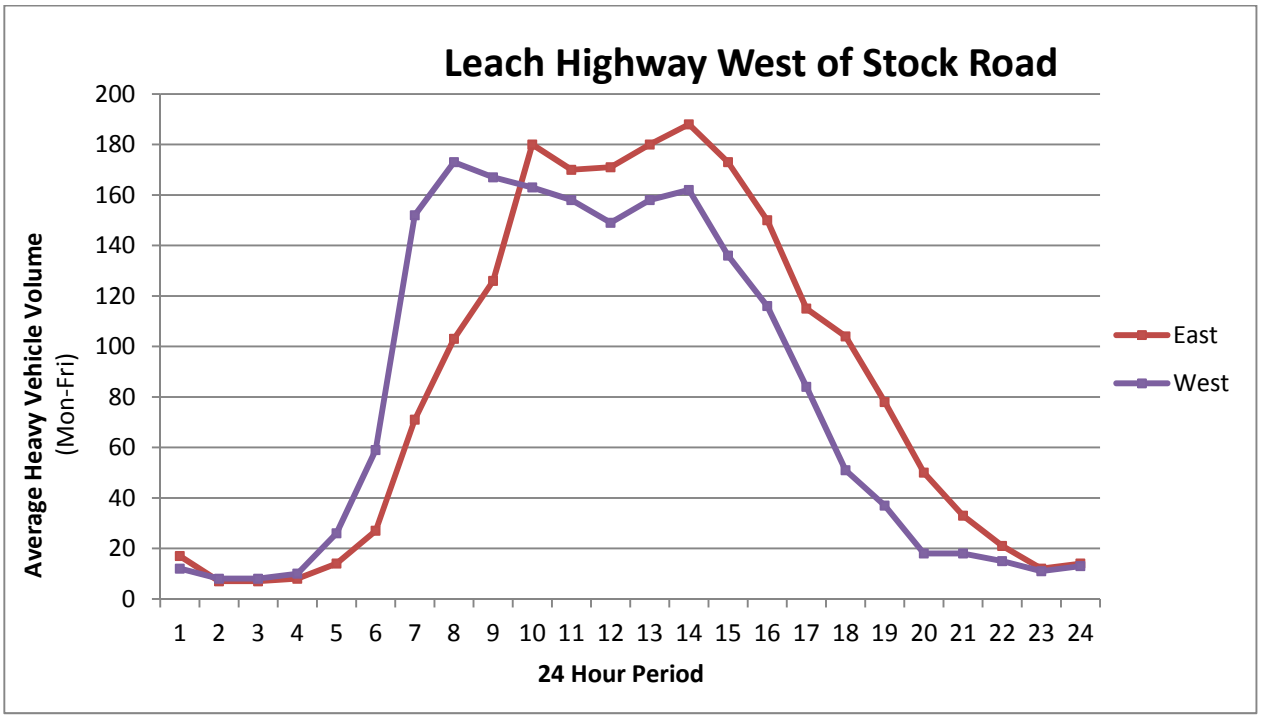


Figure 5.5 – Hourly heavy vehicle distribution – Roe and Leach Highways

5.1.3. On road public transport

Total boardings on Transperth buses[5] for 2013-14 and 2014-15 are shown by contract area in Table 5.3.

Table 5.3 – Bus boardings by contract area – 2013-14 and 2014-15

Contract area	2013-14	2014-15	Change
Kalamunda	7.580m	7.261m	-4.2%
Morley	11.399m	11.379m	-0.2%
Canning	8.399m	8.416m	0.2%
Claremont	4.373m	4.320m	-1.2%
Marmion	7.629m	7.510m	-1.6%
Midland	2.409m	2.445m	1.5%
Southern River	3.918m	3.944m	0.7%
Fremantle	9.551m	9.412m	-1.5%
Joondalup	7.171m	7.096m	-1.0%
Rockingham	6.146m	6.155m	0.1%

Total boardings on buses within the metropolitan area recorded a 0.5% increase in 2014-15 to 84.1 million. The Morley area recorded the highest volume followed by Fremantle and Canning.

5.2. Transport modelling

Transport modelling for *Transport @ 3.5 Million* was undertaken using the Main Roads Regional Operations Model (ROM24) and the Department of Transport's EMME Strategic Transport Evaluation Model (STEM). ROM24, which has a refined zonal system and more detailed representation of the road network was the primary modelling source for the assessment of the Road Network Plan. STEM was used for both the assessment of the road network and for public transport modelling. The land use and transport networks used in both models were comparable to ensure that the models produced comparative outputs.

5.2.1. Land use

The Economic Development Study (EDS) land use provided by the Department of Planning, which reflects the land use contained in *Perth and Peel @ 3.5 Million*, was adopted as the base case land use for transport modeling. The EDS land use allows for a population of 3.64 million people and total employment of 1.69 million jobs. This land use achieves high Employment Self Sufficiency (ESS) in the outer metropolitan areas, which reduces transport demand into the Perth CBD.

An alternative land use scenario with lower ESS levels in the outer regions and increased employment in the Perth CBD was developed to test the effect on transport demand, particularly volumes on the primary distribution network. This land use redistributed about 90,000 jobs (~5%) from the outer sub-regions, particularly the North West sub-region, to the inner sub-region.

An external influences (behavioural) scenario was also developed. This scenario investigated external factors that are likely to affect current travel patterns, including changes in employment, education, shopping patterns and socio-demographic trends, as well as advances in intelligent transport systems (including autonomous vehicles) and other technological changes such as dynamic road and parking pricing.

[5] Public Transport Authority, Annual Report 2014-15

5.2.2. Mode share

Research was undertaken as part of the modelling work to investigate mode share expectations for the future 2031 and 2050 time horizons. The possible mode share outcomes are shown in Table 5.4. The public transport mode share is expected to increase from its current 6% level to around 11% by 2050. This assumes that the recent gradual shift from the car to public transport and active transport modes will continue and strengthen into the future.

Table 5.4 – Mode share expectations

Main mode	2003-06 PARTS	2011 Base Year	2031	2050
Car driver	58.2%	~58%	~55%	~50%
Car passenger	24.1%	~23%	~22%	~21%
Public transport	4.9%	5.6%	8 - 9%	~11%
Non-motorised	12.8%	~13.5%	~15%	~18%

5.2.3. Transport networks

An iterative approach was followed to develop and refine road and public transport networks for the 2031 and 2050 time horizons. The process involved building the road and public transport networks, running them in ROM24 and STEM, reviewing and evaluating the outputs and updating the networks before the next iteration. The final 2050 road and public transport networks used in ROM24 and STEM were comparable. The 2031 network was developed as a logical stage of the 2050 network.

Road network

In developing the road network, the type and function of the road, the need to implement Managed Freeways, the number of lanes, posted speed, road safety aspects and the need for grade separation were considered. Detail on the future road networks is provided in Section 3.

Public Transport networks

The mass transit network, which was defined through work undertaken by PATREC, includes extension of existing rail lines, provision of new rail lines, and provision for BRT and LRT. Detail on the on-road public transport network is provided in Section 8.

Line-haul and feeder bus networks were subsequently developed to integrate with the PATREC mass transit network, and to service the modelled patronage demand. Highest volume routes include sections of: Joondalup centre routes, Wanneroo Road, Whitfords Avenue, Beach Road, Cedric Street, Charles Street, Mounts Bay Road, GEH, South Street, Ranford Road and Pinjarra Road. Bus priority measures, including partial bus priority such as queue jumps at signals and full priority in the form of dedicated bus lanes were included in the network. Detail on bus networks and level of priority envisaged is provided in Section 8.

5.3. Future demand

5.3.1. 2031 demand

While the 2050 demand was based on the Economic Development Study (EDS) land use provided by the Department of Planning (DoP), an accompanying 2031 EDS land use was unavailable and the DoP 2031 MLUFS land use was used to provide an indication of future 2031 demand.

5.3.2. 2050 demand

Network statistics

Modelled network statistics for 2050 from STEM are shown in Table 5.5. Based on STEM outputs, the population of 3.6 million people in Perth and Peel will generate in the order of 12.4 million person trips per day, an increase of 6.1 million person trips or 97% from 2011. The public transport network is expected to carry 1.4 million trips by 2050, an increase of 950,000 trips from 2011. Although the public and active transport mode shares increase significantly by 2050, modelling suggests that the road network will need to carry around 6.3 million car driver trips by 2050, 2.7 million (76%) more than in 2011.

Table 5.5 – 2050 network statistics

	Mode share	No. of trips (In millions)
Car driver	50 %	6.3
Car passenger	21 %	2.6
Public transport	11 %	1.4
Cycle	4 %	0.5
Walk	14 %	1.7
Total	**100 %**	**12.4**

Road network

The future 2050 modelled all day volumes on the road network are shown in Figure 5.6. Traffic volumes on Kwinana Freeway south of Roe Highway and Mitchell Freeway north of Reid Highway will increase significantly by 2050. Daily volumes on Kwinana Freeway south of Armadale Road will grow by 60% from 100,000 vehicles per day (vpd) during 2014-15 to around 160,000 vpd. Volumes on Mitchell Freeway north of Warwick Road will grow by 40% from 130,000 vpd to around 180,000 vpd.

The increase on the Kwinana and Mitchell Freeways through the inner metropolitan area between Reid and Roe Highways will, however, be moderated by a significant growth in rail patronage, the limited potential to increase capacity of the freeway network through this area and the spatial distribution of employment growth contained in the EDS land use with 70% of new jobs located outside of the Central sub-region. The proposed river crossing, discussed in Section 6 also moderates demand.

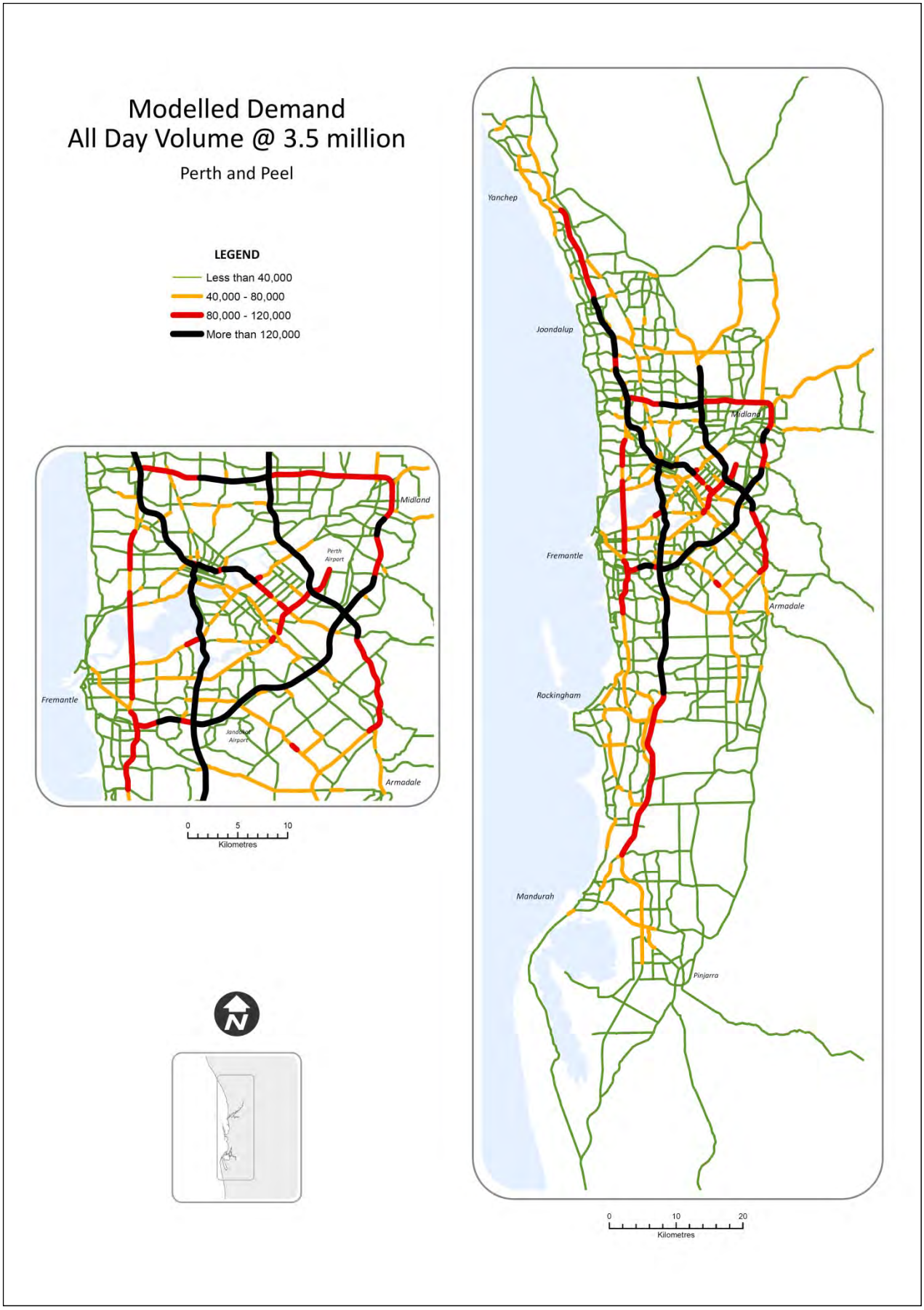


Figure 5.6 – Modelled demand (ROM24) – 2050

Kwinana Freeway north of Canning Highway will carry 180,000 vpd, an increase of only 13% from 160,000 vpd during 2014-15. Volumes on the Narrows Bridge will grow by 16% from 190,000 vpd to 220,000 vpd. Mitchell Freeway will see higher increases, with volumes south of Powis Street growing by 30% from 160,000 vpd to 210,000 vpd.

Daily volumes on Reid, Roe and Tonkin Highways, which are strategic freight routes serving key industrial areas and Perth airport, will see significant growth. Volumes on Tonkin Highway between Reid and Great Eastern Highways will more than double to between 150,000 and 190,000 vpd, with volumes on Redcliffe Bridge set to increase from 90,000 to 190,000 vpd. Volumes on Reid and Roe Highways will show similar growth, with Roe Highway between Tonkin Highway and Kwinana Freeway carrying up to 170,000 vpd.

The section of PDNH up to Stock Road will carry significant volumes, generated by future industrial areas. The southern section of the WYH will also carry high volumes, serving new development in East Wanneroo.

Major new urban areas include Alkimos to Two Rocks and East Wanneroo in the North-West sub-region, Bullsbrook in the North-East sub-region, and Mundijong and Ravenswood Riverfront / Pinjarra in the South Metropolitan Peel sub-region. The arterial road networks serving these areas will see significant increases in volume by 2050. The arterial road network shows moderate volume increases in the inner-city areas, with higher increases closer to the metropolitan centres.

Peak spreading will see a marginal decrease in peak hour volumes as a percentage of the total daily flow. Modelled peak hour percentages on the higher-order road network typically vary between 7.5% and 8.5% of daily flow in the peak direction, a decrease of around 1% from current levels.

The increased self-sufficiency in the outer sub-regions has resulted in higher contra-flow movements during peak periods on the freeway network, achieving more productive use of available road space.

Growth in heavy vehicle volumes will be driven by increased activity at the Inner and Outer Harbours and the city's key industrial areas. It is assumed that the Outer Harbour container port will start operating by around 2040 and that growth in heavy vehicles to/from the ports will increase by 3% per annum between 2031 and 2050.

The strategic freight routes, including Tonkin and Roe Highways, sections of Kwinana Freeway and the Fremantle Rockingham Controlled Access Highway (FRCAH) will carry very high freight volumes by 2050. The section of Roe Highway east of Nicholson Road currently carries in the order of 12,000 heavy vehicles (16%), increasing to over 40,000 heavy vehicles by 2050. Kwinana Freeway south of Roe Highway also carries significant freight volumes, around 12,000 heavy vehicles per day (11.5%). This is expected to increase to over 30,000 heavy vehicles by 2050. Tonkin Highway between Roe and Reid Highways will carry over 20,000 heavy vehicles by 2050.

Bus

STEM modelling shows that a number of bus priority corridors will carry high volumes by 2050. These corridors are shown in Figure 8.1 in Section 8. Routes which carry more than 1,000 passengers in the peak direction during the 2050 morning peak hour include:

- Whitfords Avenue, with high demand on the eastern approach to Whitfords Station
- Beach Road, showing high demand on both approaches at Warwick Station
- The Ellenbrook BRT on Lord Street south of Gnangara Road
- Cedric Street, at Stirling Station

- Mounts Bay Road, showing high demand between UWA (not QEII) and the Perth CBD, which is moderated by the proposed Murdoch to Stirling Orbital rail
- Charles Street on the approaches to the Charles Street Bus Bridge, serving the Charles Street / North Perth catchment, as well as a collection point for buses from Scarborough Beach Road and Flinders Street
- Great Eastern Highway, showing high demand between Graham Farmer Freeway and the Causeway
- Great Eastern Highway, at the approaches to Bellevue Station
- South Street and Ranford Road, which link Jandakot and Murdoch with Fremantle
- Armadale Road, in the vicinity of Cockburn Central
- Pinjarra Road, which provides a link between Pinjarra, Ravenswood and Mandurah at Mandurah Forum and the Mandurah Station.

Other routes which carry more than 1,000 passengers in both directions and more than 500 passengers in the peak direction during the 2050 morning peak hour include:

- The Two Rocks to Yanchep transitway
- Ocean Reef Road / Gnangara Road, on the approaches to the East Wanneroo rail
- Scarborough Beach Road, with high volumes in the vicinity of Stirling Centre
- Abernethy Road and Oats Street
- Great Eastern Highway, which provides a link between the Hills, specifically Mundaring / Sawyers Valley and Midland
- Canning Highway in the vicinity of the Canning Vision development area
- Armadale Road, between Nicholson Road and South Western Highway
- South Western Highway, between Byford and Armadale
- Safety Bay Road, between Warnbro Station and Baldivis.

The need for bus priority measures is discussed in Section 8.

5.3.3. Effect of land use distribution on 2050 demand

As stated previously, the EDS land use achieves high Employment Self Sufficiency (ESS) in the outer metropolitan areas, with the ESS in Wanneroo increasing from 44% in 2011 to 81% in 2050. Although the ESS for the Central sub-region remains constant between 2011 and 2050, the ESS for the Perth CBD decreases significantly through a combination of slower employment growth and an increase in employed residents. These aspirational assumptions on ESS will reduce the average car trip length, resulting in less traffic congestion in the network than would otherwise be the case.

An alternative land use scenario was developed with lower ESS levels in the outer regions and increased employment in the inner sub-region to investigate the effect of ESS on transport demand. The alternative land use scenario moved about 88,000 work opportunities from the outer sub-regions to the inner sub-region, which included shifting around 40,000 work opportunities from south of the river to north of the river and placing an additional 20,000 work opportunities in the Perth CBD.

The alternative employment scenario results in a network with fewer car driver trips and more public transport trips, which is a good outcome. However, car driver trip lengths increase which results in an overall increase in car driver vehicle kilometres, vehicle hours and road network congestion.

Based on STEM modeling, public transport trips increase by 7% as public transport competes well with the private car due to longer average car trip lengths. Rail boardings increase by 13% compared to 8% for Light Rail and 7% for bus. Boardings on all rail lines increase, with boardings on the Mandurah line increasing by 30% (an additional 40,000 boardings), which is a

direct result of shifting 40,000 work opportunities north of the river. Boardings on the Joondalup line increase by 5%, or an additional 8,000 boardings. Boardings at the Perth CBD stations increase by 15%.

The alternative employment scenario generates 67,000 fewer car driver trips. However, the increase in the average car driver trip length would result in an additional 1 million vehicle kilometres on the network during a typical weekday. As expected, the alternative employment scenario decreases volumes in the outer sub-regions while increasing volumes in the inner sub-region. A screenline assessment shows that traffic volumes along various corridors within the inner sub-regions would increase by around 3% to 6%. The increase would be distributed across the freeway and arterial road networks.

Daily volumes on the Mitchell and Kwinana Freeways close to the Perth CBD would increase by around 3,000 vpd, with inbound volumes on the Kwinana Freeway during the morning peak increasing by around 200 vehicles per hour. Similarly, daily volumes on the Graham Farmer Freeway would increase by around 3,000 vpd, with inbound volumes during the morning peak increasing by around 300 vehicles per hour. As the road network around the inner city area will operate at or close to capacity by 2050, this would affect the operation of the freeways, increasing congestion during peak periods. Volumes would also increase on the arterial road network close to the city, with Orrong Road and Albany Highway carrying an extra 2,000 vpd and Mounts Bay Road an extra 5,500 vpd.

6. RIVER CROSSINGS

6.1. River crossing need and objectives

Perth has historically developed as a north-south linear city with urban development concentrated between the Indian Ocean and the Darling Scarp. The Swan and Canning Rivers form a natural east-west constraint for the provision of essential north-south infrastructure networks including transport, particularly the road network.

Very early transport planning for the Perth region (1950's/1960's) identified the need for additional high standard road crossings of the Swan River. These river crossings included: a freeway concept to link Stock Road with Stephenson Highway, a freeway link from Graham Farmer Freeway to Great Eastern Bypass along the Swan River (known as Swan River Drive) and a link from Riverside Drive to Berwick Street.

Modelling undertaken for *Transport @ 3.5 Million* confirms that the existing road river crossings, especially crossings in close proximity to the Perth CBD, will not provide adequate capacity for the 2050 peak period demand. Additional river crossings at appropriate locations could potentially achieve multiple objectives. These include increasing the river crossing capacity, providing a bypass of the constrained freeway network through the Perth CBD, providing a bypass of the heavily trafficked freeway network through the inner metropolitan area between Reid and Roe Highways, and providing a bypass of Fremantle. New river crossings would also significantly improve cross-river access to work, shopping, education and recreation opportunities, influencing trip patterns in the crossing's catchment area.

In developing *Transport @ 3.5 Million* the influence of the additional river crossings and their preferred location were assessed. The work undertaken by PATREC in developing the Mass Transit Network demonstrated the need for an additional rail river crossing west of the Perth CBD.

6.2. Previous work

Work was recently undertaken by Veitch Lister Consulting and Main Roads to investigate options for potential road river crossings.

Veitch Lister Study, September 2012

In September 2012, Veitch Lister Consulting (VLC) completed a high level review of potential river crossings in Perth post 2031. This work considered a wide range of potential network enhancements with the objective of reducing redundant travel distance and time. A total of 19 indicative river crossing proposals were assessed, shown in Figure 6.1.

The study concluded that options crossing the Swan River west of the Perth CBD produced the greatest benefits and were worthy of further investigation. The VLC report was considered a preliminary guide for further work to be undertaken.

Following on from the VLC work, the Transport Portfolio undertook further investigation of river crossing options, including selected options identified by VLC. This work entailed a high-level transport assessment of the river crossings shown in Figure 6.2 based on future 2031 demand.

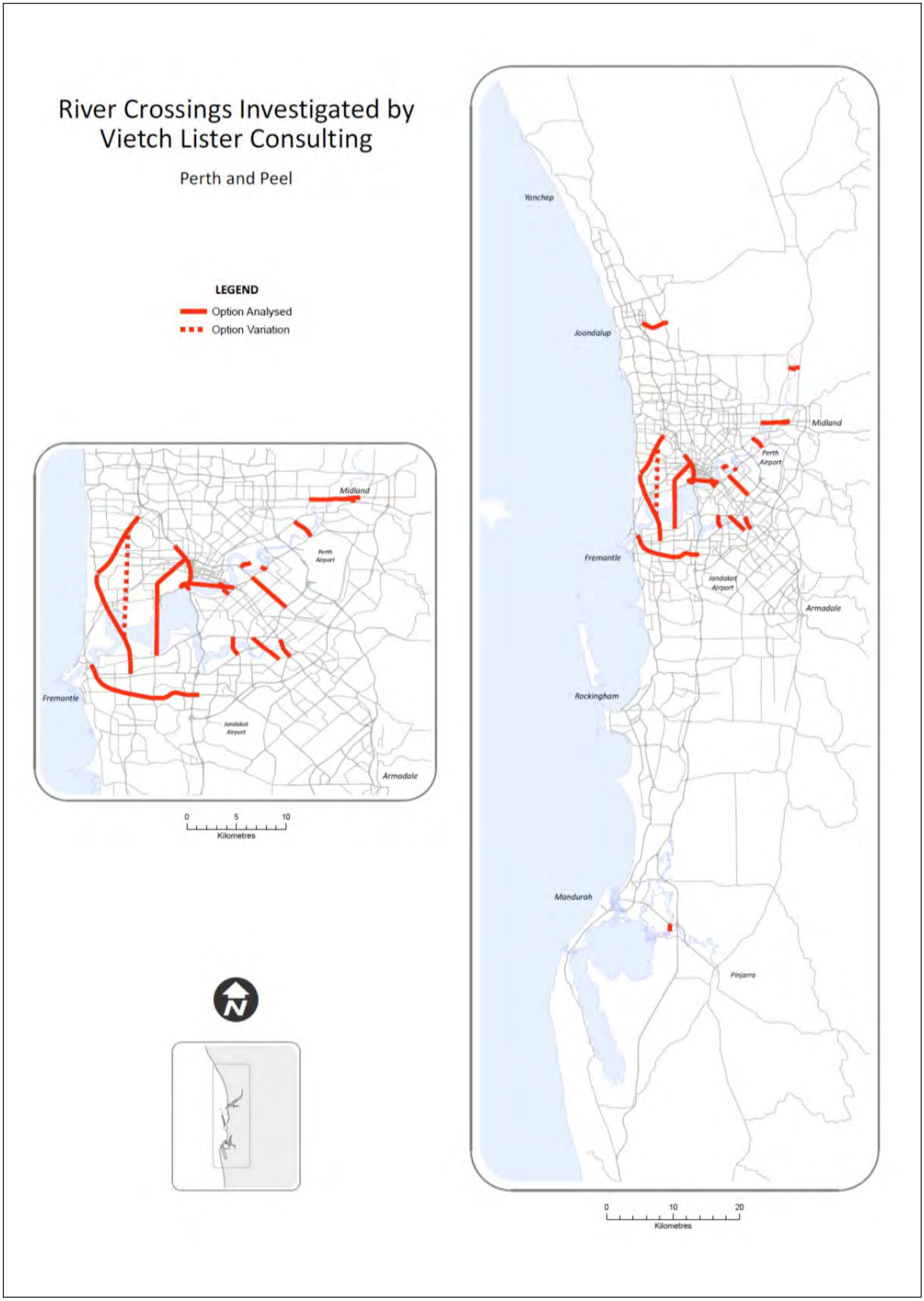


Figure 6.1 – River Crossings investigated by VLC

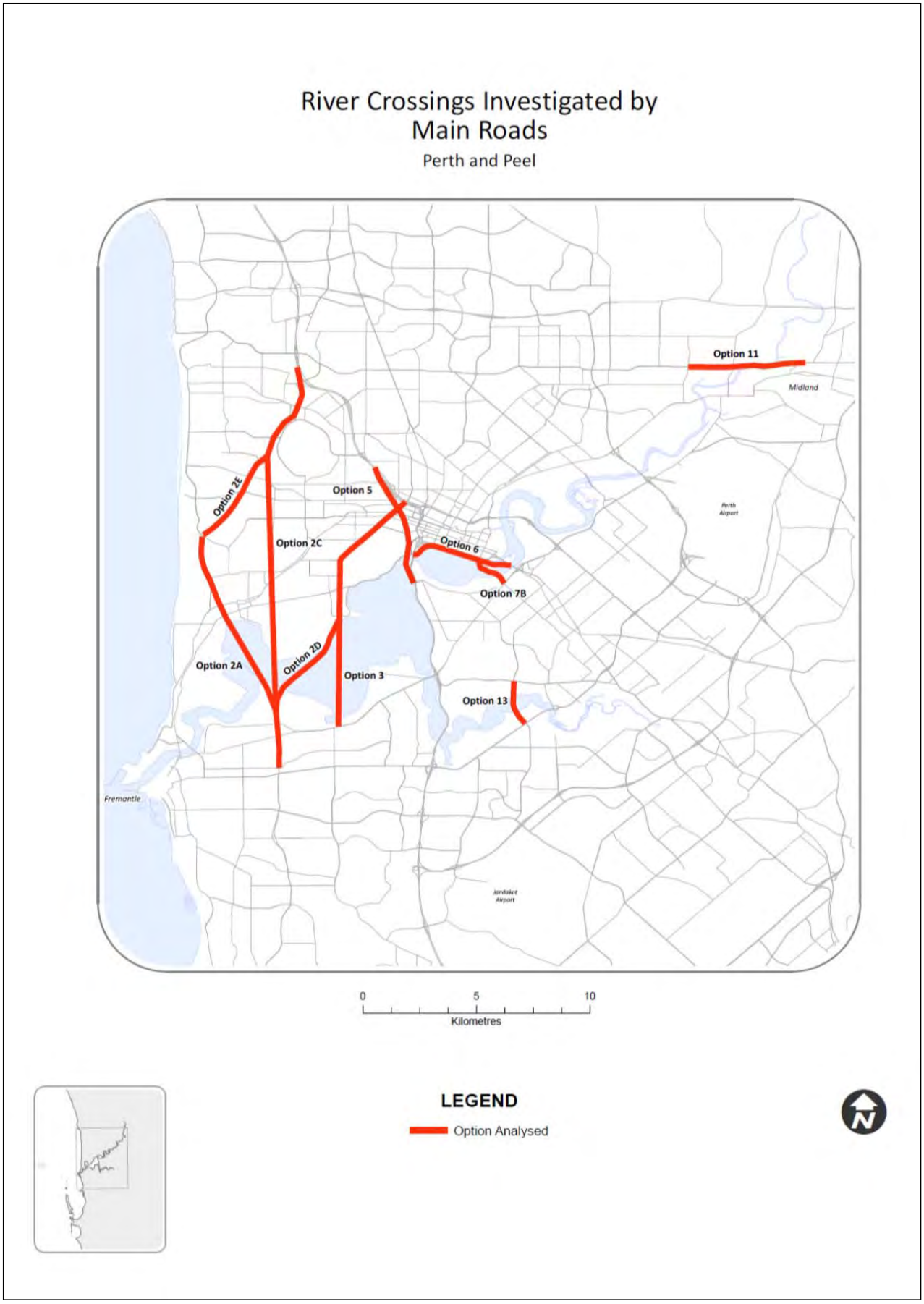


Figure 6.2 – River Crossings previously investigated by Main Roads

Options 2A, 2C, 2D, 5 (a CBD bypass connecting Kwinana Freeway south of the Narrows Bridge with Mitchell Freeway north of Vincent Street) and option 7 (a connection between Canning Highway at Berwick Street with Riverside Drive at Plain Street) were shortlisted for further investigation. This work assessed various northern termination points for Option 2C and investigated possible connection points with the existing road network, based on future 2031 demand. Option 5 was eliminated due to impacts on the heavily constrained freeway network at the proposed tie-in points.

6.3. River crossing options considered

River crossing options that were further investigated for *Transport @ 3.5 Million* using 2050 demand included Options 2A, 2C, 2D and 7. A river crossing between Belmont Park on the Burswood Peninsula and Mount Lawley, identified in district structure planning, was also considered.

6.3.1. Stock Road options

Option 2C

Option 2C entails an extension of Stock Road (the FRCAH) northwards from Leach Highway. South of the river an interchange is provided at Leach Highway with Stock Road entering tunnel in the vicinity of Marmion Street, and a connection is provided at Canning Highway with north-facing ramps. At the northern end, termination points at Stirling Highway, Brockway Road, Jon Sanders Drive / Stephenson Avenue and Mitchell Freeway were considered. North of the river connection points at Stirling Highway (south-facing ramps), Railway Road (south-facing ramps), Underwood Avenue and Stephenson Avenue / Jon Sanders Drive were assessed. While the river crossing could be in tunnel for its full length, the possibility of at-grade sections to enable staging was considered.

Option 2A

Option 2A has the same configuration as Option 2C at the southern end, proceeding northwest to tie in with West Coast Highway at Rochdale Road. Connections are provided at Canning Highway (north-facing ramps) and Stirling Highway (south-facing ramps).

Option 2D

Option 2D has the same configuration as Option 2C at the southern end, proceeding north east to tie in with Thomas Street north of Winthrop Avenue.

Option 2C/2D combination

This option combines options 2C and 2D, bifurcating at the Swan River northern bank in the vicinity of the Point Resolution Reserve, Dalkeith.

6.3.2. Canning Highway – Riverside Drive Bridge

This river crossing provides a connection between Canning Highway at Berwick Street with Riverside Drive at Plain Street.

6.3.3. Belmont Park – Mount Lawley Bridge

The WAPC-endorsed Burswood Peninsula District Structure Plan (March 2015) provides for a future local road connection between Belmont Park on the Burswood Peninsula and Mount Lawley over the Swan River. The connection, which lies north of the Windan Bridge, ties in with

Summers Street and enables local traffic to access the Burswood Peninsula via Summers Street and East Parade. This connection entails a new bridge over the Swan River.

6.4. Assessment of options

6.4.1. Stock Road options

High level transport and constraints assessments were undertaken to evaluate the Stock Road river crossing options against a range of criteria, identify fatal flaws and select preferred options. The criteria considered were:

- **Network characteristics:** traffic volume attracted, catchment area and centres served, the effectiveness in reducing volumes on the existing river crossings, the effectiveness in reducing volumes on constrained freeway sections, network connectivity, the ability of connecting side roads to manage increased demand and network resilience
- **Impacts:** property, environmental, heritage and engineering impacts
- **Engineering and economic aspects:** the required cross-section, the need to upgrade existing infrastructure, constructability, the ability for staging and cost
- **Community aspects:** political sensitivity and community acceptance.

The main outcomes of these assessments were as follows:

Network characteristics

The river crossings significantly improve access to work, shopping, education and recreation opportunities, carrying between 60,000 and 100,000 vehicles per day, and generating up to 65,000 additional cross-river trips. Option 2C with connections at Stephenson Avenue and Mitchell Freeway carries the highest volume while Option 2D which connects with Thomas Street carries the lowest volume.

The river crossing catchment area varies by option. South of the river, the main catchment area extends to Leach Highway. However, the area of influence extends well south, with up to 40% of traffic generated from south of South Street. North of the river the main catchment area extends to Thomas Street / Underwood Avenue. For options connecting with Stephenson Avenue and Mitchell Freeway, up to 20% of traffic is generated from Mitchell Freeway north of Stephenson Avenue.

The river crossings serve well as a Fremantle bypass, removing up to 20,000 vehicles per day from the Fremantle Traffic Bridge and Stirling Bridge. Traffic reduction on the Narrows Bridge is lower, with up to 15,000 vpd removed from this crossing point. Option 2A which links with West Coast Highway serves primarily as a Fremantle bypass, while Option 2C achieves the highest traffic reduction on the Narrows Bridge.

The river crossings do not significantly reduce traffic on Mitchell Freeway north of the Perth CBD.

Options that connect with Mitchell Freeway achieve the greatest network resilience.

Impacts

All river crossing options involve extensive infrastructure improvements and a degree of property impact. The extent of impact relates to the number of connection points and the surrounding land use.

Options that connect with Stirling Highway would have unacceptable land impacts and were eliminated. Connections at Canning Highway and Railway Road will impact on residential and commercial property, while a southern connection at Underwood Avenue will impact property held by the State.

Engineering and economic aspects

A 6-lane cross-section is required between Stock Road and the first connection point north of the river. For option 2C extending to Stephenson Avenue and Mitchell Freeway, a 6-lane cross-section is required to Stephenson Avenue / Jon Sanders Drive.

While the shorter options are cheaper, economies of scale are achieved for the longer options.

The combination of options 2C and 2D will not be feasible, with the link between the main alignment and Thomas Street carrying only 23,000 vpd.

6.4.2. Canning Highway – Riverside Drive Bridge

Transport and constraints assessments were undertaken to investigate the need for this river crossing and its influence on traffic in and around the CBD. The assessment considered the combination of this crossing with a proposed additional east-west CBD link, linking Riverside Drive with the Narrows interchange (see Section 7).

The river crossing substantially improves connectivity between the city and areas east of the river, carrying strong peak period movements into/out of the CBD from Berwick Street and Canning Highway (East Victoria Park and Kensington).

In combination with the proposed east-west CBD link, the crossing carries east-west movements between Albany Highway / Berwick Street / GEH (East Victoria Park, Kensington, Bentley, Redcliffe and Kewdale), and Mounts Bay Road (Subiaco, QEII, UWA and Nedlands) as well as the freeway north.

The river crossing significantly reduces volumes on the Causeway, improving transit operations across and at the approaches to the Causeway.

6.5. Preferred options

6.5.1. Stock Road river crossing

Option 2C linking Stock Road with Stephenson Avenue at Jon Sanders Drive, including an extension tying in with Mitchell Freeway south of Reid Highway, was selected as the preferred option, shown schematically in Figure 6.3. This option connects with the freeway network at both ends and facilitates good east-west distribution of trips north of the river with connections at Railway Road, Underwood Avenue and Pearson Street. Good access is provided to QEII via Railway Road and Aberdare Road. The connection with Mitchell Freeway to the north reduces volumes on Stephenson Avenue through the Stirling Regional Centre.

The section between Leach Highway and Pearson Street is 16.2km in length. While this entire section could be tunneled, an opportunity exists for an at-grade solution between Railway Road and Underwood Avenue, enabling staging.

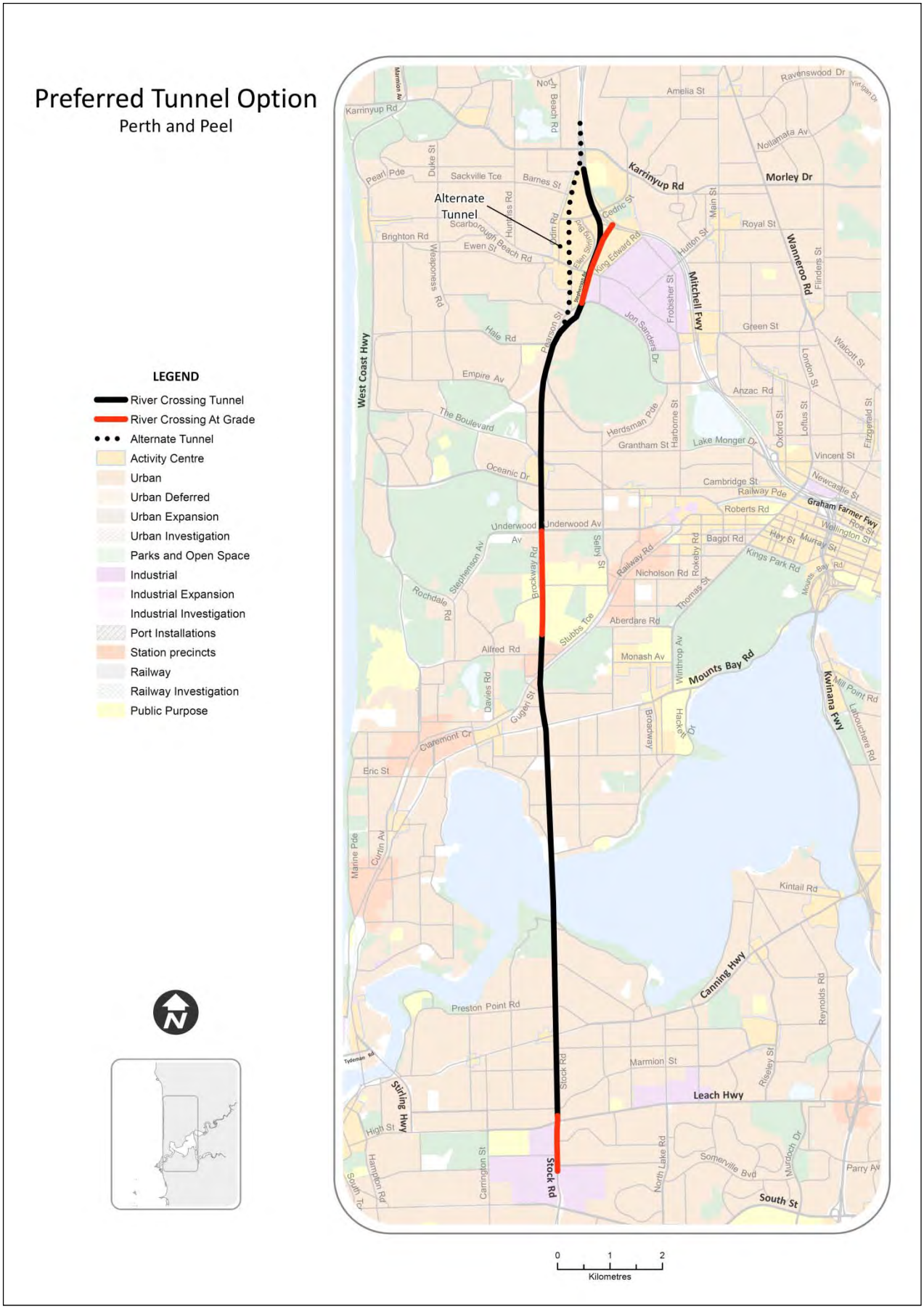


Figure 6.3 – Preferred River Crossing option

This option carries 100,000 vehicles per day (vpd) over the river, generating an additional 65,000 cross-river trips. Volumes north of Railway Road reduce to around 60,000 vpd, increasing to 90,000 vpd north of Underwood Avenue. The longer-term connection to Mitchell Freeway will carry in the order of 80,000 vpd.

Option 2C achieves a 20,000 vpd reduction on the Fremantle bridges and a 15,000 vpd reduction on the Narrows Bridge. Limited reduction in volume on Mitchell Freeway north of the Perth CBD is achieved.

The intersecting local roads will be capable of carrying the additional traffic demand. However, the Stephenson Avenue / Pearson Avenue and Stephenson Avenue / Scarborough Beach Road intersections may require modification.

Option 2C is likely to impact property at the Leach Highway, Canning Highway, Railway Road, Underwood Avenue and Jon Sanders Drive connection points.

6.5.2. Canning Highway – Riverside Drive bridge

The preferred network solution entails a combination of the Canning Highway – Riverside Drive bridge with a proposed additional east-west CBD link, linking Riverside Drive with the Narrows interchange. This is discussed further in Section 7.

6.5.3. Belmont Park to Mount Lawley bridge

The Belmont Park to Mount Lawley connection tying in with Summers Street will carry in the order of 15,000 vpd. A 2-lane local road will adequately service this demand. *Transport @ 3.5 Million* has also identified this as a potential river crossing point for cyclists. An opportunity exists to provide a green bridge that accommodates cyclists, pedestrians and local traffic.

7. PERTH CBD ACCESS

Access to and through the Perth CBD is provided by the freeway system and a network of arterial roads which connect with the city to the north, east and west. Transport modelling shows that peak period trips generated by employment growth in the CBD to 2050 will be served mainly by public transport, including improved rail and bus services, as well as LRT. However, the number of peak period vehicle trips into the CBD will increase by 2050, as will trips passing through and bypassing the CBD.

It is essential that the road networks serving the Perth CBD, which will remain Western Australia's administrative centre for business and government, continue to operate at acceptable levels of service during peak periods to support the State economy and city amenity.

7.1. North – south CBD movements

The Kwinana and Mitchell freeways provide access to the Perth CBD via the Narrows and Hamilton interchanges. This section of the freeway network also accommodates north-south local and regional through movements, which are in conflict with movements accessing the Perth CBD. In addition, the successive on- and off-ramps and associated weaving areas significantly reduce capacity and compromise operation of the freeway network through the CBD.

Critical congestion points in the southbound direction include the 2-lane section between the James Street off-ramp and GFF on-ramp, the merge and lane-drop at the GFF on-ramp, and the restricted weaving area between the Murray Street on-ramp and Mounts Bay Road off-ramp. Critical congestion points in the northbound direction include the merge and weave areas between the William Street on-ramp and Market Street off-ramp, and the 2-lane section between the GFF off-ramp and Wellington Street on-ramp. Without modification, the existing 2-lane sections for north-south movements through the interchange would operate well over capacity by 2050.

The operation of the Kwinana and Mitchell freeway network through the CBD will be improved through operational efficiency improvements and better management of traffic flow. Measures to achieve this include:

- The provision of an additional lane northbound and southbound through use of available shoulder space, providing for All-Lane Running
- Rationalising on- and off-ramps
- Ramp metering of the critical on-ramps to regulate flow through the CBD
- Speed control to maximize throughput.

A network of city arterials provide access to the city from the north, including Loftus Street, Charles Street, Fitzgerald Street, William Street, Beaufort Street, Lord Street and East Parade. Charles Street, Fitzgerald Street, William Street and Beaufort Street are designated public transport priority corridors. Future upgrading of these city arterials is focused on providing public transport priority measures such as dedicated bus / LRT lanes, and the scope for further upgrading to improve access by private car is very limited.

7.2. East – west CBD movements

The Graham Farmer Freeway (GFF) serves as the primary east-west link to the north of the CBD. The Northbridge Tunnel has been upgraded to its ultimate 6-lane cross-section and future upgrades to GFF are limited to the grade-separation of the East Parade on- and off-ramps. The Northbridge Tunnel will carry an estimated 130,000 vpd by 2050. Riverside Drive, which previously served as the primary east-west cross-city link on the southern side of the CBD, no

longer performs this function and much of this demand has redistributed to GFF. By 2050, the Swan River crossings east of the city will carry high volumes, carrying over 200,000 vpd on the Causeway (4 general traffic lanes) and Windan Bridge (6 general traffic lanes).

As the city grows and provides for an increase in public transport, pedestrian and cyclist trips, the internal east-west distribution network, which includes Wellington Street, Murray Street, Hay Street and St Georges Terrace / Kings Park Road, will have less capacity to service private car demand.

Modelling shows that the city will need an additional high-capacity east-west link by 2050. Various options were assessed to understand east-west city demand, including links between:

- Albany Highway east of GEH and Hay Street / Roberts Road west of Thomas Street
- Riverside Drive west of Plain Street and Stirling Highway east of Winthrop Avenue
- Riverside Drive west of Plain Street and Kings Park Road at Havelock Street
- Riverside Drive west of Plain Street and the Narrows Interchange
- Riverside Drive west of Victoria Avenue and the Narrows Interchange.

The Riverside Drive links included the Canning Highway – Riverside Drive bridge to provide a continuous route crossing the Perth CBD.

A high level transport assessment was undertaken to evaluate the east-west links, especially the extent to which these links would generate traffic into the CBD and their effectiveness as a CBD bypass. The assessment showed that an additional east-west CBD link combined with the Canning Highway – Riverside Drive bridge (or tunnel) generates an additional 900 vehicle trips into the CBD during the morning peak period, which is not significant. Cross-river demand increases by up to 10,000 vpd, as the link facilitates cross-city movement, improving access to work, shopping, education and recreation opportunities, which changes trip-making patterns. Demand across the CBD also increases. The link achieves a limited reduction in traffic on GFF and other east-west city arterials.

The link between Riverside Drive west of Plain Street and the Narrows Interchange (the east-west link), combined with the Canning Highway – Riverside Drive bridge (or tunnel), achieves the greatest network benefits. This combined network solution, shown in Figure 7.1, achieves the highest reduction in traffic on GFF, around 11,000 vpd. It also achieves limited traffic reduction on other east-west city arterials, including Wellington Street, Murray Street, Hay Street and St Georges Terrace / Kings Park Road, with volumes on these roads reducing by between 2,000 and 4,000 vpd. The east-west link will carry in the order of 50,000 vpd, significantly reducing volumes on Riverside Drive. This creates the opportunity to close Riverside Drive with remaining traffic using Terrace Road, enabling activation of the Perth waterfront.

This network solution substantially improves east-west connectivity for cross-city trips, with the east-west link carrying mainly longer distance cross-city trips. It carries traffic with origins/destinations east of the city (East Victoria Park, Kensington, Bentley, Redcliffe and Kewdale) to origins/destinations west of the city (Subiaco, QEII, UWA and Nedlands) as well as the freeway north. It also serves as a high-standard connection between East Perth and destinations west of the city due to connectivity with Plain Street at Riverside Drive.

The Canning Highway – Riverside Drive section improves connectivity to the CBD from suburbs east of the river, including East Victoria Park, Kensington and Bentley. Additional benefits include reducing volumes on the Causeway, and improving transit operations across and at the approaches to the Causeway.

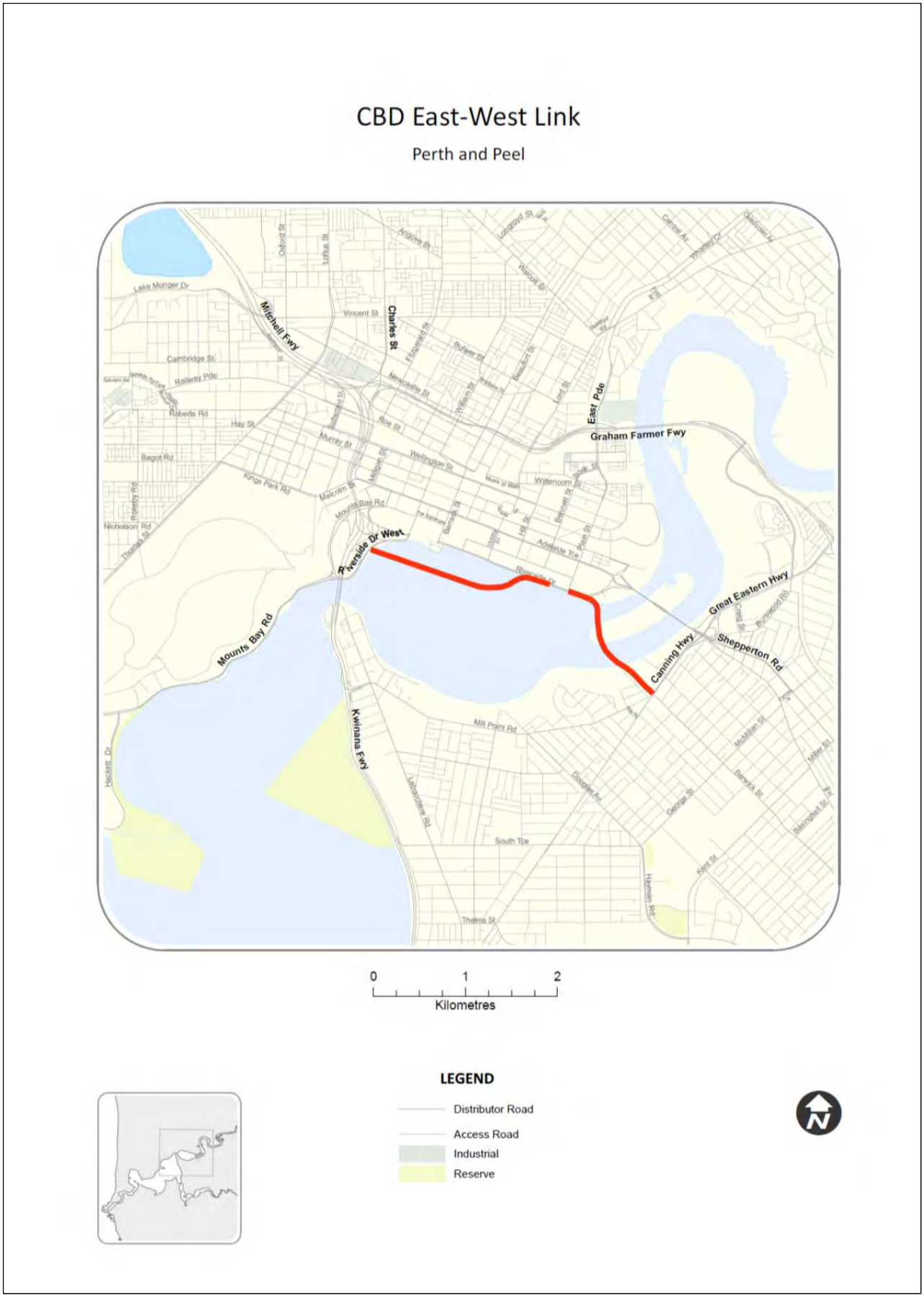


Figure 7.1 – CBD east-west links

8. PUBLIC TRANSPORT NETWORKS AND BUS PRIORITY

Transport @ 3.5 Million contains the proposed public transport networks for 2050 and beyond. The plan distinguishes between rapid transit (rail), semi-rapid transit which includes Bus Rapid Transit (BRT) and Light Rail (LRT), public transport priority corridors and street transit. The rapid and semi-rapid transit networks were defined through work undertaken by the Planning and Transport Research Centre (PATREC). This report considers the on-road semi-rapid transit network only.

8.1. Semi-rapid transit

Bus Rapid Transit

The Ellenbrook BRT, which includes dedicated transit infrastructure as well as new infrastructure for general traffic, will run on a two-lane continuous dedicated, grade separated bus transit way from Ellenbrook Town Centre to Marshall Road. It will include bus stations at Ellenbrook Town Centre, Gnangara Road and Marshall Road, with grade separations at Gnangara Road, Park Street and Youle-Dean Road. New Lord Street will be constructed between Reid Highway and Gnangara Road to improve the efficiency of local bus services, providing a link to the BRT. The BRT will be provided in two stages. The first stage includes construction of the BRT section and a single carriageway between Reid Highway and Gnangara Road. The second stage could include the upgrading of New Lord Street to dual-carriageway standard, an additional bus station at Youle-Dean Road and expansion of park and ride facilities.

Light Rail

The planned LRT network includes the following sections:

- LRT Stage 1: LRT line from UWA and QEII along Thomas Street, Kings Park Road and Hay Street through the CBD to the Causeway and Curtin University
- LRT Stage 2: extension of the line from Curtin University and to Canning Bridge.

BRT or LRT

A number of routes were identified that could be served by either BRT or LRT. These include:

- Murdoch Station to Fremantle and the Cockburn Coast
- Canning Bridge to Booragoon, via Riseley Street and Canning Highway, facilitating passenger transfers to the Stirling-Murdoch Orbital rail line
- Ellenbrook to Bassendean Station, Midland and the new East Wanneroo Rail link
- Glendalough Station to Scarborough Beach via Scarborough Beach Road.

These routes have been included as public transport priority corridors below.

8.2. Public transport corridors and bus priority measures

Transport @ 3.5 Million identifies a network of high priority and high frequency on-road public transport corridors. The high priority corridors will contain a range of bus priority measures, including partial bus priority such as signal priority and bus queue jump lanes, and full priority in the form of dedicated bus lanes. The on-road public transport network is shown in Figure 8.1. As passenger volumes increase and bus services are expanded to satisfy the demand, transit priority measures will be progressively implemented on high-volume routes in these corridors.

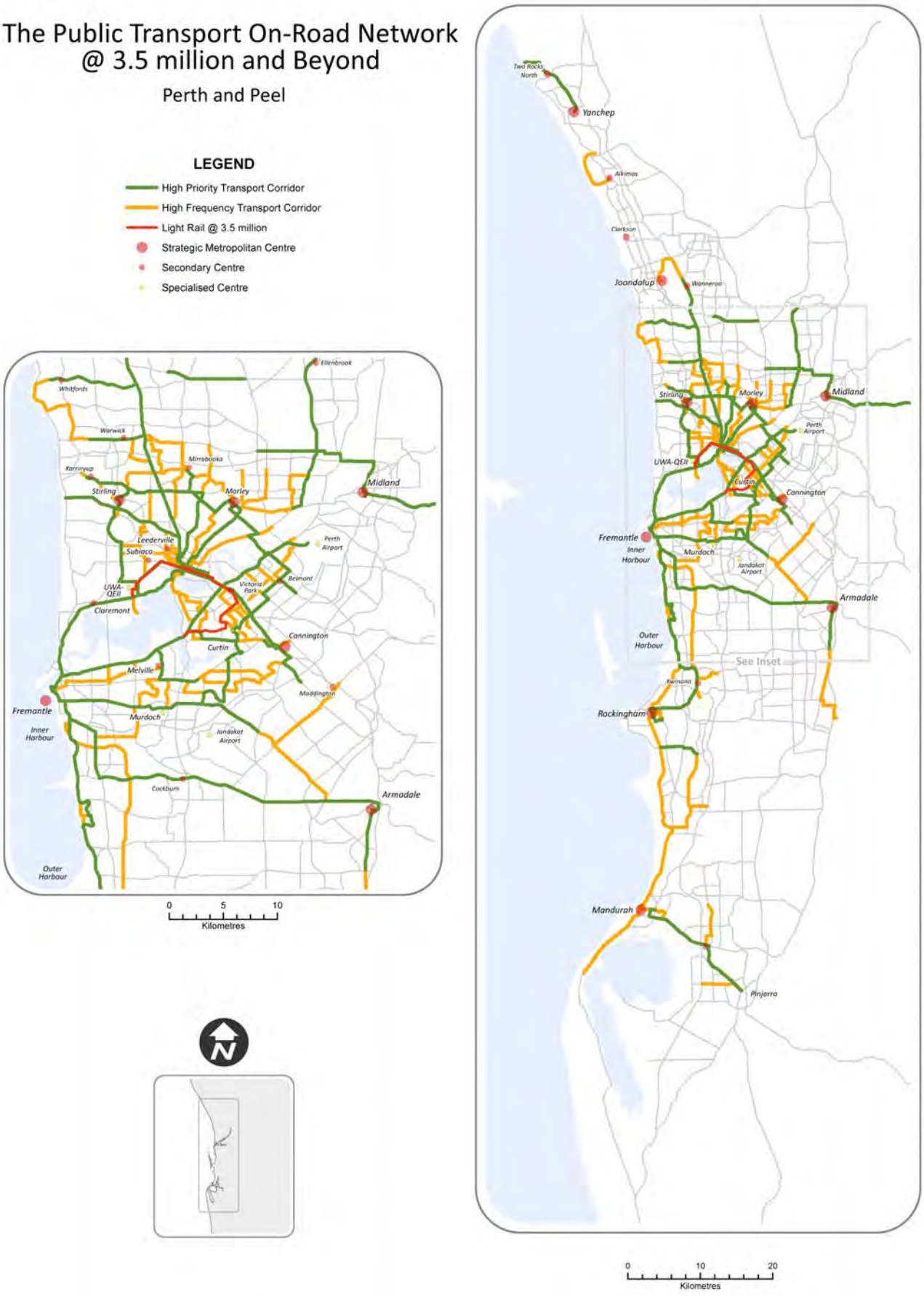


Figure 8.1 – Transit priority corridors and high volume sections

The need for bus priority measures on routes carrying high volume by 2051 was investigated and initial outcomes are discussed below by route section. Various green bridges, which cater exclusively for public and active transport modes, have been included in the public transport network.

Two Rocks transit way

A dedicated bus transit way is planned, linking the Yanchep metropolitan centre with the Two Rocks North secondary centre.

Ocean Reef Road / Gnangara Road

The section between Badjerup Road and Whiteman-Yanchep Highway will carry around 800 passengers per hour by 2050. The provision of bus queue jumps lanes to serve the future station requires further investigation.

Whitfords Avenue

Whitfords Avenue will carry high passenger volumes (around 1,000 passengers per hour by 2050) at the approaches to Whitfords Station. The possibility of implementing dedicated bus lanes on the station approaches requires further investigation. Implementing a lane for the western approach would require duplication of the bridge over Mitchell Freeway. For the section between Whitfords centre and Whitfords Station, bus queue-jump lanes at intersections would provide adequate priority.

Beach Road

Beach Road will carry very high passenger volumes (over 1,000 passengers per hour eastbound and westbound by 2050) on both approaches to Warwick Station. The implication of implementing dedicated bus lanes on the station approaches requires further investigation. Implementing a lane for the western approach would require widening of the bridge over Mitchell Freeway.

Cedric Street

The section of Cedric Street between the freeway and Karrinyup Rd / Morley Dr will carry very high passenger volumes (up to 2,000 passengers per hour by 2050). A westbound dedicated bus lane is planned for this section, including eastbound bus priority. Bus priority is also planned at the eastbound approaches to Ellen Stirling Boulevard.

Scarborough Beach Road

Dedicated bus lanes are planned for Scarborough Beach Road between Main Street east of the freeway and Hinderwell Street east of West Coast Highway, providing 4 lanes for general traffic with 2 bus lanes in the median for most of this section. Between Stephenson Avenue and Odin Road the existing 6 lanes for general traffic will be reduced to 4 lanes. Between St Brigids Terrace and Hinderwell Street the existing 4 lanes for general traffic will be reduced to 2 lanes.

Charles Street Bus Bridge and Charles Street

The Charles Street Bus Bridge project entails providing a continuous connection between the Wellington Street Bus Station and Charles Street and includes construction of 500m of new bus lane as well as the Roe Street off-ramp to replace the James Street off-ramp. The section of Charles Street between the bus bridge and Green Street will carry high volumes (close to 1,000 passengers per hour in the peak direction by 2050). A southbound dedicated bus lane is planned for Charles Street from Scarborough Beach Road, linking with the bus bridge. The

opportunity for southbound priority at the Wiluna and Green Street intersections requires further investigation.

Beaufort Street

The opportunity to convert an existing traffic lane to a dedicated bus lane between Grand Promenade and Russell Street requires further investigation.

Stirling Highway

Bus queue jump lanes are planned at 13 intersections between Broadway at UWA and Alfred Road in Fremantle.

Great Eastern Highway

Great Eastern Highway between Bellevue Station and Sawyers Valley will carry high passenger volumes, increasing to the west. The opportunity for bus queue jump lanes at intersections, as well as the access for Bellevue Station, requires further investigation.

Canning Highway

Recent planning allows for dedicated bus lanes along Canning Highway between Riseley Street and Canning Bridge. While dedicated bus lanes are planned along Canning Highway between the freeway and the Causeway, future 2050 passenger volumes suggest these lanes will not be required.

Mounts Bay Road

Passenger demand on Mounts Bay Road will be significantly reduced once the proposed Murdoch to Stirling Orbital rail line is provided. However, in the interim passenger demand between UWA and the Wellington Street Bus Station will remain high. A bus queue jump lane for the westbound movement at Hackett Drive has been constructed.

South Street

The section of South Street between Roe Highway and Kwinana Freeway will carry well over 1,000 passengers per hour in the peak direction by 2050. The peak period reserved bus lanes will adequately accommodate this demand. The section west of Discovery Way will carry in the order of 800 passengers per hour. Planning allows for dedicated bus lanes west of Discovery Way to Hampton Road in Fremantle, including 4 lanes for general traffic. This implies converting lengths of existing general traffic lanes into bus lanes, which is reliant on Roe Highway extension reducing demand. The reservation west of the former Fremantle Eastern Bypass is constrained and achieving the required cross-section will impact heritage buildings.

Ranford Road

The section of Ranford Road between Roe Highway and Nicholson Road will carry high passenger volumes (over 1,000 passengers per hour on sections by 2050). This road section will also carry high traffic volumes, requiring a 6-lane cross-section by 2050. Planning allows for 4 general traffic lanes and 2 dedicated bus lanes.

Armadale Road / Beeliar Drive / North Lake Road

The section of Armadale Road between the freeway and Tapper Road will carry over 1,000 passengers per hour by 2050 and the opportunity to provide dedicated bus lanes requires further investigation. Recent planning allows for grade separation at Solomon and Tapper

Roads with free-flowing through-lanes and adjacent collector-distributor lanes carrying turning traffic. East of Tapper Road traffic and passenger volumes are lower and the 6-lane cross-section will provide adequate capacity for general traffic and buses without the need for transit priority.

South Western Highway

Notwithstanding the extension of the Armadale rail line to Byford, the section of South Western Highway between Armadale Road and Mundijong Road will carry high passenger volumes by 2050. However, adequate road capacity is provided for general traffic and buses without the need for transit priority.

Safety Bay Road

The section between Warnbro South Avenue and Nairn Drive will carry close to 1,000 passengers per hour by 2050. The opportunity for bus queue jump lanes requires further investigation.

Pinjarra Road

Pinjarra Road carries very high passenger volumes between Pinjarra, Ravenswood, Mandurah Forum and Mandurah Station. Planning allows for 4 general traffic lanes and 2 dedicated bus lanes.

8.3. Street transit

Street transit prioritises accessibility over speed, providing a low speed service with high coverage. Stops are closely spaced and buses run in general traffic lanes. Street transit is therefore not suited to longer distance travel. Many suburban bus services in Perth provide this type of service. The street transit network, which runs predominantly on the local street network, is not dealt with in this plan.

9. CYCLE NETWORK

A 2050 cycle network covering the Perth and Peel regions was prepared for *Transport @ 3.5 Million*. This network of interconnected Principal Shared Paths (PSPs), strategic routes, local routes and Recreational Shared Paths (RSPs) aims to provide high quality links between Perth's various universities, schools, train stations, activity centres and tourist destinations. The network includes a number of new routes to make cycling attractive for many journeys, including coastal routes and river crossings. Further detail is available in the *Cycling Network Plan*.

10.ROAD NETWORK ASSESSMENT

An iterative assessment process was undertaken to develop a 2050 road network that achieved defined KPIs, informed by the key network principles. The assessment was based on the outputs provided by the ROM24 and STEM transport demand models.

The assessment took into account the primary function of the route, distinguishing between commuter routes, major and strategic freight routes, high frequency on-road public transport routes, and routes fulfilling a specific function such as High Wide Load routes and the National Land Transport Network.

10.1. Key Performance Indicators

Key Performance Indicators (KPIs) relate to the efficiency, reliability and safety of the road network. KPIs may be defined at network, route and link levels. At a network level typical KPIs include mode share, network Vehicle Kilometres Travelled (VKT), network Vehicle Hours Travelled (VHT), vehicle operating and time costs, network crash costs and environmental externalities. At a route level typical KPIs include journey time reliability, travel speed, route efficiency and route productivity. At a link level typical KPIs include volume/capacity ratio, Level of Service, travel speed and travel time.

Through the Congestion Management Program, Main Roads currently monitors the following peak performance indicators for the freeway network:

- Throughput of vehicles: flow in vehicles per hour and vehicles per lane per hour
- VKT
- Travel speed (average km/h)
- Reliability % - consistency of travel time. The freeway is reliable if travel time is maintained within 20% of expected / average travel time. Journey time reliability is a key measure of smooth traffic flow and relates to reaching the destination in a consistent journey time. The value of travel time reliability is estimated from the reduced travel time variability and associated buffer time that travelers have allowed before making trips. Reliability is therefore a function of congestion in the network
- Efficiency % - variation from posted speed limit. The freeway is efficient if vehicles are able to travel within 20% of the speed limit
- Productivity % - speed and flow. The freeway is productive when the optimum traffic flow (throughput) is at or near theoretical capacity and speed is maintained within 80% of the speed limit.

Road network assessment was undertaken at a network and link level, informed by ROM24 and STEM model outputs. The models provided the outputs shown in Table 10.1 which were available to assess the performance of the road network. These KPIs may be further grouped into six main categories including: Accessibility, Mobility, Economic Development, Quality of Life, Safety and Operational Efficiency.

The network KPIs listed above were used to guide the development of an integrated transport network.

Table 10.1 – Key Performance Indicators from modelling

Level	Key Performance Indicator	Category
Network	Mode share	Accessibility, Environmental Conservation, Operational Efficiency
	Average vehicle occupancy	Operational Efficiency
	VKT	Operational Efficiency, Economic Development
	VHT	Operational Efficiency, Economic Development
	Vehicle operating costs	Operational Efficiency, Economic Development , Environmental Conservation
	Time costs	Operational Efficiency, Economic Development
	Network crash costs	Economic Development, Safety
	Vehicle emissions	Environmental Conservation, Quality of Life
	Lane-kilometres	Mobility, Operational Efficiency
Route	Average travel time	Accessibility, Mobility, Operational Efficiency
Link	Volume / capacity ratio	Mobility, Operational Efficiency
	Level of service (derived)	Mobility, Operational Efficiency

10.2. Road network assessment

At a network level, key parameters included mode share, Vehicle Kilometres Travelled (VKT) and Vehicle Hours Travelled (VHT). Additional outputs included vehicle operating and time costs, accident costs and vehicle emissions. The relationship between lane kilometres by road type and average travel times was investigated to ensure that reasonable network outcomes were being achieved. The network parameters were reviewed to guide the development of a balanced, integrated transport network.

The operation of road links and intersections during the AM and PM peaks was assessed, network deficiencies and hot spots identified and network improvements identified so that the defined KPIs were achieved, where possible. The assessment took into account the primary function of the route, distinguishing between commuter routes, strategic and major freight routes, high frequency on-road public transport routes, and routes fulfilling a specific function such as High Wide Load routes and the National Land Transport Network.

The relationship between the modelled 2050 one-hour and two-hour peak volumes in ROM24 was investigated. On average, the two-hour peak (50% of the 7 to 9 am volume, or the 4 to 6 pm volume) is equivalent to around 95% of the highest one-hour peak and was used for the road network assessment. The two-hour directional peak typically accounts for between 7% and 9% of the total directional daily volume, and was deemed appropriate considering future peak spreading.

The volume / capacity ratio (v/c ratio) was used to assess the performance of road links. It is appropriate to set v/c ratio targets based on the function of the route, with freight routes justifying better operating conditions. The following benchmarks were set:

- For the freeway network, a target v/c ratio of 1.0 (transition between LOS E and F) should be achieved
- For strategic freight routes, High Wide Load routes and the National Land Transport Network, a target v/c ratio of between 0.85 and 1.0 should be achieved, preferably 0.85 (typically limit of LOS D)
- For high frequency bus routes (> 1,000 passengers per hour) running along divided or undivided urban arterials with bus priority (not dedicated facilities), a target v/c ratio of between 0.85 and 1.0 should be achieved, preferably 0.85 (typically limit of LOS D).

The ROM24 link capacities shown in Table 10.2 were used for assessment.

Table 10.2 – Link capacities

Link type	Typical speed km/h	Link capacity / hr / lane
Freeway	100	1,700
Ramp	80	1,500
Expressway	80	1,500
Divided arterial	70	1,400
Undivided arterial	60	1,200
Residential	50	600
Managed freeway	100	1,870

The performance of individual intersections was not assessed. Intersections were ranked in terms of entering volumes, with intersections recording a total entering volume above 70,000 vehicles per day potentially requiring future grade separation. Another quick benchmark (the product of the intersecting flows exceeding 800 million) was also applied to identify intersections that may require future grade separation.

The ROM24 and STEM model outputs enabled a network-level assessment which was adequate to define the broader regional road network requirements across the metropolitan area. It is noted that more detailed assessment using mesoscopic and/or microsimulation modelling would be required to accurately confirm infrastructure requirements for various inner metropolitan routes and more complex infrastructure such as new river crossing network interface nodes. The inner metropolitan routes are constrained by intensive development, carry high volumes, accommodate high quality public transport services and require challenging and innovative design solutions. The river crossing network interface nodes require detailed assessment due to concentration of traffic at these nodes and associated design requirements. It is expected that more detailed assessment will be the subject of further studies.

10.3. Performance of the 2050 network

A comparison of the network level KPIs for the 2011 and 2050 networks is provided in Table 10.3.

Table 10.3 – Network level KPIs

KPI	2011	2050	Change
Population	1.8 million	3.5 million	99 %
PT mode share	5.6 %	11 %	89 %
Car driver mode share	56.9 %	50.3 %	- 11 %
VKT total	51.6 million	104.6 million	103 %
VKT car driver	32.9 million	66.5 million	102 %
VKT car driver/capita	17.9 km	18.3 km	2 %
VHT total	1.1 million	2.09 million	90 %
VHT car driver	0.73 million	1.37 million	88 %
VHT car driver/capita	0.40 hrs	0.38 hrs	- 6 %
Car driver trip length	9.1 km	10.4 km	14 %
PT trip length	13.6 km	20.1 km	48 %

At a network level, the modeling assumes that a public transport mode share of 11% would be achieved by 2050, a significant increase from the current share which is around 6%. Concurrently, the car driver mode share decreases to around 50% from current levels of around 57%..

Based on STEM outputs, total vehicle kilometres travelled (VKT) on the network increases from around 52 million during 2011 to around 105 million by 2050.

The car driver VKT increases from 32.9 million to around 66.5 million, or a 102% increase. A more illustrative road network evaluation criterion is the car driver VKT per capita, which increases by 2% from 17.9 km to 18.3 km by 2050. This is related to the average car driver trip length, which also increases from 9.1 km in 2011 to 10.4 km by 2051, or a 14% increase. The preferred land use and transport network outcome would see a reduction in the car driver VKT per capita and average trip length.

However, car driver VHT per capita decreases by 6%, notwithstanding an increase in VKT per capita and average trip length. This suggests that car drivers are able to travel more quickly from their origins to their destinations, which is a good network outcome.

The average public transport trip length also increases from 13.6 km in 2011 to 20.1 km by 2050, or a 48 % increase.

The performance of the 2050 network is shown in terms of v/c ratio for the AM peak in Figure 10.1 and for the PM peak in Figure 10.2. Notwithstanding extensive upgrading, the increased traffic demand in Perth and Peel by 2050 will continue to place pressure on sections of the road network.

Freeway network

Kwinana and Mitchell Freeways between Roe and Reid Highways carry the highest volumes and sections will operate over capacity, with v/c ratios ranging between 1.0 and 1.2. Volumes on the Kwinana and Mitchell Freeways beyond the Reid / Roe inner ring generally decrease away from the Perth CBD, and the current reservations and ability to implement All-Lane Running will allow upgrading to achieve v/c ratios below 1.

Without modification, the freeway network passing through and providing access to the Perth CBD will operate over capacity during peak periods. As stated previously critical congestion points include lane-drop, merging and weaving sections. The existing 2-lane sections for north-south movements through the interchanges will be modified to mitigate congestion in this area.

Strategic freight network

Most of the freeway network performing a strategic freight function will operate acceptably by 2050. The current reservations for Perth-Darwin National Highway, Reid Highway, Roe Highway, Tonkin Highway and the FRCAH will allow upgrading to achieve v/c ratios below 1. An improved v/c ratio of 0.85 can generally be achieved by implementing All-Lane Running. The arterial freight routes serving the Western Trade Coast (Rowley Road, Anketell Road and Mundijong Road) carry much lower volumes than the freeway network and will operate at good levels of service by 2050.

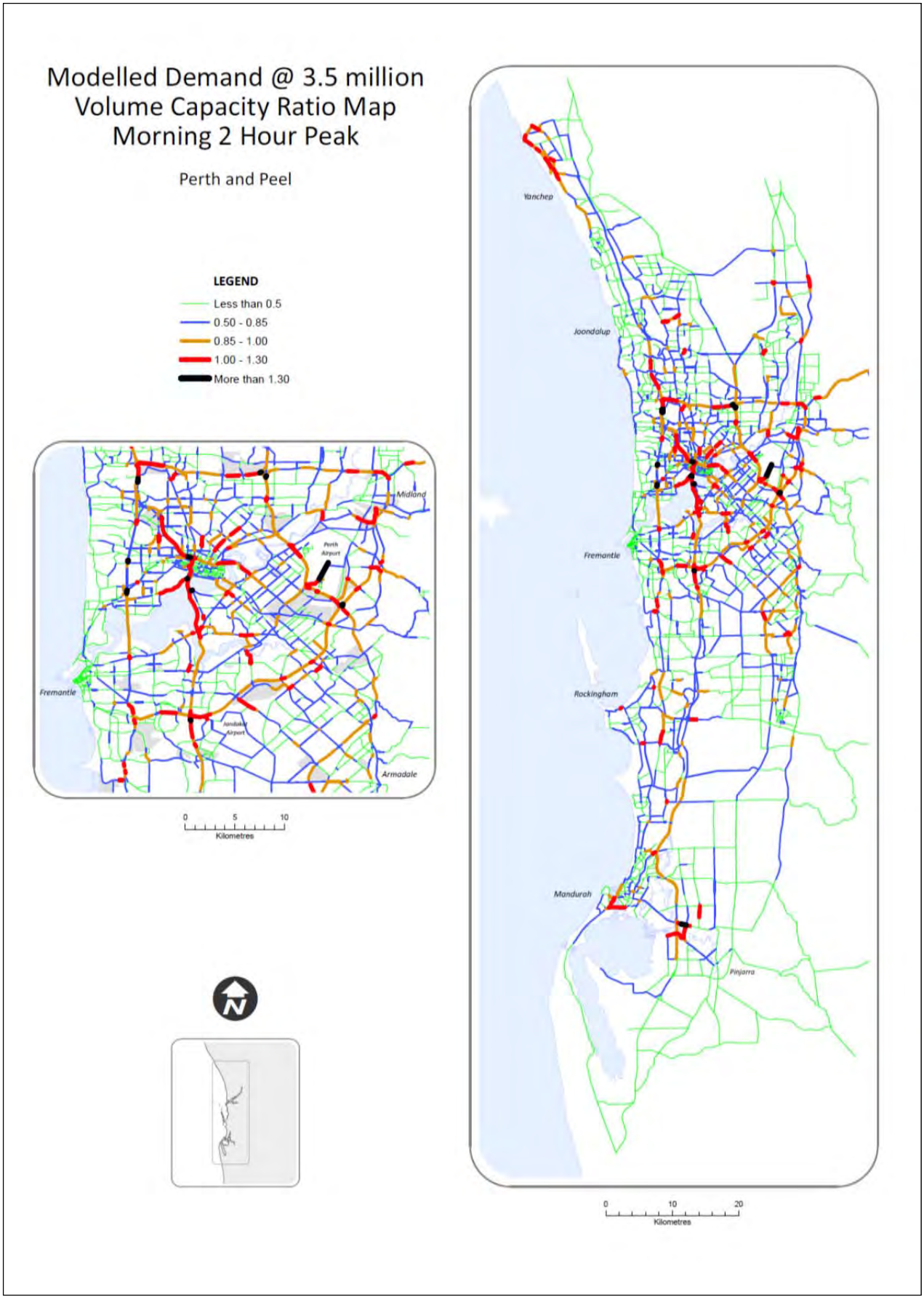


Figure 10.1 – 2050 AM peak network performance in terms of v/c ratio

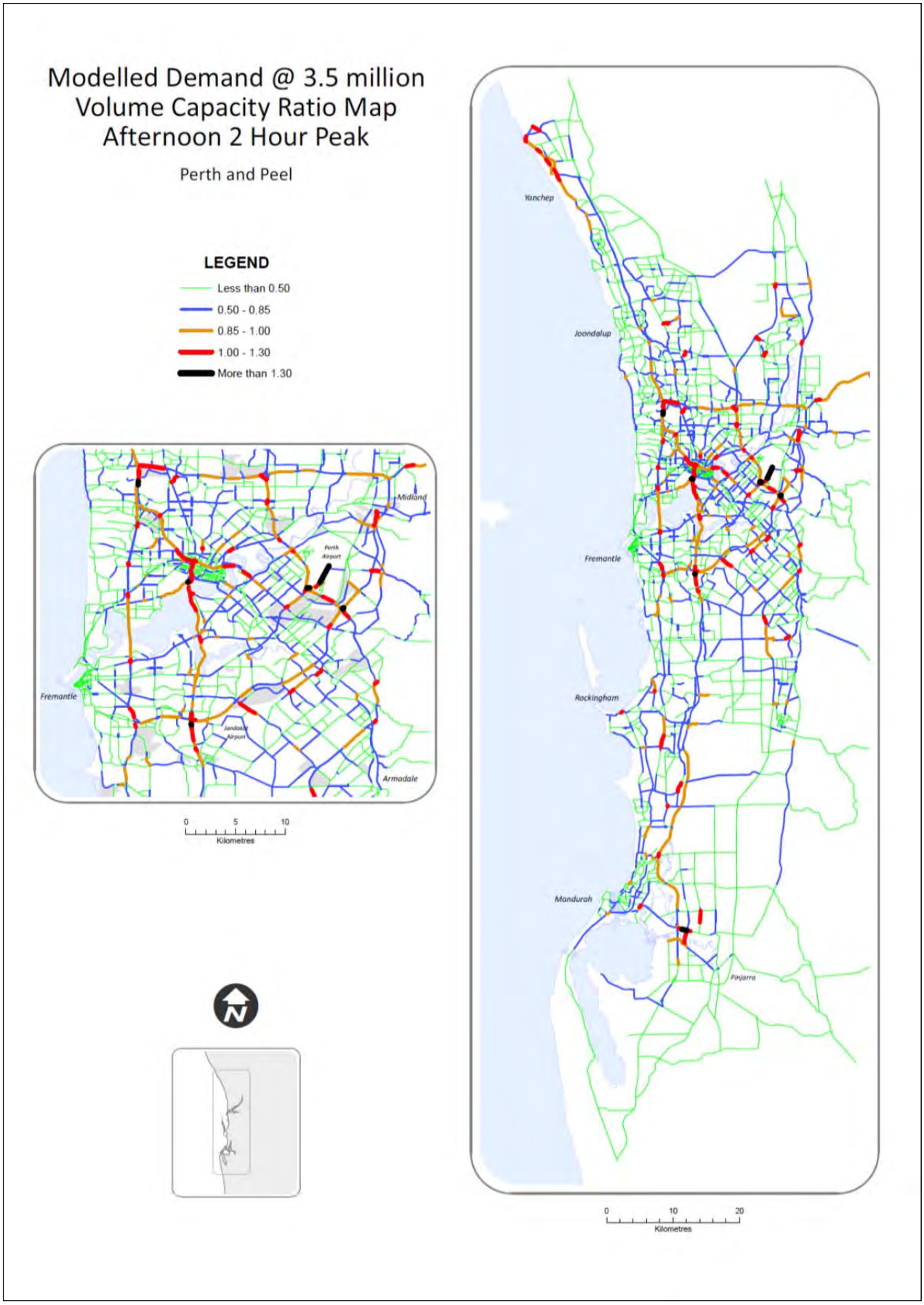


Figure 10.2 – 2050 PM peak network performance in terms of v/c ratio

Arterial road network

Figure 10.1 shows that the arterial road network will mostly operate at acceptable levels of service by 2050. However, the v/c ratio assessment generally relates to the operation of road sections at mid-block and does not adequately account for delay experienced at signalised and unsignalised intersections. Intersections that will carry entering volumes between 50,000 and 70,000 vehicles per day, and above 70,000 vehicles per day, are shown in Figure 10.3. This is subject to review as modeling is refined over time.

Selected arterial roads that will most likely face constraints include:

- Marmion Avenue between Alkimos and Yanchep (lane capacity unless upgraded to 6-lane divided and intersection capacity)
- Sections of Ocean Reef Road (intersection constraints) between Mitchell Freeway and Gnangara Road
- Sections of Wanneroo Road, Karrinyup Road and Morely Drive (intersection constraints)
- Orrong Road (intersection constraints) between Great Eastern Highway and Roe Highway
- Great Eastern Highway (intersection constraints) between the Causeway and Tonkin Highway
- Sections of Canning Highway between the Causeway and Kwinana Freeway
- Sections of Leach Highway between Manning Road and Stock Road (intersection constraints)
- Albany Highway (intersection constraints) between Great Eastern Highway and Kelvin Road
- Ranford Road (intersection constraints) between Roe Highway and Southern River Road
- Sections of Armadale and Nicholson Roads
- Sections of Mandurah and Pinjarra Roads (intersection constraints)
- The access road to the Perth Airport terminals (Leach Highway extension), which will require upgrading from a 4-lane divided standard to 6-lane standard to provide adequate capacity.

Dedicated bus lanes and/or bus priority measures at intersections will be introduced on selected arterials, as discussed in Section 8. Dedicated bus lanes are planned for implementation on sections of Scarborough Beach Road, Cedric Street, Charles Street, Canning Highway, South Street, Ranford Road and Pinjarra Road. These roads, besides Ranford Road, will perform at acceptable levels of service, but further assessment of intersection performance is required. The section of Ranford Road between Roe Highway and Nicholson Road carries high general traffic and bus volumes during peak periods.

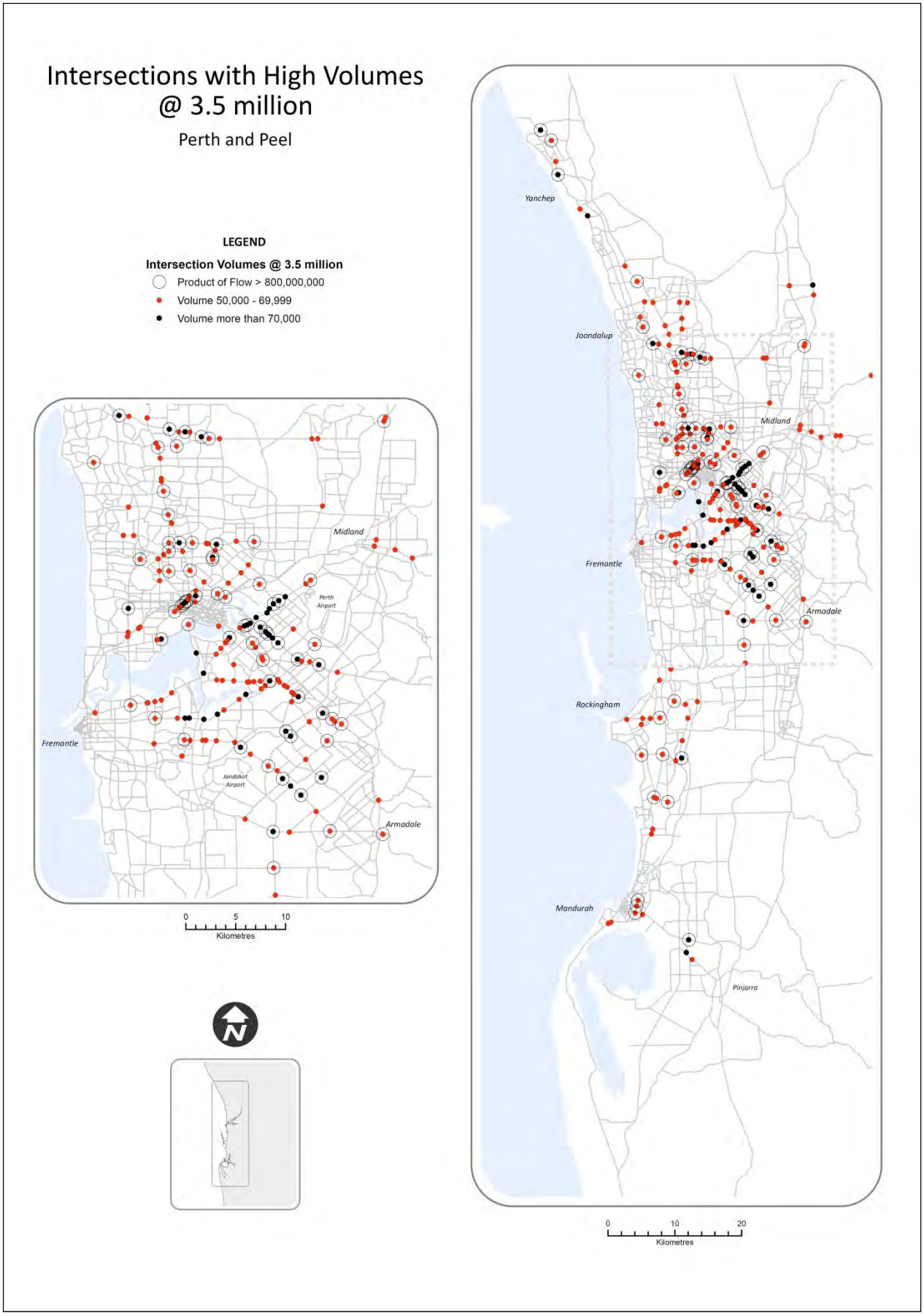


Figure 10.3 – Intersections carrying high volumes by 2050

11.FURTHER WORK

The *Road Network Plan* provides a high-level assessment of road network requirements to 2050 based on modeling work undertaken using the ROM24 and STEM strategic demand models. Further work will be required to refine the ROM24 model and undertake more detailed transport assessment. Where necessary, existing ultimate planning design concepts and associated reservations will have to be reviewed and updated to reflect the Road Network Plan requirements for 2050. New planning design concepts will have to be prepared for new road links. Design and engineering feasibility work will be required for proposed major transport infrastructure.

11.1. Transport assessment

Transport assessment for the Road Network Plan was undertaken at a link level, considering peak hour volume versus link capacity. Intersections carrying high demand were identified but not assessed in detail. More detailed transport assessment will be required to inform the preparation of ultimate planning design concepts for specific road sections. Transport assessment will be required to develop solutions for the freeway network in constrained environments, especially through the Perth CBD and along sections requiring All-Lane Running. This will include assessment of merging/diverging and weaving sections to identify the need for collector-distributor systems, and detailed assessment of freeway on and off-ramp requirements and potential rationalisation of access points.

Intersections carrying high volume by 2050 will require further investigation to confirm the need for grade separation and the required interchange configurations.

11.2. Planning

Detailed planning studies will be required to review and update current ultimate planning design concepts and associated reservations, and to prepare new concepts where none exist.

This planning work will be undertaken by Main Roads and the Department of Planning for the PRR and ORR. Proposed upgrading of certain local road sections has also been identified. Consultation with local government will be required to initiate this work.

11.3. Engineering Design and Feasibility

The Road Network Plan identifies a number of major transport infrastructure improvements, including the Stock Road to Mitchell Freeway river crossing and the east-west CBD link. Engineering design and feasibility will have to be undertaken for these proposals. This work will include further traffic and constraints assessment, tunneling and geotechnical investigations, constructability assessment, engineering design and economic assessment.

11.4. Review of PRR and ORR

Main Roads is currently reviewing the framework for the administrative classification of roads, in association with the WA Local Government Association and local government representatives. This project will identify ORR and local roads that should be classified as PRR, as well as PRR that should be de-proclaimed.

12.REFERENCES

ABS Catalogue 3218.0, Regional Population Growth, Australia, 2011

Bureau of Infrastructure, Transport and Regional Economics (BITRE), April 2016, *Information Sheet 74: Traffic and congestion cost trends for Australian capital cities*

Department of the Premier and Cabinet, December 2015, *Perth and Peel Green Growth Plan for 3.5 million, Strategic Assessment of the Perth and Peel Regions, Draft Action Plan C: Infrastructure*

Department of Transport, July 2011, *Public Transport for Perth in 2031 (Draft for Comment)*

Department of Transport, 2015, *Perth Freight Transport Network Plan (Draft)*

Department of Transport, March 2014, *Western Australian Bicycle Network Plan 2014-2031*

Department of Transport, March 2016, *Travel Demand Management Plan, Perth and Peel @ 3.5 Million and Beyond*

Fremantle Ports, November 2014, *North Quay Truck Survey 2014*

Infrastructure Australia, April 2015, *Australian Infrastructure Audit – Our Infrastructure Challenges, Volume 1 (p83)*

Main Roads Western Australia, June 2016, *Road Trauma Risk Analysis*

Western Australian Planning Commission, March 2015, *Burswood Peninsula District Structure Plan*

Western Australian Planning Commission, May 2015, *Perth and Peel @ 3.5 Million (Draft)*

Western Australian Planning Commission, May 2015, *North-West Sub-regional Planning Framework (Draft)*

Western Australian Planning Commission, May 2015, *North-East Sub-regional Planning Framework (Draft)*

Western Australian Planning Commission, May 2015, *Central Sub-regional Planning Framework (Draft)*

Western Australian Planning Commission, May 2015, *South Metropolitan Peel Sub-regional Planning Framework (Draft)*

WSP Parsons Brinckerhoff, March 2016, *Perth and Peel at 3.5million and Beyond Bike Network*

Department of Transport
Public Transport Authority

mainroads
WESTERN AUSTRALIA

Travel Demand Management Plan

Transport @ 3.5 Million

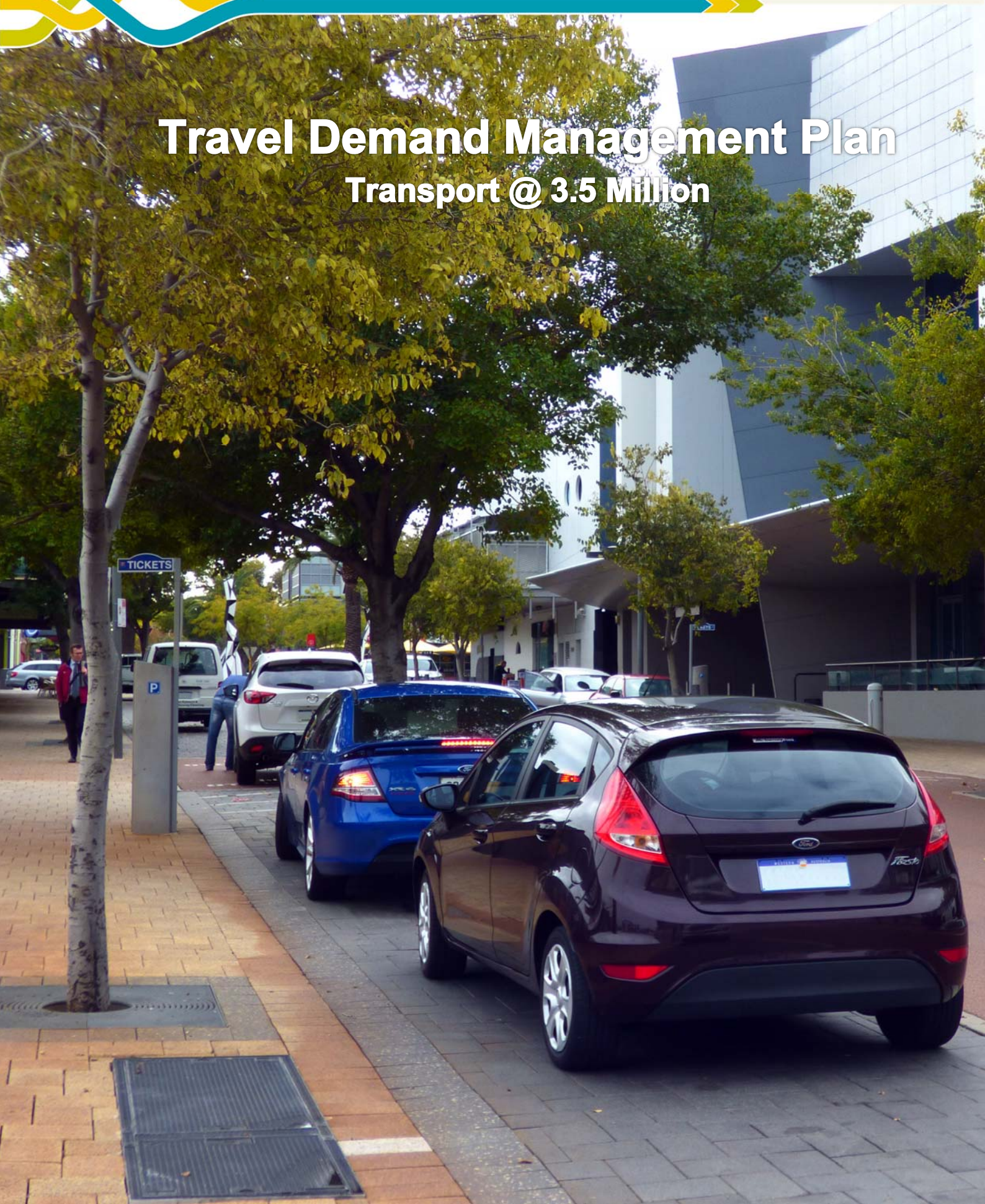


Table of Contents

Executive Summary

This plan has been produced as part of the *Transport @ 3.5 million* project. It identifies key travel demand management (TDM) measures and initiatives that will be effective in the Perth and Peel region as it heads towards a population of 3.5 million.

TDM includes initiatives that improve transport outcomes, such as congestion mitigation, more efficient use of infrastructure and a more reliable transport system, without the need to provide significant additional road or public transport infrastructure or services. TDM can delay or defer the need to provide costly infrastructure upgrades and extensions and offer solutions when there is limited capacity to expand existing networks.

Improvements to transport systems' efficiency and reliability can be achieved through managing supply or demand. Supply-side measures typically refer to delivery of road and public transport infrastructure, which often require large capital outlays. The role of TDM in a sustainable transport system is to deliver substantial social, economic and environmental benefits including:

- reduction of congestion cost and growth
- efficient use of existing transport infrastructure and services
- reduction or deferral of transport infrastructure investment
- improved accessibility for the transport disadvantaged
- increased physical activity and public health
- improved liveability and amenity
- road safety benefits including reduced personal trauma, injuries and other costs
- improved air quality and reduced emissions.

Following an extensive literature review and a workshop with local, national and international TDM experts, a number of measures were identified as the most likely to succeed in Perth in terms of transport, cost, economic and social effects. Further detailed appraisal of these measures included an independent assessment of likely transport outcomes as well as projected economic, social and environment benefits of specific applications in Perth.

The plan identifies six key TDM measures for implementation in Perth at a population of 2.7 million and 3.5 million. These measures and their future application in Perth are described below.

Travel demand management measures for Perth @ 2.7m and 3.5m

Travel plans for new developments

Travel plans are a package of actions to encourage safe, healthy and sustainable travel options for specific organisations or sites such as large medical centres, shopping centres, large residential developments and universities. Their purpose is to plan actions that are relevant, feasible and likely to be effective in changing transport choices. Establishing travel plans in new major commercial and residential developments in Perth could be achieved through building on existing processes that have proved successful in introducing travel plans for some specialised activity centres and large commercial developments in Perth.

Population	Recommendation
2.7 million	Travel plans implemented for new major commercial development and travel plans implemented for new major residential development associated with strategic activity centres in Perth and Peel.
3.5 million	Travel plans implemented for all new major commercial and all new major residential development in Perth and Peel.

Travel behaviour change programs

Travel behaviour change programs use education, information, incentives and other marketing-based approaches to persuade and assist people to decrease their need to travel, reduce dependence on private cars and increase physical activity by making voluntary changes in their travel habits and patterns. Such changes include reducing car use and increasing the share of trips by alternatives such as cycling, walking, public transport or car-pooling.

Travel behaviour change programs achieve these shifts in demand by changing perceptions or attitudes to alternative travel options. Travel behaviour change programs typically target households, workplaces and schools.

Population	Recommendation
Integrated travel change programs	
2.7 million	Integrated travel behaviour change programs that target households, workplaces and schools expanded and delivered across targeted regions in Perth and Peel with an emphasis on optimising efficiency of the existing network and new infrastructure and services. Integrated travel behaviour change programs combined with significant public transport infrastructure projects and services and a proportion of associated capital budgets allocated for this purpose. Alternative sources of funding will be increasingly leveraged.
3.5 million	Integrated travel behaviour change programs delivered across Perth and Peel every 10 years. Workplace programs delivered in major activity centres and transit oriented developments. School programs offered to all schools in the Perth and Peel region.

Workplace travel change programs	
Population	***Recommendation***
2.7 million	Workplace travel behaviour change programs delivered across Perth and Peel focusing on identified priority areas such as major activity centres and transit oriented developments. Travel plans mandated in the Government Office Accommodation Standards for workforce relocations, including appropriate parking levels and fleet management. Programs delivered as part of the integrated travel behaviour change approach described above.
3.5 million	Workplace travel behaviour change programs delivered in major activity centres and transit oriented developments in the Perth and Peel region.
School travel change programs	
Population	***Recommendation***
2.7 million	Large-scale school travel behaviour change programs delivered across Perth and Peel. Programs delivered as part of the integrated travel behaviour change approach described above.
3.5 million	School travel behaviour change programs offered to all schools in the Perth and Peel region.

Walking and cycling infrastructure

Walking and cycling infrastructure provides safe and enjoyable routes and facilities, which encourage people to walk or cycle. Appropriate infrastructure for walking and cycling can improve transport network efficiency and improve safety.[1] There are also positive and statistically significant relationships between bicycle paths and lanes and levels of cycling. The provision of a full range of bicycle end of trip facilities in particular increases the likelihood of bicycle commuting.[2]

Population	*Recommendation*
2.7 million	Perth's off-road cycling and walking network expanded from 172 km to 350 km to better connect all activity centres with an increasing emphasis on the separation of cyclists and pedestrians. End of trip facilities widely available in all major activity centres in Perth.
3.5 million	Further expansion of the PSP network to cater for long distance commuters and additional river crossings, resulting in 850 km of off-road cycleways.

Parking strategies

Efficient parking management includes various mechanisms that result in more efficient use of parking facilities. Measures include supply constraints, sharing, efficient pricing, improved user information, and incentives to use alternative modes where it is more cost effective than subsidising parking. Effective parking strategies

1 Department of Infrastructure and Transport (2013) *Walking, Riding and Access to Public Transport: Supporting Active Travel in Australian Communities*. Ministerial Statement. Commonwealth of Australia.

2 Wardman, M, Tight, M & Page, M (2007) 'Factors influencing the propensity to cycle to work', *Transp. Res. Part A* vol. 41, pp. 339–350.

generally combine the use of long and short term parking charges, levies and limits to parking supply (parking caps) to discourage private car journeys to specific sites or areas. Levies applied to parking facilities can increase parking prices as well as provide revenue for various planning objectives and increase use of alternative transport modes. Parking caps impose an upper limit on parking supply in particular districts or areas. Reducing parking supply can also make cities more liveable by reallocating surface car parking to public spaces and footpaths or new residential areas.

Public transport time of day pricing

Public transport time of day pricing includes the introduction (or increase) of public transport fare differentials between peak periods (higher) and non-peak periods (lower). Peak pricing schemes can be introduced as either a surcharge for travel in peak periods or discounted travel during off-peak periods, or a combination of both.

Introducing large fare differentials between peak and off-peak periods can shift public transport users' travel patterns. Perth's public transport fares currently have a differential pricing structure for distance (zone based) but are not time-based and do not distinguish between different modes or services. This is in contrast to most other major Australian cities that have introduced some form of public transport peak and off-peak pricing.

Population	*Recommendation*
2.7 million	Revenue neutral time of day pricing scheme implemented with peak fares 30 per cent higher than off-peak fares. Concession fares remain unaffected.
3.5 million	Pricing of public transport fares reviewed to assess the need to increase the fare differential between peak and non-peak periods. Concession fares remain unaffected.

Road use pricing reform

Pricing measures to manage road use demand include schemes that charge motorists a road use fee that varies by time, distance, location and vehicle. Fees might be higher under congested conditions or for larger and more polluting vehicles and lower on uncongested roadways or in off-peak times. Road use pricing reform aims to eliminate other road user taxes and charges such as vehicle registration fees and fuel excise while more directly charging motorists for their individual levels of road use. Cordon pricing, where motorists are charged a fee for driving in specific areas such as central business districts, is sometimes proposed as an urban congestion reduction strategy aimed at reducing local traffic impacts and discouraging unnecessary road use in busy areas. Successive Commonwealth Government tax, competition and productivity reviews, including the Henry Tax Review[3], the recently released Harper Review[4], have identified reforming the way road users are charged as a national priority and the key to a more productive, efficient and sustainable Australian transport

[3] Australian Treasury (2010), *Australia's Future Tax System,* The Commonwealth Government of Australia

[4] The Harper Review advised that Governments should introduce cost-reflective road pricing with the aid of new technologies, with pricing subject to independent oversight and revenues used for road construction, maintenance and safety

system. The 2016 Australian Infrastructure Plan also recommended road user charging reform as a way of reducing congestion and to help fund major projects.[5]

Any measures to use pricing to manage road use demand in Perth would need to be fair and equitable for all motorists and have scope to remove existing road user costs such as vehicle registration fees and fuel excise charges.

Population	*Recommendation*
2.7 million	Work with national reform agencies, other Australian jurisdictions and stakeholders to develop options to introduce cost reflective road pricing for all vehicles.
3.5 million	Well-designed road use pricing initiatives that mitigate congestion and meet overall social equity objectives considered for introduction in Perth and Peel.

Implementation

As part of the broader *Transport @ 3.5 Million* implementation program, the Department of Transport will develop a TDM Implementation Plan to address how recommended measures will be implemented in the short to medium term, identify further research and policy work to be undertaken and identify enablers that underpin the implementation of successful TDM strategy and policy in Perth.

Development of the TDM Implementation Plan will include consultation and engagement within the Transport Portfolio, across government and with other key stakeholders.

[5] Infrastructure Australia (2016) *Australian Infrastructure Plan: Priorities and reforms for our nation's future*

1. Travel demand management in Perth and Peel

1.1 What is travel demand management?

Travel demand management (TDM) is a strategic approach to mitigate urban traffic congestion and defer or reduce the need for additional transport infrastructure investment.

TDM includes initiatives that improve transport outcomes, such as congestion mitigation, more efficient use of infrastructure and a more reliable transport system. Essentially, TDM results in more efficient travel as people change their mode or time of travel, or simply travel less. It can delay or defer the need to provide infrastructure upgrades and offer solutions when there is limited capacity to expand existing networks.

Travel patterns (or demand) are determined by the availability of transport infrastructure and services, the locations of places, and people's need to access goods and services. A variety of initiatives including policies, programs, services or products that address transport demand are grouped under the term 'Travel Demand Management'. By influencing whether, why, when, where and how people travel, TDM measures can contribute to the following changes in travel behaviour:

- modal shift – more people choosing to walk, cycle, use public transport, carpool, or use other means of access;
- trip reductions – more people choosing to telework, shop online or conduct personal business by telephone or internet;
- driving reductions – more drivers making fewer trips by car, particularly to closer destinations; and
- time and route shifting – more drivers changing the time or route of their driving trip to avoid traffic congestion.

In simple terms the effect of most TDM initiatives is to change users' modes of transport, time of travel or amount of travel.

1.2 Why manage travel demand?

Improvements to transport system efficiency and reliability can be achieved by changing either supply or demand. Supply-side measures typically refer to delivery of road and public transport infrastructure, which often requires large capital outlays. Demand-side measures typically refer to using instruments or programs that use incentives or disincentives to affect transport choices and often do not require large resource outlays to implement and manage.[6]

[6] Noxon Associates, (2011), *Transportation Demand Management for Canadian Communities: A Guide to Understanding, Planning and Delivering TDM Programs,* Transport Canada.

TDM is an essential part of a sustainable transport system, delivering social, economic and environmental benefits including:

- reduction in congestion cost and growth;
- efficient use of existing transport infrastructure and services;
- reduction or deferral of transport infrastructure investment;
- better access and more transport choices for socially and economically disadvantaged people;
- increased physical activity and better public health;
- improved liveability and amenity;
- road safety benefits including reduced personal trauma, injuries and other costs; and
- improved air quality and reduced emissions.

Comparative advantages of TDM include[7]:

- *Flexibility* – TDM measures tend to be flexible in application and scope. They can be deployed with new infrastructure or to trouble spots to address specific issues and be responsive to changing circumstances. TDM measures can be customised for specific user groups, which is often more difficult with supply-side and land use measures. TDM can also address congestion where there is limited capacity to increase supply.
- *Synergies* – TDM complements infrastructure investment in walking and cycling networks and upgraded public transport services. TDM can make investments in networks and services more effective and maximise economic, social and environmental benefits.
- *Speed* – TDM measures can be planned and deployed in months, weeks or even days. Supply-side and land use measures can take many years, even decades.
- *Affordability* – TDM measures can be scoped and scaled to match available resources and can make effective and creative use of existing staff and budgets. In many cases it is more cost effective to manage demand than to continue expanding supply.

TDM will play a crucial role in achieving the Smart Transport campaign. This campaign aims to develop a collective sense of responsibility for Perth's transport system and provide people with information and tools that influence their travel choices. Research conducted to inform this initiative found that identifying small changes people could make to improve the transport system would highlight the personal and social benefits they could achieve and the difference that their behaviour could make to the efficiency of the transport system for the community. Many TDM measures, particularly behaviour change programs, can help people achieve these small changes and often have a local, personalised focus.

[7] Noxon (2011)

1.3 Existing travel demand management in Perth

Many TDM initiatives already exist in Perth and have been in place for many years. Travel behaviour change programs that target households, workplaces and schools have been progressively rolled out in Perth and Peel since the first WA TravelSmart program was launched in 1997. Travel Plans have also been used to achieve a number of travel and other benefits in specific Perth and Peel activity centres, including the QEII Medical Centre, Fiona Stanley Hospital, Murdoch campus of Challenger Institute of Technology and some recent large shopping centre expansions.

Bus priority infrastructure, including full and part time bus lanes and dedicated busways, has been opportunistically implemented in Perth and there is an increasing focus on providing priority for bicycles and pedestrians with upgrades and trials in local areas.

Investment to improve Perth and Peel's cycling network has escalated in recent years in response to increasing numbers of people cycling and a growing recognition of cycling as a valuable and significant transport mode. Implementation of *Transport @ 3.5 Million* will see the off-road cycle network expand from 172 km to around 850 km by the time the population reaches 3.5 million people. Key actions include:

- expansion of pathways;
- better connectivity to stations and schools;
- development of an online trip planner; and
- increasing the number of end of trip facilities in the Perth central business district (CBD) and activity centres.

Enhancements in public transport service frequency and reliability have been effective in Perth and Peel to achieve strong public transport patronage over the last 10 years and reduce the number of car trips. More recently, WA transport agencies have made a number of moves to provide real time travel information to travellers to help reduce public transport waiting times and influence mode choice.

Parking levies and controls on the supply and location of non-residential parking in Perth's CBD and parking caps at key specialised and strategic activity centres have played a major role in helping shape travel demand in Perth.

TDM is not new or unfamiliar in Perth and many TDM instruments have been successfully applied in Perth and Peel. As Perth continues to grow however, specific and targeted TDM techniques that minimise congestion and increase transport network reliability and efficiency will need to become more prevalent.

1.4 Relevant trends and external factors

Demographic and economic trends and rapidly changing technology will create change in demand as well as opportunities for applying TDM. Trends that increase demand for non-vehicle modes can have significant synergistic effects that should be fostered.[8]

[8] Litman, T (2015) The future isn't what it used to be: Changing trends and their implications for transport planning, Victoria Transport Policy Institute, viewed 5 November 2015, http://www.vtpi.org/future.pdf

1.4.1 Demographics and changing traveller preferences

Factors such as age, culture, income, place of residence and employment location all influence travel demand and travel behaviour.

The ageing population is a significant trend. Older people have different mobility needs, increasing the importance of providing travel options for non-drivers.[9] From a TDM perspective, this trend will increase the importance of providing quality travel options for non-drivers.

Further deregulation of retail trading hours is likely to result in some peak spreading.[10] It is also likely to reduce shopping activity and the high number of shopping trips undertaken between 9am and 5pm on Saturdays. Shopping activity patterns in Australian jurisdictions that have achieved full shopping hours deregulation indicate that weekend travel activity is more likely to follow the same profile as weekdays.[11]

Community attitudes in Perth towards density, public transport and car-dependence have changed in recent years. Compared to three years ago, more people believe an efficient public transport system is highly important and fewer people value Perth's low-density lifestyle.[12] Over the past two decades fewer young people are obtaining driver's licences and public transport patronage has risen in Australian cities.[13]

These changes in consumer preferences will attract increasing public support for TDM initiatives as growing numbers of people prefer to live in communities where it is possible to walk and cycle safely and have access to quality public transport.

1.4.2 Trends in technology and industry

In 2014 the Productivity Commission estimated that since 2000 net revenue from fuel excise had fallen 30 per cent. In the same time period road use grew 25 per cent and the cost of road construction and maintenance grew by 40 per cent. Fuel excise returns are dropping partly because cars are becoming more fuel efficient. As revenue from fuel excise to fund transport infrastructure continues to decline and transport infrastructure costs increase, road pricing reform is likely to become an increasingly important priority for all governments.

The rise of the sharing economy, or collaborative consumption, has the potential to change the dynamic of Perth transport by changing the way products and services are produced, offered, purchased and used. Examples of collaborative consumption will include new mobility options that affect travel behaviour such as car sharing, bike sharing, ride sourcing, ride sharing and shared parking.[14]

Future transport policy innovation will need to harness the benefits of technology-enabled mobility. Technology can build links between demand management and transport system operations.

---

9 Victoria Transport Policy Institute (2015)

10 Wildermuth, H. (2015) Transport Modelling for 2041 and 2051. Technical Note 4: External Factors Likely to Affect Current Travel Patterns, draft prepared for Department of Transport

11 Economic Regulation Authority WA (2014) *Inquiry into Microeconomic Reform in Western Australia*,

12 Committee for Perth (2015) *Perth perception survey,* prepared by Ipsos, Perth

13 Newman, P., & Kenworthy, J. (2011). Peak car use: Understanding the demise of automobile dependence. *World Transport Policy and Practice*, *17*(2), 31-42.

14 RAC (2015) *Exploring the role of car sharing in Perth*

TDM initiatives are also likely to be supported by governments increasingly embracing open data[15] in order to boost efficiency, performance, transparency, trust and credibility. By embracing open data transport agencies can work with others in the community to help analyse and improve transport systems.[16]

1.5 Freight and TDM

The effective movement of freight across the state is crucial to Western Australia's economy and communities. Between 1971 and 2007 Australia's road freight task grew by approximately 5.4 per cent per annum to approximately 184 billion tonne kilometres (ABS, 2008). Over this period, increases in heavy vehicle size and capacity enabled more freight to be carried by fewer trucks.[17] Careful management of roads and congestion is critical to ensure efficient freight movement and to minimise heavy vehicle impact.

There is a large spectrum of road freight vehicles operating within the transport industry, ranging from light commercial vehicles transporting urban freight, through to large vehicles transporting containerised freight from ports. Freight vehicles make up a lower portion of total urban-peak traffic but constitute a large portion of traffic on specific transport corridors, for example major arterial roads leading to ports and strategic industrial precincts. In this context, freight vehicles can be a major beneficiary of TDM strategies that reduce car trips on arterial and other major roads.

Some of the key benefits that can be achieved by reducing the amount of freight traffic include:

- *Reduced traffic congestion* – due to the vehicle size and slower acceleration rate, compared with light vehicles, heavy freight vehicles impose more congestion per unit of travel.
- *Reduction in road maintenance costs* – heavy freight vehicles cause higher levels of road wear and damage than light vehicles.
- *Reduction in pollution* – heavy freight vehicle emissions can be a major contributor to pollution along major industrial transportation corridors (ICB Consulting, 2001).
- *Improved community liveability* – freight traffic can degrade community amenity by imposing noise, dust, air pollution, traffic risk and traffic delay, particularly in neighbourhoods near major highways or intermodal terminals.
- *Improved pedestrian and cycling conditions* – heavy vehicle traffic is a deterrent to pedestrian and bicycle travel.[18]

There are a number of demand-side strategies that government and private industry can implement to improve freight transport efficiencies including:

- Improving scheduling and routing to reduce freight vehicle travel and empty container haulage by increased computerisation and greater coordination among distributors.

---

15 Merritt, K, (2015) The Next 5 Years in Open Data: 3 Key Trends to Watch, http://www.govtech.com/opinion/The-Next-Five-Years-in-Open-Data-Three-Key-Trends-to-Watch.html

16 Russell, A, (2015) Washington Post helps trumpet how open data improves our transit options. http://mobilitylab.org/2015/10/27/wapo-open-data-techies/

17 Australian Government Department of Infrastructure and Transport, Bureau of Infrastructure, Transport and Regional Economics, research report 123: road truck productivity sources, trends and future prospects, p. xiii

18 TDM Encyclopaedia, Victoria Transport Policy Institute, Freight Transport Management online: http://www.vtpi.org/tdm/tdm16.htm

- Adopting innovative technologies.
- Organising regional delivery systems so fewer vehicle trips are needed to distribute goods.
- Using smaller vehicles and active forms of transport (for example bicycle couriers) for urban distribution.
- Changing freight supply chain operating hours, including delivery times, to reduce congestion during peak-periods.
- Establishing pricing and taxation policies to encourage efficient freight transport.[19]

[19] TDM Encyclopaedia, Victoria Transport Policy Institute, Freight Transport Management online: http://www.vtpi.org/tdm/tdm16.htm)

2. Methodology

Research conducted by the Planning and Transport Research Centre (PATREC) in 2014 identified more than 70 measures or initiatives that could be used in Perth to help manage travel demand. The following methodology was applied to identify the most appropriate measures to be included in *Transport @ 3.5 Million*.

An extensive literature review and gap analysis was used to evaluate international and domestic experience of TDM as well as to capture measures not considered in the PATREC research. Measures that did not fit the TDM definition were also excluded.

A workshop was held on 25 July 2015 at which local, national and international experts provided input to the assessment of the TDM measures. Attendees used an evaluation framework to assess high-impact TDM measures' effectiveness and priority for Perth.

The high level assessment undertaken to shortlist all measures was based on the extent to which each TDM measure met the following criteria:

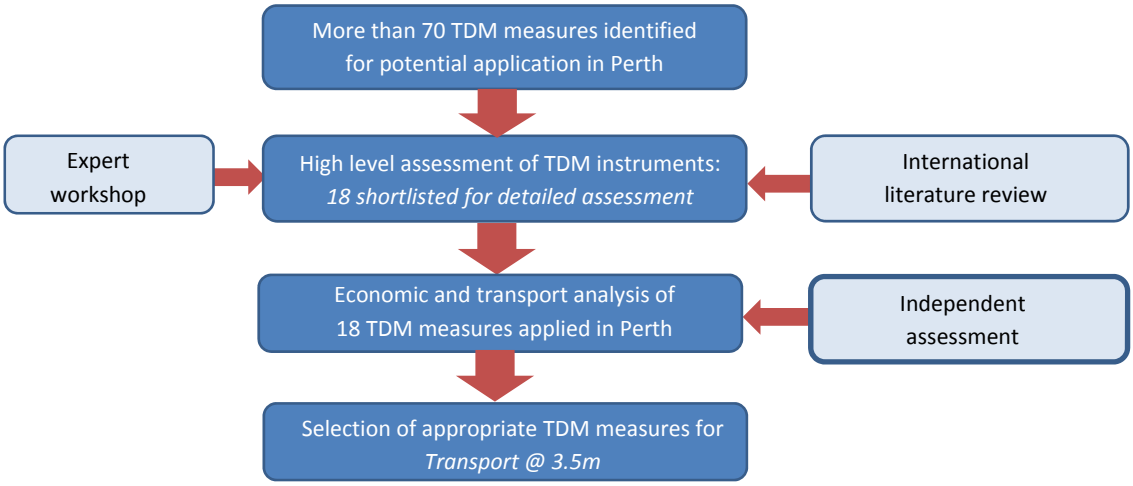
- effectiveness in managing travel demand, particularly during peak congestion periods;
- suitability for the Perth and Peel context; and
- demonstrated ability to achieve significant transport outcomes and associated economic, social and environmental benefits.

Likely risks and synergies associated with each measure were also identified as part of this process.

The high level assessment resulted in a preliminary report that described 25 TDM measures considered likely to be appropriate for the Perth context, represent good value for money and achieve significant transport outcomes such as mode shift, reduced vehicle kilometres travelled and reduced trips, particularly in peak periods. These transport effects translate to broad economic benefits including reduced congestion costs, lower vehicle emissions, fewer crashes, travel time savings, improved roadway performance reliability and lower operating costs.

Eighteen TDM measures were selected for further detailed appraisal by assessing the likely impact on travel behaviour and economic outcomes associated with effective implementation of each measure in Perth at a population of 3.5 million. This assessment was significantly informed by the work of independent transport economists, which included the development of a well-designed application of each measure and a detailed analysis of likely transport and economic benefits of each application.

Based on this detailed assessment, six measures have been recommended as appropriate for introduction or expansion in Perth as the population grows. For other measures, further investigation and monitoring is required to determine how the State Government might investigate, monitor or influence certain initiatives that work to mitigate traffic congestion as well as optimise existing transport infrastructure.



3. Travel demand management measures for Perth @ 2.7m and 3.5m

The following TDM measures are recommended for Perth at a population of 2.7 million and 3.5 million.

3.1 Travel plans for new developments

Travel plans are a package of actions to encourage safe, healthy and sustainable travel options for specific organisations or sites such as large medical centres, shopping centres, large residential developments or universities. Their purpose is to plan actions that are relevant, feasible and likely to be effective in changing transport choices. Establishing travel plans in new major commercial and residential developments in Perth could be achieved in a number of ways including building on existing planning processes that have proved successful in introducing travel plans for some specialised activity centres and large commercial developments in Perth to date. Plans can be tailored to specific organisations or sites drawing on a variety of tools such as site audits, transport facilities and policies, surveys of local transport system users and consultation with stakeholders.

3.1.1 Rationale

When travel plans are established in new developments they can help incorporate alternative modes in facility planning and design, such as well-designed pedestrian and bicycle facilities, convenient bicycle and rideshare vehicle parking, end of trip facilities, attractive and convenient bus stops and on-site car share vehicles. They can also reduce car travel to or around a specific site by limiting parking supply.

The application of travel plans allows local authorities to set transport targets for new developments and require operators to monitor ongoing performance and report findings.

3.1.2 Background

UK experience has shown that travel plans mandated through planning approval mechanisms and supported by legislation can reduce single occupant vehicle use by approximately 18 per cent when combined with effective parking management strategies.[20] Travel plans must be established for any new development that exceeds a prescribed threshold[21] and in London all large-scale developments and applications must submit a full travel plan as part of the planning application process. This requirement applies to new developments and extensions of existing sites.

In Perth, the planning process has been used in certain cases to leverage the introduction of travel plans, usually through requirements in the development application process for universities, hospitals and shopping centres. The requirement for a travel plan was a condition of approval for a number of developments, including QEII Medical Centre, Fiona Stanley Hospital, Murdoch campus of Challenger Institute

---

[20] Cairns, S., Sloman, L., Newson, C., Anable, J., Kirkbride, A., & Goodwin, P, (2004) 'Smarter choices-changing the way we travel.' *Transport Reviews*, *28*(5), 593-618.

[21] Rye, T, Green, C, Young, E, & Ison, (2011)

of Technology and some recent large shopping centre expansions. This mechanism has sometimes been used to offset non-standard aspects of a proposal.

Transport assessments are currently undertaken in Perth and Peel and applied at the structure plan, subdivision and individual development level. These assessments are voluntary, although strongly encouraged. The assessments look at transport implications of land use development proposals including implications for roads, intersections, pedestrian and cycle networks, and public transport services. The Department of Planning has published guidelines to assist developers in conducting transport assessments. The guidelines are also used by the approving authority's planning officers to determine whether or not the appropriate level of transport assessment has been provided in support of the proposal.

Some Western Australian local authorities, including the Town of Victoria Park and the City of Geraldton, have proposed adapting their local planning policy to require new medium and large scale developments to prepare and maintain travel plans, although these changes have not yet been implemented.

The City of Sydney development plan requires a travel plan where estimated peak trip generation exceeds certain thresholds.[22]

3.1.3 Assessment

Transport and economic

Assessment of a travel plan implemented at a specialised activity centre in Perth provides some empirical indication of potential travel benefits. Travel plans established for the QEII Medical Centre are estimated to have reduced private car travel to and from the site by 30 per cent over four years.[23] Based on the number of employees and visitors accessing the centre, this is estimated to represent a reduction of approximately 3,840 trips by employees in peak periods as well as an additional 3,000 trips generated by patients and visitors every day.[24]

The potential benefits of introducing travel plans for new major commercial and residential developments in Perth and Peel were independently evaluated. The evaluation considered the application of two scenarios expected to achieve different rates of vehicle trip reduction.

The first scenario envisages travel plan initiatives being implemented at mainly low or no net cost to business, with light-touch monitoring and enforcement, while the second assumes substantial business investment and monitoring and enforcement to drive travel change.

Based on existing data on development applications and assuming a cumulative effect, the assessment estimates that a total of 1,940 sites in Perth and Peel would develop travel plans by 2050.

---

22 See 3.11.1 in http://www.cityofsydney.nsw.gov.au/development/planning-controls/development-control-plans

23 Martin, J (2014) *Parking Supply Restriction and Mode Shift at QEII Medical Centre* – A Case Study, AITPM 2014 National Conference

24 QEII tenants employ more than 8,000 people, with approximately 80 per cent working on any particular weekday. In addition, there are approximately 5,000 patients and visitors that attend every day. These calculations were based on a 30 per cent reduction of trips generated by these groups.

In the absence of information on current developments or the projected future mix of developments, an average of 100 peak hour vehicle trips per development is assumed.[25] Using this assumption, the 1,940 sites subject to travel plans in 2050 would be responsible for 194,000 peak hour vehicle trips. If total vehicle trips grow in proportion to population and if Perth mode shares remain constant, this figure would represent approximately 28 per cent of all peak hour vehicle trips in Perth and Peel in 2050.

If introducing travel plans for major new developments can reduce vehicle trips by an average of five per cent[26] there will be 9,700 fewer daily peak hour trips in 2050. If travel plans (when combined with parking management strategies) can reduce vehicle trips by 18 per cent[27] there will be approximately 35,000 fewer peak hour trips per day.

Table 1 shows these results along with corresponding reductions in daily trips and vehicle kilometres travelled.

Table 1: Vehicle traffic changes in 2050 with travel plans implemented for major new developments

	5% vehicle trip reduction	18% vehicle trip reduction
Peak hour		
Vehicle trips	- 9,700	- 34,900
Vehicle km	- 101,000	- 363,000
Daily		
Vehicle trips	- 126,000	- 453,000
Vehicle km	- 1,310,000	- 4,720,000

Calculations of indicative benefit/cost ratios for the introduction of travel plans are based on the method used by Marsden Jacob Associates in their 2011 evaluation of the TravelSmart Local Government and Workplace Programs[28] and a number of assumptions about likely travel effects (based on overseas and local estimates) and monitoring and enforcement costs.

Table 2 shows the results of the indicative economic analysis for travel plans for major new developments in 2050, assuming a population of 3.5 million, by which time it is estimated approximately 1,940 developments will have travel plans in place. Benefit/cost ratios will be lower in earlier years when there are fewer developments.

[25] This is one of the thresholds at which the Town of Victoria Park requires new developments to prepare a full travel plan

[26] Workplace travel plans have been found typically to reduce single occupant car use by 5 – 15 per cent

[27] UK experience has shown that mandatory travel plans can reduce single occupancy vehicle use by approximately 18 per cent when combined with parking management strategies

[28] The assessment identified a number of limitations with this methodology. However using this approach does provide indicative results that can be compared with the MJA BCR values for local government and workplace travel plans.

Table 2: Indicative benefit/cost ratios for travel plan scenarios in 2050

Scenario description	Scenario 1 5% vehicle trip reduction	Scenario 2 18% vehicle trip reduction
	Travel plan initiatives mainly low or no net cost to business, with light-touch monitoring and enforcement	Substantial business investment and monitoring and enforcement to drive travel change
Annual cost ($M)		
Government	0.2	1.2
Private	3.9	38.8
Total annual cost	4.1	40.0
Annual benefits ($M)*	26.1	94.1
Indicative BCR	6.4	2.4

* Calculation of benefits does not include likely reduced capital costs associated with avoided or deferred transport infrastructure for reduced peak period trips.

It is likely that the first scenario a five per cent reduction in vehicle trips could be achieved with a system relying mainly on implementation of travel plan initiatives chosen on the basis that they are effective but have minimal or no net cost to owners or tenants, for example employers paying subsidies for travel behaviour change that are offset by reduced costs to provide car parking. Only a low level of monitoring and enforcement would be necessary as the travel plan initiatives should be mostly self-sustaining.

For the second scenario, an 18 per cent reduction in vehicle trips would require more substantial investment by developers and subsequently by owners and tenants.

Social

Travel plans can ensure accessibility of new developments for the mobility disadvantaged. Wider social benefits can accrue from reduced travel times, health benefits associated with increased use of alternative modes of travel and increased amenity of activity centres through parking constraints.

Environmental

Travel plans can reduce the amount of land used for parking space and leave more for green space. Through reducing single occupant vehicle use, travel plans also result in lower transport energy use, fewer greenhouse gas emissions and less noise pollution.

3.1.4 Challenges for implementation

UK experience indicates that a regulatory approach risks poor engagement by applicants and the perception that travel plans are burdensome.[29] Likewise a lack of engagement or involvement might prompt local planning authorities to approach travel plan implementation with a lack of interest or commitment.

Monitoring and enforcement is a key consideration. In the UK there is little assessment of whether established travel plans are actually put into effect or outcomes achieved.

[29] Enoch, M & Zhang, L (2012) 'Travel plans,' in T Rye & S Ison (eds.), *The implementation and effectiveness of transport demand management measures: an international perspective*. Ashgate Publishing, Ltd.

Travel plans will only meet their intended objectives if appropriate regulatory or other mechanisms ensure plans are properly implemented.

Area travel plans have been suggested as being a more effective, holistic TDM measure than individual site-based plans, as they ensure that capacity released by an individual travel plan is not taken up by latent demand from elsewhere. This model could reduce applicant participation and accountability however, and remains untested in Australia.

Detailed investigation is needed to identify the best approach for implementing travel demand management plans in Perth. Successful implementation will require collaboration with key State and local governments as well as developers.

3.1.5 Synergies and enablers

Some elements of parking management, for example parking caps or maximum parking standards, significantly enhance the effectiveness of travel plans. Offsetting the impact of reduced car parking is a common reason for requiring a travel plan for a new development. Reducing car parking has clear benefits for developers through reduced costs, and acts as an important incentive to manage car use as part of a site's travel plan.[30]

Other enablers could include:

- endorsement and push from higher levels of government to gain local government support;
- guidance documents from government agencies to provide advice, support and promotion of travel plans, recognition when good practice is demonstrated, and build industry skills to enable planning consultancies to effectively develop the plans; and
- facilitating ownership and engagement by involving occupants in developing travel plans, which is widely recognised as a key success factor.

Taking a staged approach to a travel plan policy will help manage risks and allow learning from early experience.

[30] De Gruyter, C., Rose, G., & Currie, G. (2014). Securing travel plans through the planning approvals process: A case study of practice from Victoria, Australia. *Cities*, 41 (A), 114-122.

3.1.6 Future application for Perth

Implementation of travel plans for new developments will require the Departments of Transport and Planning, as well as local government authorities, to work closely together to:

- establish widespread support across government for the use of travel plans for major developments;
- establish an agreed threshold at which a development is considered 'major';
- establish consistent policies and processes to promote the introduction of good practice travel plans in major developments;
- consult on an ongoing basis with developers, major property owners and occupants of new developments to facilitate ownership, engagement and support for site specific travel plans; and
- investigate how to support the establishment of public-private partnerships to help property owners implement trip reduction programs by providing transport and parking management services in particular areas such as commercial districts, medical centres and industrial parks.

Different kinds and levels of travel plans could be applied depending on the scale of development and location. Full travel plans could include a site assessment, travel surveys, objectives linked to the site's context, travel targets, provision for end of trip facilities, travel change programs and effective strategies that might limit or efficiently charge for car parking.

Population	*Recommendation*
2.7 million	Travel plans implemented for new major commercial development and travel plans implemented for new major residential development associated with strategic activity centres in Perth and Peel.
3.5 million	Travel plans implemented for all new major commercial and residential development in Perth and Peel.

3.2 Travel behaviour change programs

Travel behaviour change programs use education, information, incentives and other marketing-based approaches to persuade and assist people to reduce their need to travel, reduce dependence on private cars and increase physical activity by making voluntary changes in their travel habits and patterns. Such changes include reducing car use and increasing the share of trips by alternatives such as cycling, walking, public transport or car-pooling.

3.2.1 Rationale

Travel behaviour change programs use a packaged approach to shift people's travel demand preferences by providing information, incentives and support to try alternative travel modes. The programs seek to permanently influence participants into more efficient travel patterns.

3.2.2 Background

Western Australia is recognised as a world leader in its travel behaviour change programs, which target households, workplaces, schools and local governments. Extensive evaluation of program effectiveness has indicated that a 10 per cent reduction in vehicle kilometres travelled, 20 per cent increase in public transport use

and significant reductions in car use can be achieved and are sustained for years following.[31]

Travel behaviour change programs in Perth and Peel have been particularly successful in increasing uptake of new and existing public transport infrastructure and services. For example, public transport trips in the Mandurah area increased by nearly 60 per cent following the opening of the Mandurah train line. Following the implementation of a household travel behaviour change program, public transport trips increased by another 31.4 per cent. Major benefits can be gained by delivering targeted travel behaviour change programs to promote new and existing transport services and infrastructure.

Travel behaviour change programs similar to those in Western Australia have been introduced in Queensland and Victoria and in cities across the world including Bellingham, Cleveland, Durham, Sacramento and the state of Oregon in the US, Vancouver in Canada, and Peterborough and Worcester in the UK. In general, these programs have resulted in reductions in single occupant car use of between three and 13 per cent, 14 per cent increases in public transport use and increases in walking and cycling of between 12 and 36 per cent.[32]

Travel behaviour change programs conducted at various schools, universities, hospitals and workplaces in Victoria resulted in the development of more than 150 travel plans across more than 38 funded projects. A 2012 review of 134 projects commissioned by Victoria's Department of Transport found that 85 per cent of participants reported a shift towards more sustainable travel options. Sixty-five per cent reported reduced car use, 35 per cent reported increased public transport use, and 49 per cent reported increased cycling.[33]

Integrated travel behaviour change programs in Perth, such as the *Your Move* program in Cockburn and Wanneroo, have improved transport system efficiency by reducing travel demand and shifting travel times, thereby helping limit local congestion. These programs also improve public transport patronage and leverage cycling initiatives to improve infrastructure connections to destinations.

3.2.3 Assessment

Transport and economic

The potential benefits of expanding travel behaviour change programs in Perth were independently evaluated. The evaluation assessed the introduction of a region-wide integrated travel behaviour change program delivered across Perth and Peel on a 10 year rolling basis with emphasis on activity centres, transport infrastructure developments and congestion hotspots. The program would target workplaces, households and schools in partnership with local governments and include developing travel plans, promoting strategic asset management and using central online engagement.

---

31 Ashton Graham, C. and John, G. (2006) *Department of Transport Working Paper: TravelSmart Household program: Frequently Asked Questions in travel demand management and dialogue marketing*, Department of Transport

32 Rodwell, J. (2009) *Evaluative Results of Individualized Marketing Programs for "SmartTrips" Programs: Synthesis*, report prepared for WSDOT

33 Victorian Auditor-General's Report (2013) *Managing Traffic Congestion*

Assumed low and standard diversion rates[34] are drawn from the draft Travel Behaviour Change volume of Australia's National Guidelines for Transport System Management, which provides default diversion rates for use in economic assessments of travel behaviour change projects based on an extensive review of the different types of programs.

The standard set of diversion rates is based on the average of all household/community projects reviewed. The low set is based on the average of the bottom half of diversion rates achieved and is applicable for projects that might not implement the full range of initiatives that have become standard in household based programs, or where public transport services or cycle/walking facilities are poor.

Table 3: Projected travel behaviour change for a region-wide integrated travel change program in Perth and Peel

Mode	Diversion rates		Percentage changes		Change in trips per day ('000) – Perth 2015 @ 2.01m		Change in trips per day ('000) – Perth 2050 @ 3.5m	
	Standard	Low	Standard	Low	Standard	Low	Standard	Low
Car driver	-3.1	-1	-6%	-2%	-304.7	-98.3	-530.6	-171.2
Car passenger	-0.5	-0.2	-2%	-1%	-49.2	-19.7	-85.6	-34.2
Public transport	1.4	0.5	33%	12%	137.6	49.2	239.6	85.6
Cycle	0.9	0.3	19%	6%	88.5	29.5	154.1	51.4
Walk	1.3	0.4	8%	3%	127.8	39.3	222.5	68.5
Measure					**Perth 2015 @ 2.01m**		**Perth 2050 @ 3.5m**	
					Standard	**Low**	**Standard**	**Low**
Change in car VKT per day (million)					-3.17	-1.02	-5.52	-1.78

Using benefit values developed for application to household travel behaviour change programs in Auckland New Zealand, and converting these to Australian dollars, it is possible to calculate the following indicative estimates of benefits.

Household travel behaviour change project benefits per capita per year:

Standard diversion rates: $145
Low diversion rates: $45

These benefit values apply to the total population of the target area, not just those that choose to participate in the program. Even if only the low diversion rates are achieved, the benefit/cost ratio of the program will be approximately seven ($45/$6.35), which is a very good return on investment.

An assessment was also undertaken of the transport and economic effects of development and implementation of a broad scale workplace travel program across the Perth and Peel region, commencing in the Perth CBD and other identified priority areas, such as major activity centres.

[34] Diversion rates refer to the proportion of additional public transport, cycling or walking trips that would otherwise be car driver trips.

Table 4: Workplace travel change program effects

	Car driver	Car passenger	Public transport	Cycle	Walk
Diversion rates (percentage points of mode share)	-5.0	1.3	1.3	0.6	1.8
Percentage changes	-9%	6%	30%	13%	11%
Change in AM peak period trips per day in year 2050	- 9,840	2,558	2,558	1,181	3,542
Change in AM peak period car VKT per day in year 2050	- 102,339				

This assessment indicated that likely effects include significant reductions in car trip from current mode share (nine per cent) and corresponding increases in public transport trips (30 per cent), cycling (13 per cent) and walking (11 per cent). An indicative benefit/cost ratio of workplace programs could be as high as 26 ($36.4 million for $1.4 million investment).[35]

An assessment was also undertaken of the potential impact of an expanded a large-scale school travel behaviour change program.

Table 5 shows potential travel behaviour impacts in 2050 assuming that one third of schools participate in the school travel change program. An indicative benefit/cost ratio of 6.4 has been calculated for the program.

Table 5: School travel change program impacts in 2050

	Car driver	Car passenger	Public transport	Cycle	Walk
Number of schools participating	330				
Total roll of participating schools	193,300				
Diversion rates (percentage points of mode share)		-9.0	2.7	2.8	3.5
Change in AM peak period trips per school day in year 2050		- 17,400	5,220	5,410	6,770
Change in AM peak period car VKT per school day in year 2050*	- 157,000				

* Based on average trip lengths of the new modes x 2 for car driver return trip

Social

A range of social benefits are associated with travel behaviour change programs including:

- reduced car traffic and parking demand around schools during pick-up and drop-off times;
- increased levels of physical activity and associated health benefits;
- reduced transport costs to households;
- reduced exposure to vehicle pollutants;
- increased accessibility for people without cars and the mobility disadvantaged;

[35] The assessment noted that this might not be achieved due to diminishing returns when all high priority workplaces have implemented workplace travel plans and remaining workplaces are smaller

- increased community interaction and social well-being; and
- increased road safety outcomes[36].

Environmental

Local assessment of existing Perth travel behaviour change programs indicates that significant reductions in greenhouse gas emissions are likely to be achieved through reductions in car trips.[37] Through reducing single occupant vehicle use, travel behaviour change programs also result in lower transport energy use and less noise pollution.

3.2.4 Challenges for implementation

Decreasing use of landline telephones as more people move to mobile devices as their principal point of contact, increasing one-person households and an aging population[38] present significant challenges for the Department of Transport's current integrated travel behaviour change model.

Participants are also increasingly likely to access and benefit from personalised information on real time travel options, public transport and health benefits derived from program participation. Travel behaviour change programs will increasingly need to engage with individual customers online and adopt behavioural marketing techniques[39] to provide relevant, instant information.

Commuter trips to and from the Perth central sub-region will remain the greatest opportunity for workplace travel behaviour change programs. Digital delivery of services through online platforms and mobile devices will be a high priority for future travel behaviour change programs to target specific, high-need areas and individual customers.

3.2.5 Synergies and complementary strategies

Travel behaviour change programs are highly adaptable and can be deployed to complement other transport initiatives such as priority programs for specific transport modes and new and upgraded infrastructure. Over the long term, travel behaviour change programs could enhance the success of transit oriented developments and should be integrated into development of all new major public transport, active transport and appropriate road projects.

Travel behaviour change programs motivate people to adopt alternative transport options and can mitigate the perceived negative impact of 'push' measures, like parking supply and pricing measures, to shift travellers out of cars.

Revenue from local parking levy schemes modelled on the Perth Parking Policy can provide important sources of revenue for local governments to fund travel behaviour change programs. Other alternative funding sources include cross-government partnerships and private sector sponsorship.

---

[36] Fishman, E., Ker, I., Garrard, J., and T. Litman, (2011)

[37] Ashton Graham, C. and John, G.(2006) *Department of Transport Working Paper: TravelSmart Household program: Frequently Asked Questions in travel demand management and dialogue marketing*, Department of Transport 2006.

[38] Department of Planning and Western Australian Planning Commission, (2015) *Draft Perth and Peel@3.5million*, Department of Planning.

[39] Silverpop, 7 (2015) Key Marketing Trends for 2015, Silverpop - IBM, 2015.

3.2.6 Future application for Perth

Implementation of travel behaviour change programs will require the Department of Transport to:

- maintain and create new alliances with key agencies including the Department of Sport and Recreation, the Department of Education, local government authorities and schools;
- develop ongoing recruitment and engagement strategies with participants including online and digital service delivery; and
- collect survey information and other data to continually evaluate program effectiveness in transport impact as well as benefit/cost terms.

Population	***Recommendation***
Integrated travel change programs	
2.7 million	Integrated travel behaviour change programs that target households, workplaces and schools expanded and delivered across targeted regions in Perth and Peel with an emphasis on optimising efficiency of the existing network and new infrastructure and services. Integrated travel behaviour change programs combined with significant public transport infrastructure projects and services and a proportion of associated capital budgets allocated for this purpose. Alternative sources of funding will be increasingly leveraged.
3.5 million	Integrated travel behaviour change programs delivered across Perth and Peel every 10 years. Workplace programs delivered in major activity centres and transit oriented developments. School programs offered to all schools in the Perth and Peel region.
Workplace travel change programs	
Population	***Recommendation***
2.7 million	Workplace travel behaviour change programs delivered across Perth and Peel focusing on identified priority areas such as major activity centres and transit oriented developments. Travel plans mandated in the Government Office Accommodation Standards for workforce relocations, including appropriate parking levels and fleet management. Programs delivered as part of the integrated travel behaviour change approach described above.
3.5 million	Workplace travel behaviour change programs delivered in major activity centres and transit oriented developments in the Perth and Peel region.
School travel change programs	
Population	***Recommendation***
2.7 million	Large-scale school travel behaviour change programs delivered across Perth and Peel. Programs delivered as part of the integrated travel behaviour change approach described above.
3.5 million	School travel behaviour change programs offered to all schools in the Perth and Peel region.

3.3 Walking and cycling infrastructure

Walking and cycling infrastructure provides safe and enjoyable routes and facilities, which encourage people to walk or cycle. Improving walking and cycling infrastructure involves constructing and expanding pathways, partial segregation of traffic, increased separation of pedestrians and cyclists, bike boulevards, better lighting, bike routes that connect to public transport, public bike-sharing programs, early-start signals for cyclists and pedestrians and high quality end of trip (EOT) facilities for cyclists.

3.3.1 Rationale

High quality infrastructure effectively attracts users from other modes of transport for suitable trips. A shift to walking or cycling mitigates congestion by reducing private car use, particularly for commuter journeys during peak periods.

3.3.2 Background

Appropriate infrastructure for walking and cycling can improve transport network efficiency and improve safety,[40] and there are positive and statistically significant relationships between bicycle paths and lanes and levels of cycling. A cross-sectional study of 40 US cities found that each new mile of cycleway per square mile increased the share of workers commuting by bicycle by one per cent[41] and several studies have also found links between infrastructure improvements that promote street connectivity and limit car parking and increased walking levels. [42]

Electric bicycles (e-bikes) could significantly increase future cycling rates and currently represent one of the fastest growing transport market segments. In the last decade, more than 150 million e-bikes have been sold worldwide.[43] In Australia, the e-bike market is growing rapidly, faster than the growth in regular bike sales.[44] E-bike users appear to cycle more frequently and further. Research in China, North America, and Australia indicates that e-bikes have a greater capacity to replace car use than standard bicycles.[45]

In recent Australian research, 60 per cent of respondents to an online survey cited replacing some car trips as a main motivation for e-bike purchase, followed by 49 per cent that said they were motivated by being able to cycle with less effort.[46]

High quality walking and cycling infrastructure can significantly increase walking and cycling in cities by improving the quality of journeys and reducing safety concerns. Perceived and actual traffic hazards are a key constraint in low walking and cycling countries such as Australia, even among those that cycle regularly.[47]

---

[40] Department of Infrastructure and Transport (2013) *Walking, Riding and Access to Public Transport: Supporting Active Travel in Australian Communities*. Ministerial Statement. Commonwealth of Australia.

[41] Pucher, J, Dill, J & Handy, S (2010) 'Infrastructure programs and policies to increase bicycling: an international review', *Preventative Medicine* 50

[42] Hooper P, Knuiman M, Bull F, Jones E and Giles-Corti B. (2015) *Are we developing walkable suburbs through urban planning policy? Identifying the mix of design requirements to optimise walking outcomes from the 'Liveable Neighbourhoods' planning policy in Perth, Western Australia.* International Journal of Behavioral Nutrition and Physical Activity, Vol 12.

[43] Fishman, E & Cherry, C 2015, 'E-bikes in the Mainstream: Reviewing a Decade of Research', *Transport Reviews*

[44] https://rideonmagazine.com.au/new-and-electric-ebikes-explained/

[45] Fishman, E & Cherry, C 2015; Johnson, M., & Rose, G. (2013). Electric Bikes – cycling in the New world city: An Investigation of Australian Electric Bicycle Owners and the Decision Making Process for Purchase. Paper presented at the Australasian Transport Research Forum, Brisbane.

[46] Johnson, M., & Rose, G. (2013), above n 82.

[47] Cycling Promotion Fund, 2008, *Cycling: Getting Australia Moving,* funded by the Australian Government Department of Health and Ageing

Measures that increase the number of people cycling reduce the risk of road injuries and fatalities. An in-depth study commissioned by Transport for London examined fatal and life threatening collisions involving cyclists over a two year period and found that the best way to achieve a safer environment and encourage more people to cycle was to invest in best practice cycling infrastructure. The 2014 report estimated that this could increase the number of cyclists four-fold by 2026.[48]

Increasing rates of cycling participation in cities can in itself improve safety outcomes for cyclists. In Portland Oregon, cycling increased four-fold between 1991 and 2006, yet crashes fell by 69 per cent. Cycling in London increased by 83 per cent between 2002 and 2008, while the number of serious crashes declined by 28 per cent. Data indicates that countries with best practice cycling infrastructure and the highest levels of cycling, such as Denmark, have the lowest levels of cycling fatalities.[49]

The provision of a full range of bicycle EOT facilities in particular increases the likelihood of bicycle commuting. Analysis of UK survey data estimates there are statistically significant impacts from providing bicycle parking and showers for cyclists.[50] There is also evidence that providing EOT facilities at workplaces that include bicycle parking, showers and lockers results in 4.86 times more people commuting by bicycle.[51]

There is immense scope for car trips to be converted to walking or cycling trips, particularly for the 40 per cent of Australians that commute less than 10 km to their place of work or study, or those that make short local trips. Up to 84 per cent of non-regular cyclists in Sydney indicate they would be willing to consider cycling or cycling more often if dedicated cycleways and off-road routes were available.[52] Perth people indicate they are likely to walk more if there are good walking paths.[53] To increase the levels of walking in neighbourhoods with increased connectivity, it is essential to provide more route choices, more direct routes and closer proximity to core destinations. Perth residents that have an accessible network of bicycle or shared use paths are 77 per cent more likely to use cycling as a form of transport.[54] Use of cycle paths in Perth's inner areas can particularly reduce demand and congestion on peak period public transport services.

Each day Perth residents take more than 400,000 private car trips of less than a kilometre and equivalent to a 10 minute walk.[55] Perth's dry climate and flat terrain make walking and cycling ideal transport options. Pedestrians form the largest single road-user group[56] and WA's cycling rate is higher than the national average. The results of a 2006 survey indicated that for all trips on an average weekday in school terms, 11 per cent are 'walk all the way' trips. For distances up to one kilometre 48 per cent are walking trips and for distances up to three kilometres 26 per cent are walking

---

48 Christie, N (2014) *Pedal Cyclist Fatalities in London: Analysis of Police Collision Files (2007-2011)*, Centre for Transport Studies, University College London 2014

49 'Power to the Pedals', 2010, *World Watch Magazine* Vol. 23, No 4

50 Wardman, M, Tight, M & Page, M (2007) 'Factors influencing the propensity to cycle to work', *Transp. Res. Part A* vol. 41, pp. 339–350.

51 Buehler, R, (2012) 'Determinants of bicycle commuting in the Washington DC region', *Transport Research Part D*, vol. 17, pp. 525-531

52 City of Sydney Council, (2006) *Sydney Cycling Research: Internet Survey,* prepared by Environmetrics

53 Department of Transport (2008) Walking Accessibility / Footpaths webpage (http://www.transport.wa.gov.au/activetransport/24033.asp)

54 Living Liveable (2015) *The Impact of the Liveable Neighbourhoods Policy on the health and wellbeing of Perth residents. The University of Western Australia*. Perth, Western Australia

55 Department of Transport. *Perth and Regions Travel Survey* (PARTS) 2002-2006. Perth. Western Australia: Western Australian Government.

56 Department of Transport (2015) Walking Accessibility webpage (http://www.transport.wa.gov.au/activetransport/24033.asp)

trips.[57] Cycling has been on the rise in Perth for many years and the use of the off-road Principal Shared Paths by cyclists to access the Perth CBD has increased by 34 per cent since 2011.

Growth in Perth Bicycle Network use has consistently exceeded population growth and local experience indicates that cycle path extensions have a cumulative effect on level of use.[58] Government investment in cycling infrastructure has also grown sharply in recent years.

Perth residents have recently identified improvements in on-road and off-road infrastructure for cycling and walking, paths to major centres, and safe crossing points for pedestrians as very high priorities.[59] Safety concerns remain one of the main reasons that people in WA choose to not cycle more often.[60]

3.3.3 Assessment

Transport and economic

In 2013, for a typical off-road path in an Australian inner urban area, the economic benefit per kilometre walked or cycled in terms of reduced motor vehicle congestion was estimated at 20.7 cents per kilometre, with vehicle operating cost savings of 35 cents per kilometre. The health benefit was up to $1.68 per kilometre, the infrastructure savings for road maintenance was 6.8 cents per kilometre and environmental savings from reduced carbon emissions was 5.9 cents per kilometre. The aggregate economic benefits over a 30 year period is that for every 1,000 pedestrians per day, around $7 million is generated per kilometre of walking path, and for every 1,000 cyclists per day around $15 million is generated per kilometre of cycling path.[61]

The provision of quality EOT facilities by workplaces and other organisations has been shown to provide considerable cost savings in terms of vehicle kilometres travelled and to significantly increase returns on public investment in on-road and off-road bicycle facilities. Recent research has also cited demand for EOT facilities as one of the key drivers of demand in Australia's central business district property markets.[62]

The potential benefits of expanded walking and cycling infrastructure in Perth were evaluated by assessing the overall planned expansion of Perth's bicycle network, implemented with supporting travel behaviour change programs. The principal document informing this evaluation is *A Business Case for Investment in Cycling in Western Australia*, prepared by Catalyst and PATREC. This economic appraisal concluded that, in socio-economic terms, investment in the Principal Shared Pathway network (over a 25 year evaluation period), that delivered a five per cent growth in bicycle travel in the metropolitan area and was implemented with support travel behaviour change programs, would result in benefits of at least 3.4 times the costs incurred. A summary of the potential benefits of applying the appraisal's benefit/cost

---

57 Data Analysis Australia (2006) Perth and Regional Travel Survey. Department of Planning

58 RAC (2012) *A Business Case for Investment in Cycling in Western Australia*, prepared by Catalyst and PATREC

59 2015 RAC cycling survey and Main Roads WA Community Perceptions Survey 2015

60 2015 RAC cycling community survey

61 Queensland Department of Transport and Main Roads 2011, *Benefits of inclusion of active transport in infrastructure projects*, prepared by SKM and PWC, table EX.1: benefits summary. NOTE: Based on per kilometre benefits for a typical inner urban project (where no location has been specified), in 2010 figures.

62 Colliers International (2015*) Who will rule our CBDs: Ownership changing the realm of office*. Research and Forecast report First half 2015 Australia & New Zealand.

ratios to the proposed additional 685 kilometres of off-road cycle paths is provided below, assuming a network-averaged capital cost of $1.15 million per kilometre for path construction costs[63] and a 7 per cent discount rate.

Table 6 Summary of potential economic benefits of 685 km Principal Shared Pathway

	PV$M	BCR
Costs	747	
Benefits:		
15 years – no induced travel	1278	1.71
25 years – no induced travel	2143	2.87
25 years induced travel + 5% pa growth	2539	3.40

It should be noted that the economic (benefit/cost ratio) performance of individual PSP schemes is likely to vary considerably from the overall program average because of substantial variations between schemes in both costs (per kilometre) and in usage (per route section) and benefits. This highlights the importance of assessing performance of individual schemes as well as for the total program.

Social

Health benefits from cycling and walking are usually included as part of economic assessments. Cycling and walking provide regular cardio-vascular activity, which reduces a large range of major health risks including heart disease, strokes, hypertension, obesity and Type 2 diabetes. For example each additional hour spent commuting in a motor vehicle increases the likelihood of obesity by six per cent.[64] Changing from motorised trips to walking or cycling can also improve health by reducing air pollution.

Walking and cycling offer low cost, accessible travel for a range of trips and ages and imposes minimal costs on household and public budgets. Pedestrians include people with disability, the elderly and the very young, and it is important to ensure they are safe and able to complete their journeys conveniently and comfortably. Access to cycling routes can also increase access opportunities for people that are currently mobility-poor. Comparison of low income households in Denmark and the UK suggests that cycling at Danish rates could increase the mobility of the UK's poorest families by up to one quarter.[65]

Well-designed urban spaces that incorporate walking and cycling infrastructure encourage community interaction and social well-being. Walking provides affordable exercise and opportunities for improved quality of life.

Environmental impact

Infrastructure interventions that achieve significant shifts from motorised transport to cycling and walking trips have clear environmental benefits because, unlike motorised transport, cycling and walking produce no noise pollution or greenhouse gas

63 While costs and benefits calculated in the Catalyst Business Case were based on investment in the Principal Shared Pathway network it is likely that similar costs and benefits would apply to other off-road pathways that comprise the WA Bicycle Network including

64 Cycling Promotion Fund (2008), *Cycling: Getting Australia Moving,* funded by the Australian Government Department of Health and Ageing

65 British Cycling (2014) *Benefits of Investing in Cycling*

emissions. Case studies indicate that cycling and walking save significant quantities of fuel and reduce carbon from vehicle emissions.[66]

3.3.4 Challenges for implementation

Full benefits of cycling are only likely to be achieved by long term, network-wide strategic investment. Key risks to achieving increased cycling rates and associated benefits in Western Australia include delays to infrastructure delivery programs, increases in costs and external factors that make cycling less attractive.[67]

The Office of the Auditor General's findings in a 2015 report reinforced this view.[68] Completion of cycle paths along major transport corridors and more clearly defined bicycle routes through local neighbourhoods was considered critical to cycling becoming a significant mode of transport.

Piecemeal approaches, where marginal additions are made to an existing fragmented cycling and walking network, will not achieve a significant mode share for cycling.[69] Well-designed networks, community engagement and staged approaches to delivery are key factors in overcoming this risk. By far the highest percentage increase in use has been on the Midland train line Principal Shared Path where new sections have resulted in a progressively longer, unbroken cycling link to the Perth CBD.

Increases in walking require similar considerations for safety and infrastructure that provides clear separation from cyclists and motorists.

Decision-makers often take walking for granted and assume that few interventions are required to boost walking rates.[70] Because it is possible to walk and cycle along roads that lack foot or cycle paths, walking and cycling facilities are often given low priority. Areas with poor or limited walking paths tend to have significantly less walking and more driving than more walkable areas.[71]

3.3.5 Synergies and complementary measures

Policies and initiatives to create robust urban cycling and walking infrastructure include investment in an extensive network of shared paths and cycle lanes, traffic calming, intersection modifications, bike parking, integration with public transport and complementary parking and land use policies.[72] Research indicates that these initiatives must be taken together to achieve success.

Cross integration of relevant government agencies, programs to achieve a broad and connected network and integration with public transport facilities, such as train and bus stations, are also important.

Awareness and education campaigns to tackle issues of safety, cyclist and pedestrian behaviour and promote cycling and walking as the mode of choice for short journeys

---

66 U.S. Department of Transportation (2000) *The Environmental Benefits Of Bicycling And Walking, National Bicycling And Walking Study*, Case Study No. 15

67 RAC (2012)

68 Office of the Auditor 2015, *General Safe and Viable Cycling in the Perth Metropolitan Area*, Perth

69 Infrastructure Australia March (2009) *Cycling Infrastructure for Australian Cities* Background Paper

70 `Goodman, R. and R. Tolley (2003), *The Decline of Everyday Walking In The UK: Explanations And Policy Implications*, *Sustainable Transport: Planning for Walking and Cycling In Urban Environments* (Rodney Tolley Ed.), Woodhead Publishing (www.woodhead-publishing.com), pp. 70-83.

71 `Litman, T. (2014) *Economic Value of Walkability*. Victoria Transport Policy Institute

72 Pucher, J (2012) *City Cycling* Ralph Buehler MIT Press

are an important complementary measure for infrastructure improvements. Initiatives that focus on reducing vehicle traffic, controlling vehicle speed and clear separation of cycling and pedestrian pathways can be important to realise benefits of infrastructure improvements.

Collaboration between stakeholder groups and State Government agencies and local governments remains essential to providing for and promoting cycling and walking effectively.

3.3.6 Future application for Perth

Implementation of improved cycling and walking infrastructure will require Transport portfolio agencies to work with other State Government agencies, local government authorities and peak cycling bodies to:

- Develop guidelines to support the introduction of EOT facilities into new developments and investigation of the feasibility of private EOT facilities in some areas.
- Improve cycling and walking safety through targeted infrastructure treatments.
- Improve collection of bicycle counter data and other technical information to measure growth in cycling participation as well as identify areas with growing demand for cycling and walking.
- Investigate capacity of future strategic transport models to estimate the transport impact of walking and cycling infrastructure.
- Target investment to address gaps within the Principal Shared Path (PSP) and Regional Shared Path (RSP) networks and expand the PSP network.
- Reduce congestion and improve safety around key destinations including the Perth CBD, strategic activity centres, and connections to stations and schools.
- Review the existing and future bicycle network to ensure all future PSPs are based on separation of cyclists and pedestrians where possible.
- Undertake a review of all PSPs and RSPs within the CBD and inner areas in partnership with the City of Perth and Road Safety Commission.
- Plan for provision for cycle-only lanes within road or rail reserves.

Population	*Recommendation*
2.7 million	Perth's off-road cycling and walking network expanded from 172 km to 350 km to better connect all activity centres with an increasing emphasis on the separation of cyclists and pedestrians. End of trip facilities widely available in all major activity centres in Perth.
3.5 million	Further expansion of the PSP network to cater for long distance commuters and additional river crossings, resulting in 850 km of off-road cycleways.

3.4 Parking strategies

Efficient parking management includes various mechanisms that result in more efficient use of parking facilities, including supply constraints, sharing, efficient pricing, improved user information, and incentives to use alternative modes where this is more cost effective than subsidising parking. Effective parking strategies generally combine the use of long and short term parking charges, levies and parking supply limits (parking caps) to discourage private car journeys to specific sites or areas. Levies applied to parking facilities can increase parking prices to provide revenue for various planning objectives and increase use of alternative transport modes. Parking caps

impose an upper limit on parking supply in particular areas and can make cities more liveable by reallocating surface car parking to public spaces and footpaths or new residential areas.

3.4.1 Rationale

Increasing or introducing parking costs through charges and levies or limiting parking supply makes other transport modes more attractive and reduces car trips.

Efficient parking management has mixed user impacts: parking fee increases are a negative incentive while parking cash out and unbundling provide positive incentives to reduce vehicle ownership and use.

3.4.2 Background

Parking management strategies, particularly efficient parking pricing, are among the most effective TDM strategies.[73] Charging motorists directly for using parking spaces, or cashing out free parking, typically reduces car travel by between 10 and 30 per cent.[74] Similarly, unbundling residential parking so motorists pay for each parking space they use tends to reduce vehicle ownership. Other parking management strategies, such as reduced and more flexible parking requirements, indirectly reduce vehicle travel by allowing more compact infill development and encouraging property owners to charge for parking.[75]

In Australia, area-wide parking pricing schemes have operated in the business districts of Sydney, North Sydney and Perth since the 1990s and in other suburban business districts of Sydney since 2000. A parking levy was introduced in Melbourne in 2006. These have achieved typical parking elasticities for car travel demand ranging from 0.20 to -0.40. Although difficult to quantify, some research suggests parking prices can achieve a diversion rate to public transport of between 50 and 75 per cent.[76]

Case studies have shown that parking policies introduced as part of an integrated transport and land use strategy have been effective in reducing growth of parking and traffic over a period of 10 to 15 years.[77]

The introduction of the Perth Parking Policy in 1999 has had a significant impact on travel patterns in central Perth over the past 15 or so years. In the early 1990s, 50 per cent of commuters travelled to the Perth CBD as a car driver. This has now reduced to an estimated 35-38 per cent and travel by public transport, cycling or walking has almost doubled. Much of this reduction has been achieved by the direct and indirect effects of the Perth Parking Policy (PPP).[78]

The joint City of Perth and State Government policy established strict maximum parking levels for new non-residential city developments, an annual non-residential parking licence fee that funds public transport, pedestrian and cycling improvements, and three parking zones on the city's edge.

---

[73] Tom Rye (2010), *Parking Management: A Contribution Towards Livable Cities*, Module 2C, *Sustainable Transportation: A Sourcebook for Policy-Makers in Developing Countries*, Sustainable

[74] J. Richard Kuzmyak, Rachel Weinberger, Richard H. Pratt and Herbert S. Levinson (2003), *Parking Management and Supply*, Chapter 18, Report 95, Transit Cooperative Research Program; Transportation Research Board (www.trb.org); at

[75] Richard Willson (2015), *Parking Management for Smart Growth*, Island Press

[76] Paul Hamer, Graham Currie, William Young (2009) *Exploring travel and parking impacts of the Melbourne CBD parking levy*

[77] Richardson, Emerson (2014) *The importance of Parking policy for sustain transport and land use city planning*. AITPM National Conference 2014

[78] Richardson, E (2014)

During a period in which employment in the city has grown by about 30 per cent, there has been a reduction in car trips to and from the city and public transport use has more than doubled. The major reasons for these travel pattern changes are direct and indirect effects of the PPP along with improved public transport capacity and services.[79] The PPP has also contributed to reallocation of parking spaces with a growing number of property owners converting car parking bays to bike parking areas.

These impacts vary depending on specific demographic and geographic conditions, and the types of travel affected. The impact of parking supply constraints on the QEII Medical Centre has been particularly effective with car driver mode share decreasing from 73 per cent to 43 per cent over four years. Although a number of other TDM measures were implemented to support the parking supply restrictions, parking caps were determined to be the driving factors for the observed mode shift.[80]

3.4.3 Assessment

Transport and economic

The potential benefits of expanding parking strategies to other activity centres in the Perth region have been independently evaluated. The evaluation assessed a policy to limit parking supply for long-stay (worker) and short-stay (shopper) parking at major activity centres. The policy involves a supply component (i.e. constraints on the number of parking spaces provided) and a pricing component (i.e. parking charges more related to the costs of provision). A cash in lieu scheme and a parking levy are proposed as part of the policy with all revenue hypothecated to improvements to transport infrastructure for public transport, walking or cycling, or the provision of public parking within the city centre.

The evaluation is based on a review of previous work undertaken to develop a parking strategy for the City of Stirling city centre.

The economic analysis was designed to assess the economic costs and benefits of the proposed parking strategy relative to a 'business as usual' strategy, which would effectively continue the prior policy settings of unconstrained free parking. Demand assessment and analysis of costs and benefits was undertaken for three years (2010, 2021 and 2031), with the report noting that demand effects were based on scenario development rather than a formal modelling approach.

[79] Richardson, (2014)

[80] Martin, J (2014) *Parking Supply Restriction and Mode Shift at QEII Medical Centre* – A Case Study, AITPM 2014 National Conference

*Table 7: Economic benefits and costs of parking strategy introduced at major Perth activity centre**

Item	Present value ($M)	
	Discount rate 7% 2021	Discount rate 4% 2031
Costs		
PT operations (and capital) costs**	133.9	205.9
Net costs	**-145.3**	**-163.9**
Benefits		
Parking infrastructure capital costs	-257.1	-335.9
Parking facility O&M costs	-22.1	-33.9
Private vehicle operation (reduction)	122.8	192.2
Congestion (reduction)	92.6	148.0
Health and fitness (increase)	72.9	115.6
Road trauma (reduction)	16.0	24.2
Air pollution (reduction)	9.4	14.2
Noise pollution (reduction)	6.4	9.9
GHG/climate change (reduction)	5.2	78.7
Net benefits	**325.3**	**512.8**
NPV	**470.6**	**675.6**
BCR	**4.5**	**3.5**

* Economic evaluation was undertaken over a 20 year period starting from 2010, based on two discount rates (7% pa and 4% pa, real terms).

** It should be noted that the costs of public transport are almost certainly over-stated because there are opportunities to make use of existing spare capacity (mainly contra flow in peak periods) or double use of capacity on services.

The main benefit items included:

- savings in private vehicle operation and reductions in congestion on the road network resulting from the reduced traffic generation by the centre; and
- health and fitness, associated with people switching from largely car travel to walking or cycling to the centre.
- savings in the capital costs of parking facilities as a result of the reduced number of spaces provided in the strategy; and
- savings, although much smaller, in ongoing parking operations and management costs.

These two savings items are partly offset by the costs associated with the higher levels of public transport provision to and from the centre.

Overall, the assessment indicated cost savings of $145 million and net benefits of $325 million at a seven per cent discount rate, and cost savings of $164 million and net benefits of $512 million at a four per cent discount rate. In economic terms this indicates a very good scheme as it results in both cost savings to public and private developers and net benefits to the transport system and its users.[81]

[81] The cost and benefit assessment was generally consistent with a conventional cost-benefit analysis approach. However, no term was included for travel time savings or losses for visitors to the centre which might impact on the validity of these estimates.

If similar analyses were to be undertaken for other major activity centres broadly similar results are likely to be obtained, suggesting that there would be a strong economic case for the adoption of parking constraint and levy strategies at other centres. It would be important that implemented strategies conform to a consistent set of guidelines applied throughout the region.

Social

Properly implemented parking policies provide multiple benefits; they can help reduce traffic congestion, encourage more compact development, support environmental objectives and raise revenue for public programs and infrastructure.

Social benefits of the PPP have included improved pedestrian amenity, which has helped encourage a 30 per cent increase in pedestrians in the CBD.[82] Reductions in traffic volumes have enabled more bus priority and cycling infrastructure as well as wider footpaths.

3.4.4 Challenges for implementation

Pricing changes need to be coupled with other incentives and complemented with good alternative transport choices so that commuters and shoppers choose to not drive.

Unless road users appreciate the benefits they traditionally object to new charges and higher prices, particularly if parking has been free or significantly subsidised. While there were some initial concerns about the PPP's impact on the CBD economy due to restricted car access, the policy, combined with public transport and pedestrian environment improvements, has been very successful and is now widely accepted.

Levies might not achieve significant mode shifts in themselves when they are not passed directly on to motorists. Examination of the introduction of a levy on public and private car parking spaces in the Melbourne CBD, where the revenue raised by the levy is not hypothecated (unlike the Perth Parking Policy) concluded that it had only been moderately effective in reducing travel demand.[83]

Parking demand that exceeds supply can result in more cars driving around a local area searching for limited parking, leading to more congestion and delay. Parking management that provides for short term parking is integral to TDM.

Imposing parking maximums are likely to have a reduced impact over time because the long-term strategic factors that they anticipate (for example improved public transport) will eventually influence parking provision through normal market forces. The congestion reduction benefits that they deliver however might persist longer.[84]

Where parking caps are implemented, some flexibility will need to be retained for commercial and delivery vehicles (these are treated differently under the Perth Parking Policy).

3.4.5 Synergies and complementary strategies

Perth's success in achieving a consistent and stable parking policy in the city centre demonstrates the benefits of introducing a statutory policy that has been negotiated

---

[82] Richardson, Emerson (2014) *The importance of Parking policy for sustain transport and land use city planning*. AITPM National Conference 2014

[83] Hamer, Currie and Young, (2011) 'Parking Price Policies – a review of the Melbourne congestion levy' *Australian Transport Research Forum 2*

[84] Auckland Council (2013) *The Economic Impacts of Parking Requirements in Auckland*

between the State and local governments. A key success factor was the fact that the policy was multifaceted and addressed parking capacity, caps, pricing and use of revenue to fund transport modes that provide alternatives to cars.

The price of parking linked to the number of available spaces influences travel behaviour in areas with high parking demand. For parking policy measures to be effective, good alternative transport must be in place before such policies are introduced.

Parking levies tend to provide the greatest benefit if they are:

- applied as broadly as possible to the widest geographic area and the most categories of parking facilities;
- implemented as part of parking management programs that encourage more efficient use of parking facilities;
- implemented as part of programs that encourage use of alternative transport modes; and
- used to fund local improvements.

Parking maximums are most effective in areas or commercial centres where parking is cheap and available, congestion is high and where attractive travel alternatives are readily available. Complementary policies such as on-street parking controls and parking levies are often necessary to form an efficient parking market.

A broad range of travel demand measures is essential to support the implementation of parking caps. Initiatives implemented at QEII Medical Centre to complement parking restrictions included:

- travel behaviour change programs;
- travel plans for new developments;
- increased frequency and hours of operation for bus services;
- provision of electric bicycles for on-site use;
- parking prioritisation;
- a centralised carpool management system with guaranteed parking for multi-occupancy vehicles; and
- introduction and expansion of on-site paid parking.

3.4.6 Future application for Perth

Implementation of new parking strategies or policies in Perth's activity centres will require the Department of Transport to work with the Department of Planning, local government authorities and the community to:

- identify activity centres where employment and density are rapidly growing and which centres are, or are expected to be, dominated by uses that generate commuter traffic;
- develop new parking policies and guidelines for access to and within strategic and specialised centres;
- develop new parking policies and guidelines for all activity centres that manage demand for parking and related congestion; and
- periodically review the Perth Parking Policy to assess potential for further mitigation of congestion in the CBD.

Population	Recommendation
2.7 million	Where good transport alternatives to car driving exist, parking strategies introduced in activity centres and industrial areas with high levels of density and employment. Levies used to fund alternate travel modes.
3.5 million	Parking strategies widely applied in appropriate locations across Perth and Peel.

3.5 Public transport time of day pricing

Public transport time of day pricing includes the introduction of public transport fare differentials between peak periods (higher) and non-peak periods (lower). Peak pricing schemes can be a surcharge for travel in peak periods, an offer of free or discounted travel during off-peaks, or a combination of both.

3.5.1 Rationale

Public transport time of day pricing makes off-peak travel more financially attractive for users who have flexible travelling times than during times of peak demand when transport costs are higher.

By encouraging passengers to reduce use of public transport during peak periods, public transport time of day pricing can optimise the use of existing public transport capacity and better achieve transport economic efficiency objectives.

3.5.2 Background

Introducing fare differentials between peak and off-peak periods can shift public transport users' travel patterns. In general, fare differentials of at least 30 per cent between peak and off-peak travel can substantially reduce peak period train overcrowding.[85]

Peak public transport use declined by about eight per cent one year after the introduction of peak surcharges by several US public transport operators.[86] Evidence in other cities suggests that simultaneous peak pricing and off-peak discounts could be more effective than peak surcharge or off-peak discounts individually to spread peak and off-peak public transport demand, if properly managed and implemented.[87]

A number of trials and schemes operate to provide discounted or free travel to passengers travelling outside peak periods. Melbourne's 'Free before 7' initiative provides free public transport for trips before 7:00am and is estimated to have reduced demand in the peak by between 1.2 and 1.5 per cent, which is equivalent to between 2.5 and five peak train loads[88]. A number of US trials to provide free off-peak public

---

85 Johnson, D.H. and Whelan, G.A. (2003) *Modelling the impact of alternative fare structures on train overcrowding*. In: European Transport Conference 2003

86 Cervero, R. 1986. Time-of-day Transit Pricing: Comparative US and International Experiences. *Transport Reviews: A Transnational Transdisciplinary Journal*,

87 Evan Gwee and Graham Currie (2013) Review of Time-Based Public Transport Fare Pricing, *Journeys*

88 Graham Currie (2009) 'Exploring The Impact of the 'Free Before 7' Campaign on Reducing Overcrowding on Melbourne's Trains', *32nd Australasian Transport Research Forum*

transport have achieved significant peak patronage share decreases. Substantially smaller impacts were found for discounted rather than free fares.[89]

While time based pricing structures can increase off-peak patronage, there is limited evidence on the impact of peak pricing on overall patronage and possible mode shifts to other forms of transport. This reflects the complicated nature in which travellers make decisions about public transport. Service frequency and on-time performance are more likely to influence patronage than fare prices[90] and price elasticities for bus and train travel can differ.[91]

Peak contraflow fares were introduced on the London Underground in January 2011 in which passengers travelling out of central London during a weekday peak period were charged an off-peak fare instead of a peak fare. Despite an average fare decrease of 46 per cent, after two months there was negligible change in patronage.

Perth's public transport fares currently have a differential pricing structure for distance (zone based) but are not time-based and do not distinguish between different modes or services. This is in contrast to most other major Australian cities that have introduced some form of public transport peak and off-peak pricing.

Despite public transport in Australian cities being among the world's most affordable,[92] according to the 2015 Perth Passenger Satisfaction Monitor approximately half of public transport users in Perth consider bus and train fares to be 'excellent' or 'good' value for money and satisfaction with fares has been in decline since 2005.

Analysis of train boardings indicates that Perth experiences a highly concentrated peak between 8:00am and 8:30am, falling sharply in the half hour before 9:00am. Travel during the morning peak is dominated by standard ticket holders. Tertiary students are a significant customer group, representing approximately 10 per cent of CBD passengers.

Perth's transport patronage has been growing over the long-term and adding new capacity to serve peak periods is difficult and costly due to existing platform lengths, signalling and train control system capacity and the cost of adding new railcars or lines.

3.5.3 Assessment

Transport and economic

The potential benefits of introducing time of day public transport pricing in Perth have been independently evaluated. The evaluation assessed a fare differential of 30 per cent in Perth public transport fares and considered economic benefits and financial costs and savings.

The key characteristics of the differential (time of day) fare options assessed are as follows.

---

89 McCollom, B.E., & Pratt, R.H. (2004). 'Transit Pricing and Fares - Traveler Response to Transportation System Changes' *Transportation Cooperative Research Program (TCRP) Report 95: Chapter 12*, published by Transportation Research Board, Washington.

90 Pratt. (2000, March). *Traveler response to transportation system changes, interim handbook (TCRP Web Document 12).* Garrett Park, Maryland: Transit Cooperative Research Program.

91 Webster, F.V., Bly, P.H. & Paulley, N.J. (1988). *Urban land-use and transportation interaction: Policies and models*. Brookfield, Massachusetts: Avebury.

92 http://www.smh.com.au/business/the-economy/public-transport-in-australian-cities-among-the-worlds-most-affordable-20150928-gjwkah.html

- Revenue neutral (no change in total public transport fare revenue).
- Peak 'standard' fare increases of approximately nine per cent while off-peak fares reduce by approximately 16 per cent, with the result that peak fares would be 30 per cent higher than off-peak fares. Concession fares would not be affected.
- Patronage reduction of approximately four per cent in peak periods with an increase of approximately 12 per cent in off-peak periods, giving an overall increase of approximately three per cent.

The economic benefit components covered were (in descending order of magnitude):

- Health benefits – associated with changes in walking/cycling travel.
- Car operating (unperceived) cost adjustment.
- Road (de)congestion.
- Other – crash savings, fuel duty reduction.

The application also results in significant cost savings, estimated as follows:

- Potential Public Transport Authority expenditure for public transport system (rail and bus) service expansion over the next 20 years that might be attributed to increases in CBD peak period capacity averages $244 million per annum (approximately $4,900 million over 20 years).
- This would provide an increase of around 60 per cent in current CBD peak period capacity.
- The reduction in the projected business as usual CBD-oriented peak period demand as a result of the differential fares policy would be 3.2 per cent.

On this basis, the estimated annual cost savings of a time of day pricing initiative as described above is $12.9 million per annum.[93]

Overall findings are as follows.

- Differential fare policies, if implemented in a revenue-neutral manner, would result in net economic benefits estimated at $7 million per annum, principally to public transport users.
- Such policies would also reduce the need for (or delay the timing of) costly increases in rail and bus system capacity in the central/inner areas. The indicative estimate is that this would result in a financial saving to government of around a further $13 million per annum.
- The overall result is a net economic benefit of between $19 million and $20 million per annum (which as calculated would apply for 20 years and potentially in perpetuity).

Social

Peak pricing is likely to improve social equity by reducing the financial burden on low income passengers. In the absence of peak pricing, off-peak travellers, who tend to have lower incomes and travel shorter distances, effectively subsidise peak period commuters, who enjoy higher incomes and travel longer distances.[94]

[93] This saving would be expected to apply throughout the 20 year period, and potentially in perpetuity.
[94] Smith (2009)

Peak-pricing schemes attract more commuters to public transport by reducing overcrowding during peak periods and offer wider community benefits through overall reductions in congestion.

Environmental

Environmental impacts of public transport peak pricing will depend on travel mode changes. Where public transport peak trips are converted to car trips, there is potential for negative environmental impact while a growth in off-peak patronage would have positive environmental benefits in terms of reduced emissions.

3.5.4 Challenges for implementation

Worldwide experiences show that any form of time-based public transport fare pricing programs would need time before they could have any perceptible effect on shifting peak ridership to off-peak periods.[95]

There are a number of transport, social and other risks where price differentiation is introduced as fare increases or peak period surcharges. Fare increases are generally unpopular and there are strong pressures to keep fares low and subsidies high to achieve wider community objectives such as social inclusion and access to services.

Peak surcharges could have the unwanted effect of reducing overall passenger numbers and shift trips made by public transport to other modes, such as car travel. Some studies have estimated passenger losses of up to seven per cent due to increased fares.[96]

While peak pricing has been considered in Perth no research to date has accurately determined whether passengers that shift from the peak move to shoulder services or leave the public transport system entirely for another mode. This impact is likely to vary from jurisdiction to jurisdiction depending on a range of other factors such as availability and price of parking, price of fuel, availability of cycling networks and end-of-trip facilities.

The existing smart ticketing system in Perth does not easily lend itself to peak pricing and consideration would need to be given to new business rules for ticketing and ensuring that a peak fare system did not encourage public transport users to purchase cash tickets.

3.5.5 Synergies and complementary strategies

Initiatives that promote flexible working, tertiary and school hours and increase the capacity of peak passengers to shift the timing of their trips will offer the greatest support to peak pricing schemes. Quality of service in peak and off-peak periods, particularly frequency and capacity, is also a critical success factor.

Success in shifting passengers out of peak periods requires pre-peak services with unused capacity, commuter willingness to re-time trips, flexible ticketing systems and gated exits, and regulatory/economic structures to realise benefits from reduced overloading.[97]

---

[95] Evan Gwee and Graham Currie (2013) Review of Time-Based Public Transport Fare Pricing, *Journeys*

[96] Carlquist and Fearnley (2001)

[97] Currie G (2010) 'Enhancing Rail Capacity Using Free Fare Incentives To Shift Demand Peaks' *World Conference Transport Research Lisbon July 2010.*

Peak public transport pricing is also related to using pricing measures to manage demand on the urban road network by ensuring that users pay appropriate fees to use the road during peak periods.[98]

3.5.6 Future application for Perth

Key government agencies including the Public Transport Authority, Department of Treasury and Department of Transport will need to work together to:

- undertake further detailed research, evaluation and discussion to agree on a differential pricing option for further assessment including modelling of various options;
- develop a robust business case to assess economic, financial, social and travel impacts of an agreed time of day pricing scheme;
- determine a timeframe and communications strategy for implementation; and
- scope and undertake changes to business processes and payment systems.

Population	*Recommendation*
2.7 million	Revenue neutral time of day pricing scheme implemented with peak fares 30 per cent higher than off-peak fares. Concession fares remain unaffected.
3.5 million	Pricing of public transport fares reviewed to assess the need to increase the fare differential between peak and non-peak periods. Concession fares remain unaffected.

3.6 Road use pricing reform

Pricing measures to manage road use demand include schemes that charge motorists a road use fee that varies by time, distance, location and vehicle. Fees might be higher under congested conditions or for larger and more polluting vehicles and lower on uncongested roadways or in off-peak times. Road use pricing reform aims to eliminate other road user taxes and charges such as vehicle registration fees and fuel excise while more directly charging motorists for their individual levels of road use. Cordon pricing, where motorists are charged a fee for driving in specific areas, such as central business districts, is sometimes proposed as an urban congestion reduction strategy aimed at reducing local traffic impacts and discouraging unnecessary road use in busy areas. The most well-known and best documented examples include schemes in Singapore, London and Stockholm.

3.6.1 Rationale

Pricing measures that manage road use demand reflect the real cost of travel during periods of high demand. Pricing schemes regulate traffic flows to efficient levels by directly charging car drivers for the use of congested roads or entry into specific areas at peak periods. Efficient pricing of roads encourages car drivers that drive frequently on heavily congested roads to make more efficient choices about what transport mode to take and/or which route to drive. Pricing measures can simultaneously generate revenue that can be used to improve an area's public transport and road networks.

[98] Smith (2009)

3.6.2 Background

Successive Commonwealth Government tax, competition and productivity reviews, including the Henry Tax Review[99] and the Harper Review[100] have identified reforming the way road users are charged as a national priority and the key to a more productive, efficient and sustainable Australian transport system. The 2016 Australian Infrastructure Plan also recommended road user charging reform as a way of reducing congestion and help fund major projects.[101]

Distance and time based charging

While direct road user charging for all motorists on the basis of distance and time is widely considered by economists to be the optimal form of charging for road use, no system of this type has been introduced in Australia or overseas for passenger vehicles. Mass-distance-location charging schemes have been established in a number of overseas countries for heavy vehicles, primarily to raise revenue to cover the cost of heavy vehicle roads and to improve efficiencies in the road transport sector. Singapore is currently planning to replace its existing electronic pricing system with a satellite-based charging mechanism by 2020.[102] While this initiative is primarily to reduce operational costs of the current gantry system, it could also allow the Singapore Land Transport Authority to introduce a distance and time based charging mechanism for roads.

Any measures to use road pricing to manage demand in Perth would need to be fair and equitable for all motorists and have scope to remove existing road user costs, such as vehicle registration fees and fuel excise charges.

Distance, location and time based road pricing has been widely promoted as a way to reduce traffic congestion and achieve other TDM objectives. This has significant implementation costs, including equipment, vehicle tracking and billing. It requires motorists to pay for special tracking equipment to be installed in their vehicles to calculate the road user fee, which reduces its cost efficiency, raises privacy concerns and tends to generate political opposition.

These costs could be reduced if implemented nationally, with standardised tracking equipment installed in all new vehicles. Until this occurs it will be difficult for a single state or urban region to implement a distance and time based road pricing system.

Cordon charging

Cordon charging has been used in a number of overseas cities to manage road use demand with some success. The Singapore scheme, which was first implemented in 1975 as a simple area-licence scheme, is estimated to have resulted in a 44 per cent decline in traffic in the city centre. London's system is reported to have reduced traffic volumes by approximately 20 per cent, which increased average traffic speed by 37 per cent and reduced bus congestion delays by about 50 per cent. Bus ridership increased 14 per cent and subway ridership by about one per cent. Stockholm's congestion charge system also reduced traffic volumes by about 20 per cent.

---

99 Australian Treasury (2010), *Australia's Future Tax System,* The Commonwealth Government of Australia

100 The Harper Review advised that Governments should introduce cost-reflective road pricing with the aid of new technologies, with pricing subject to independent oversight and revenues used for road construction, maintenance and safety

101 Infrastructure Australia (2016) *Australian Infrastructure Plan: Priorities and reforms for our nation's future*

102 www.channelnewsasia.com/news/singapore/satellite-based-erp-to-be/2547700.html

In Milan, a cordon charge that differentiated between private and commercial vehicles reduced the number of vehicles entering the city centre by around one-third.[103] A pause in implementation due to legal action by car park operators provided clear evidence that the reduction in vehicle numbers was almost solely due to the congestion charge, as vehicle numbers reverted to pre-cordon charge levels.

Singapore currently has the most well developed electronic road pricing system. The Singapore scheme involves more than 50 charging points in a ring around the central business zone, on the main expressway and on several arterial streets. The charges vary by vehicle type, location and time of day/traffic conditions - with the aim of keeping speeds on the routes affected within a 'golden range' which ensures efficient traffic flow.

3.6.3 Assessment

Transport and economic

An assessment of road user pricing reform included consideration of distance and time based charging as well as cordon charging in the Perth central business district.

There are currently no examples of real-time, distance-based, time-of-day large area charging although a number of studies have tested how this kind of road-based charging might affect travel activity. One study[104] found small-scale travel adjustments by motorists could virtually eliminate traffic congestion. Other potential benefits included lower vehicle emissions, fewer crashes, travel time savings, improved roadway performance and reliability, and lower operating costs. A conservative analysis indicated that the present value of net economic benefits could exceed $28 billion over a 30-year period.[105]

Transport portfolio modelling of the impact of a moderate distance-based charge in Perth and Peel at 3.5 million showed a 5.1 per cent decrease in car driver trips (all day), a small increase in car passenger trips, a 4.1 per cent increase in PT trips and approximately 1 per cent increase in walking and cycling trips. Modelling also showed that average trip length for car drivers dropped significantly. The combination of fewer car driver trips and shorter car driver trips resulted in a decrease in both car driver vehicle kms and vehicle hours.

By reviewing the effects of cordon charges in Stockholm, Milan and in particular London, where extensive post-implementation analysis has been undertaken, some likely effects of an inner city cordon charge and its impact on road traffic in Perth have been estimated.[106]

---

[103] EC (2013). *Milan: Lessons in congestion charging.* European Commission. http://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/italy/20130708_milan-lessons-in-congestion-charging_en.htm

[104] *TheTraffic Choices Study* (www.psrc.org/transportation/traffic) tested a road pricing system on using 275 representative households in the Puget Sound, Washington region.

[105] Wallis, Ian (2016) *WA Department of Transport Assessment of Travel Demand Management Instruments*

[106] Wallis, Ian (2016) *WA Department of Transport Assessment of Travel Demand Management Instruments*

The key behavioural impacts of the application are expected to be:

- Reduction in traffic volumes within the cordon area and (to an extent) approaching the cordon, offset to some extent by an increase in traffic travelling on circumferential routes just outside the cordon.[107]
- Reduction in the demand for parking within the cordon areas, particularly by employees.
- Increase in public transport patronage, particularly for work trips to and from the CBD.
- Reduction in peak period traffic congestion and associated externalities (crashes, vehicle emissions, etc).
- Increased travel costs for motorists that need to access the cordon area, translating into increased revenues to the cordon charging authority (but partly offset by scheme implementation and administration costs).
- Time savings due to reduced congestion for motorists that need to access the cordon area.

In summary the economic assessment indicated that:

- The benefits of a cordon charge scheme would significantly exceed the costs.
- There would be some benefits to road users from road decongestion and savings in vehicle operating costs; however, road users would also be disadvantaged, largely through having to pay the cordon fee.
- The cordon fee would result in some current car users switching to public transport, cycling or walking. There would be some consequent health and fitness benefits and a reduction in air pollution costs.
- Economic assessment of transport benefits forecast that the wider community would gain $0.54 billion from reduced noise, pollution, greenhouse gas emissions, crashes and improved health from increased cycling and walking.
- Wider benefits are likely to accrue through the mitigation of the overall economic, social and environmental effects of traffic congestion, including financial and productivity costs. Monetised time savings are estimated to be higher than the operating costs of a congestion charging scheme by a wide margin.[108]

Social

While cordon charges deliver substantial general social benefits through reduced congestion costs and travel time savings, cordon pricing is often criticised as unfair and regressive. Its overall equity impacts depend on the price structure, motorist demographics (whether economically disadvantaged people frequently drive on congested roads), the quality of alternatives to driving and how revenues are used. In many situations, road user fees are less regressive than other road financing options, and benefit disadvantaged people overall if a portion of revenue is invested in affordable transport options such as public transport service improvements.

Car drivers that drive minimal distances such as seniors and the economically disadvantaged benefit from a user pays system. Research in Melbourne however indicates that people who currently live in urban fringes without good public transport

[107] A component in the success of the London (and Stockholm) congestion charge schemes was the existence of a high capacity ring route just outside the cordon.

[108] E. Pike (2010), *Congestion Charging: Challenges and Opportunities*, International Council on Clean Transportation;

(and likely to be less wealthy than inner city residents) travel longer distances than those living in the metropolitan areas.[109]

Environmental

Cordon charges deliver localised environmental benefits within the cordon charging area by reducing the number of vehicles accessing the zoned area, vehicle idle time and start-stop driving. The benefits of cordon charging schemes are not restricted to the immediate area of application and overall reductions in traffic volumes are likely to contribute to reduced local air pollution, noise and greenhouse gas emissions.

3.6.4 Challenges for implementation

The primary risks of introducing any congestion pricing initiative include community rejection, implementation costs, risk of failure (for example inaccurate charging levels to manage travel demand), social impacts and unintended consequences. Any measures to use pricing to manage road use demand in Perth would need to be fair and equitable for all motorists and have scope to remove existing road user costs such as vehicle registration fees and fuel excise charges.

One of the key hurdles to the introduction of broad scale road pricing is community acceptance. Opponents are concerned not only about the direct cost to users but also diversion of traffic into residential areas and a lack of alternative forms of transport, including public transport, being in place before the scheme is implemented.

Failure to manage expectations in advance was the primary reason for the overwhelming rejection of proposed cordon charging by 74 per cent of Edinburgh voters (BBC, 2005).[110] Asking people in advance, with no benchmark to inform them and no demonstration of commitment to providing alternatives, appears to be a recipe for non-implementation. In addition, initial rejection has long-term consequences making reintroduction of price measures to manage road use demand even more difficult.[111]

Any cordon-based price measure to manage road use demand would place added pressure on car parking in areas immediately outside the cordon. This can already be seen with high CBD parking charges leading to all-day parking pressure in parts of the City of Vincent and will require active and effective management, including enforcement.

For more comprehensive road use pricing initiatives, experience of heavy vehicle charging schemes across the world indicate costs of implementation can vary widely and therefore careful consideration of technology and functions of any scheme is essential to minimise capital and operating costs.

3.6.5 Synergies and complementary measures

Clear policy objectives and rationale for road use charging schemes has been an important element of successful heavy vehicle charging schemes across the world.

---

[109] Currie (2014) 'When the wheels come off: transport poverty and disadvantage'. *Insight Magazine*, Victorian Council of Social Service

[110] BBC News, 22nd February, (2005) 'Edinburgh rejects congestion plan'. http://news.bbc.co.uk/2/hi/uk_news/scotland/4287145.stm (accessed 16th October, 2015)

[111] Edinburgh Evening News, (2014) - http://www.edinburghnews.scotsman.com/news/transport/council-rule-out-new-city-congestion-charge-1-3482932.

Road use charging schemes need to be supported by efficient operation with low costs to demonstrate a clear nexus between the policy and net contribution to the economy and the community. Appropriate capabilities to deliver policy, effective compliance and enforcement strategies along with public engagement activities and partnership with key decision makers has been vital to ensuring support for policy implementation.

Any comprehensive road use charging scheme must demonstrate that the benefits clearly exceed the disadvantages. Support for road pricing reform can be engendered through trial periods, express lanes, and advocacy through non-government groups.

Replacement of existing road user charges and taxes would be a key element to gain community acceptance of distance and time based charging as could hypothecation of revenue to fund transport solutions.

3.6.6 Future application for Perth

Population	***Recommendation***
2.7 million	Work with national reform agencies, other Australian jurisdictions and stakeholders to develop options to introduce cost reflective road pricing for all vehicles.
3.5 million	Well-designed road use pricing initiatives that mitigate congestion and meet overall social equity objectives considered for introduction in Perth and Peel.

4. Further work

The Department of Transport will develop a TDM Implementation Plan to address how recommended measures will be implemented in the short to medium term, identify further research and policy work to be undertaken and identify enablers that would underpin the implementation of successful TDM strategy and policy in Perth.

Development of the TDM Implementation Plan would include extensive consultation and engagement with Transport Portfolio partners, relevant State Government agencies and other key stakeholders.

The TDM Implementation Plan will reflect, where relevant, the objectives of the Smart Transport framework which promotes small step changes in travel behaviour, localised content and a collective sense of responsibility for Perth's transport system. It will include a focus on the campaign's key audience segments that include car users who are open to congestion minimisation strategies and public transport use, public transport users open to greater use and those who like to walk and cycle. It will also help to provide people in Perth with a sense of what is being achieved now and in the future.

4.1 Implementation of recommended measures

The TDM Implementation Plan for Perth will specify an implementation strategy for the recommended measures for the short, medium and long term. It will describe responsible agencies, timeframes, key activities to be undertaken, resourcing requirements and how measures will be designed. In some instances, the Implementation Plan will recommend the development of detailed business cases.

4.2 Other potential applications

A number of the TDM measures assessed in this report indicate potential for moderate to high impacts on travel behaviour at relatively low cost. The TDM Implementation Plan will describe additional work or activities to be undertaken in respect of the following initiatives or measures.

4.2.1 Flexible and staggered hours

Although the Department of Transport has no direct role in implementing flexible and staggered hours in workplaces, it will continue to provide guidance and information through its travel change workplace programs, which promote the potential benefits of reducing the need for employees to travel in peak periods. In partnership with transport agencies in other Australian jurisdictions and relevant organisations, it will also continue to research, explore, monitor and assess the effect of alternative work schedules, staggered hours and telecommuting on mitigating congestion.

Alternative work schedules

Alternative work schedules are variations to the typical 9am-5pm, Monday to Friday, working week in order to reduce peak period traffic and public transport demand. Alternative work schedules include flexible work hours ('flexitime'), compressed working week (employees working fewer but longer days) and staggered shifts that reduce the number of employees arriving and leaving a worksite at the same time.

Provision of alternative work schedules can have a strong effect on peak period traffic and public transport demand. The option of a flexible work schedule is the primary factor determining how employees schedule their travel.

Teleworking

Telework uses technology to replace the need for physical travel for work purposes. As technology costs reduce and service quality improves the feasibility of telework increases. Telework might occur from home or from a regional telework centre. Teleworking, also known as telecommuting reduces vehicle kilometres travelled, especially during peak times.

Staggered school hours

Staggering school hours refers to schools adopting different starting and finishing times and is aimed at reducing the number of students and staff arriving and leaving schools at the same time. For example, school shifts could be split between a 7am to 1pm shift, a 9am to 3pm shift, and a 12pm to 6pm shift.

Staggering school drop off and pick up times can considerably reduce congestion around schools.[112] spread out peak demand on roads and public transport, particularly on buses and trains that carry school students.[113] and therefore optimise the use of existing infrastructure. It can also reduce extreme early morning peaks at particular departure points.[114] Staggered school hours do not directly promote mode shift or reduce the need to travel.

4.2.2 Improved travel information and payment systems

Improving the provision of timetabling information online, at stops and stations and on board buses and trains increases the convenience, connectivity and ease of using public transport and encourages more people to use public transport services. High quality provision of real-time timetable information can also help change the perception that public transport is unreliable. Technology innovations such as advanced traveller information systems that enable networked and real-time information can have a significant peak spreading effect.

The Department of Transport in conjunction with the Public Transport Authority will monitor the impact of the increasing provision of real time passenger information in Perth and the development of personalised journey planners, and the effect of these initiatives on mode shift and travel times.

The Department of Transport in conjunction with Transport Portfolio partners will investigate the feasibility of establishing and developing standards and partnerships between service operators and commercial partners to promote data sharing and user involvement in public transport service development. Proposals will be developed as appropriate depending on available technology, adoption rates, costs and private user-provided services, and might be undertaken by the private sector.

---

[112] La Vigne, N. (2007). 'The Problem of Traffic Congestion Around Schools'. *Guide No. 50*. Centre for Problem Oriented Policing (http://www.popcenter.org/problems/school_traffic/print/)

[113] Yellow School Bus Commission (2008) *Commission's Report and Recommendations*, London: Yellow School Bus Commission

[114] Ljungberg A. and Jansson J. (2009). 'Staggered school hours to spread peak demand for public transport - benefits and costs. *International Journal of Transport Economics*, 36(1), pp141-160

4.2.3 Integrated land use and transport

Growth strategies include the establishment of transit oriented developments (TODs), corridor planning and smart growth. TODs increase residential density and mixed uses around public transport stations and can be used to manage transport demand. TODs can provide accessible alternatives to car use and reduce the need to travel by containing activities such as work, shopping, leisure and education within a higher density urban precinct. Corridor planning integrates land use and transport planning by providing frequent public transport services, linear transport networks and activity centres along high density corridors. Smart growth is a term used predominantly in North America and Europe for policies that integrate urban planning and transport decisions to concentrate growth in compact, walkable urban centres to avoid sprawl.

The land use system plays a crucial role in travel demand by determining people's transport needs and options. Changes to the land use system that increase employment, residential density and other activity, particularly around public transport hubs, while providing for effective corridor planning and promoting efficient employment distributions are vital to fundamentally change travel behaviour in Perth.

The land use scenarios depicted in the Western Australian Planning Commission's Perth and Peel @ 3.5 million are modelled in Transport @ 3.5 Million. The challenge is to improve employment self-sufficiencies by providing jobs near to where people live and so maximise the use of existing and proposed infrastructure.

The Department of Transport will develop cross-agency policies that support integrated land use, including a policy to facilitate the development of TODs. It will also investigate and address potential governance and other barriers to better integration of land use.

4.2.4 New mobility services

Car sharing

Car sharing schemes provide members with short term access to vehicles for personal and business use. Car sharing can provide the benefits of private car ownership without the operating costs and responsibilities and are effective in reducing overall vehicle kilometres travelled. Although car sharing has existed for many years around the world, it is currently undergoing a technology-driven revolution to offer advanced services such as open-ended bookings, instant access, one-way rentals, prepaid user cards, interoperability and personal vehicle sharing. The potential annual savings from car sharing in the US is estimated to be $4.3 billion[115] and include factors such as reduced vehicle maintenance costs, reduced congestion costs, annual deferred road construction costs, crash avoidance and carbon emissions reduction.

The greatest benefits of car sharing schemes are likely to be realised when implemented with 'unbundled parking'. Currently in Perth the cost of parking for residential and commercial units is often passed on to the occupants indirectly. Unbundling parking from rent or purchase prices by renting or selling parking spaces separately could reduce the total amount of parking available in buildings and influence choices about vehicle ownership. Facility managers and developers could unbundle

[115] Viechnicki, K, Fishman & Eggers. S (2015)

parking in several ways when renting or selling building space and offer discounts to tenants or buyers that require fewer than average parking spaces.

Studies in a number of US cities suggest that car sharing schemes implemented with unbundled parking typically reduce vehicle ownership and parking demand by 10 to 20 per cent.[116]

The Department of Transport will undertake research and stakeholder engagement to assess the likely impact of introducing car sharing schemes in Perth and develop appropriate policies to optimise transport benefits. The Department of Transport will also undertake research to assess the likely impact of unbundled parking in Perth and identify implementation enablers and barriers.

Ride sharing

Ride service companies such as Uber and Lyft provide app-based, on-demand ride sharing services. Ride sourcing companies provide direct competition to traditional taxi services, however ride sourcing users tend to be younger, own fewer vehicles and more frequently travel with companions[117] and can therefore reduce single or low occupancy car trips.

Higher vehicle occupancy will also likely be achieved by technology-enabled ride matching and changing attitudes towards car ownership. By accommodating different user origins and destinations and requirements for forward planning, dynamic ride sharing overcomes major barriers to traditional carpooling or vanpooling.

Ride splitting services are now offered by some ride service companies overseas and enable riders to share a ride and split the fare. Ride splitting is a significant trend and now represents approximately half of the ride sourcing market in the San Francisco Bay area.

The Department of Transport will work with transport agencies in other Australian jurisdictions to assess the impact of ride sharing on congestion and public transport patronage, and identify strategies to increase positive effects on travel behaviour. Proposals that might be undertaken by the private sector will be developed as appropriate depending on technology development and adoption rates, costs, private user-provided services and other factors.

Flexible transport solutions

Flexible transport services cover a range of mobility options including demand responsive transport, where services are flexible along one or more routes, vehicle allocation, vehicle operator, type of payment and passenger category. Flexible transport services are often operated with dedicated small buses, minibuses or maxi-taxis for general public use or for closed user groups such as special services for seniors or people with disabilities.[118]

Flexible transport services are increasingly used throughout the UK, Europe and USA as part of the public transport mix.[119] The services are provided particularly in areas

---

116 Litman, Todd (2013) *Parking Management: Strategies, Evaluation and Planning*, Victoria Transport Policy Institute 2013

117 Rayle, L., Shaheen, S., Chan, N., Dai, D., & Cervero, R. (2014). *App-Based, On-Demand Ride Services: Comparing Taxi and Ride-sourcing Trips and User Characteristics in San Francisco University of California Transportation Center* (UCTC). UCTC-FR-2014-08.

118 Daniels, R., & Mulley, C. (2010). *Overcoming barriers to implementing flexible transport services in NSW*.

119 Nelson, J. D., & Mulley, C. (2013). 'The impact of the application of new technology on public transport service provision and the passenger experience: A focus on implementation in Australia' *Research in Transportation Economics*, *39*(1), 300-308.

where demand is too low to support conventional scheduled public transport services. Flexible transport services are not widespread in Australia.

The Department of Transport will monitor national and international experience of flexible transport solutions to identify new opportunities for filling the public transport gaps as Perth and Peel populations grow. Proposals that might be undertaken by the private sector will be developed as appropriate depending on technology development and adoption rates, costs, private user-provided services and other factors.

4.3 Other enablers

4.3.1 Ongoing transport survey data

Good transport planning requires comprehensive data on who moves where, and how and why they do it. Historically data has been used from the Perth and Regions Travel Survey, a study of the day-to-day travel patterns of 10,947 households in the wider Perth metropolitan area between October 2002 and September 2006.

The Transport Data Survey project is a five-year initiative to collect data on household travel behaviour and commercial vehicle trips to update the State Government's strategic transport models for the Perth metropolitan region. Outputs from the updated transport models will better inform transport infrastructure investment decision making. The Department of Transport will continue to update transport survey data at appropriate intervals.

4.3.2 Tax and workplace reform

A major impediment to the success of workplace travel programs is the impact of concessional car fringe benefits. There have been many inquiries, studies and advocacy papers on this issue[120] and provision of these benefits is acknowledged by the Henry Tax Review as providing a strong incentive for employees to take a car as part of their remuneration package and skew consumption toward motor vehicle services.[121] Similarly, cars and parking are commonly provided as employee benefits and this promotes commuting by car. The provision of free car parking substantially reduces incentives to cycle, walk or use public transport.[122]

The Department of Transport will investigate the development of employer and employee incentives such as employer-funded SmartRiders and bicycles, end of trip facility grants, public transport incentives and initiatives that encourage employees to switch from car driving to active forms of transport.

The Department of Transport will continue to monitor developments in concessional car fringe benefit tax reform as well as other tax policies that combat the impact of employer-provided cars.

---

120 These include:
http://www.heartfoundation.org.au/SiteCollectionDocuments/Blueprint-for-an-active-Australia-Second-edition.pdf (see p74)

121 Australia's Future Tax System Review Panel (Henry tax review) 2008 *Australia's Future Tax System Consultation Paper*, p90.

122 Shoup, DC (1997)

APPENDIX A: List of Acronyms

ATIS	Advanced traveller information systems
AUPS	Advanced user pays systems
BCR	Benefit/cost ratio
CAT	Central Area Transit
DoT	Department of Transport
EOT	End of trip
ERP	Electronic road pricing
FTS	Flexible transport services
HOT	High occupancy toll
HOV	High occupancy vehicle
ICT	Information communication technology
MRWA	Main Roads Western Australia
NPV	Net Present Value
PTA	Public Transport Authority (WA)
PV	Present value
RTPI	Real-time passenger information
TDM	Travel demand management
TOD	Transit oriented development
VKT	Vehicle kilometres travelled

15.3 Adoption of Local Development Plan – Cassia North – Lot E6 Durrant Avenue, Parmelia

SUMMARY:

A Draft Local Development Plan (LDP) for Cassia North – Lot E6 Durrant Avenue, Parmelia has been received for consideration under the City of Kwinana Town Planning Scheme No. 2 (Scheme) (refer Attachment A for Location Plan). This LDP was the subject of a presentation to Councillors at its Council Forum held on the 8 August 2016 which addressed it and a number of other pressing and urgent LDPs. It has taken some time however to finalise this LDP as City Officers and the proponent have been liaising on appropriate design provisions to be included.

Subdivision approval was granted for this lot by the Western Australian Planning Commission (WAPC Reference: 151047) on 15 April 2015 with a condition requiring preparation of an LDP for the subject lots. The Draft LDP sets out design requirements for the development of the lots indicated within the LDP boundaries. These requirements apply in addition to normal Scheme and State Planning Policy No. 3.1 (Residential Design Codes of Western Australia) (R-Codes) requirements and will permit certain variations in order to achieve an optimal form of development.

Councillors will be aware via a number of Councillor Forums that the City is presently progressing towards the completion of an Urban Amenity Strategy and a number of accompanying policies focused on 'Landscape and Tree Retention' and 'Built form and Streetscapes'. This work is being undertaken in conjunction with key representatives of the local development industry and the Department of Planning to seek to achieve improved urban amenity across the City.

One response being considered by Council has been the application of mandatory two storey development of lots at, or less than, 7.5 metres in width, as well as additional design criteria for lots with widths between 10 metres and 7.5 metres to seek to achieve better amenity outcomes and scaled development. City staff and Councillors have acknowledged however, that this is a complex matter and, in keeping with the City's practice, wish to partner with industry and State Government to develop the best policy framework possible with these stakeholders.

In this respect, a number of LDPs which are in process have been set aside pending the formulation of a final policy position from Council. These included LDPs with lots less than 7.5 metres in width including this LDP. It has become apparent however, that many of these LDPs are now urgent and further delay will adversely affect local developers and significantly impact on new lot growth in the City.

As such City Officers have recommended progression of some of these LDPs to finalisation and this was discussed with Councillors at the Council Forum held on the 8 August 2016. In some instances, there were relatively minor modifications to previously approved LDPs (where often, lots have already been sold and approvals in place). In these cases, City Officers have not sought to introduce any additional provisions addressing built form.

In other instances however, where the LDPs are for newly created subdivisions, City Officers have liaised with the applicant and have sought additional provisions aimed at delivering better built form outcomes. This is the case with this LDP which has been at the City for approval since April 2016 and has been deferred to date because of the City's urban amenity concerns.

15.3 ADOPTION OF LOCAL DEVELOPMENT PLAN – CASSIA NORTH – LOT E6 DURRANT AVENUE, PARMELIA

Unlike a number of other similar LDP applications which were presented at the Forum, and further considered at previous Council meetings for determination, this LDP has not been considered to date due to ongoing discussion between City Officers and the proponent to finalise the recommended additional design provisions. These provisions have now been added to the LDP.

For this LDP, a total of 15 lots have frontages of 7.5m or less with 13 lots being between 7.785 metres and 10 metres in width. There are no 5m wide lots on this LDP. City Officers have liaised with the applicant who has agreed to introduce some additional provisions for built form to help contribute to achieving a good quality of streetscape and provide a mix of housing designs.

The draft LDP also specifies quiet house design provisions to mitigate noise transfer between buildings on narrower lots (7.5m wide or less). The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots.

The Draft LDP (refer Attachment B) has been assessed and supported by City Officers on the basis of these amendments.

OFFICER RECOMMENDATION:

That Council approves the Local Development Plan for Cassia North - Lot E6 Durrant Avenue, Parmelia (as per Attachment B), pursuant to Clause 52(1)(a) of Schedule 2 – Deemed Provisions for Local Planning Schemes of the Planning and Development (Local Planning Schemes) Regulations 2015.

DISCUSSION:

Land Status

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

A LDP is a planning tool which allows certain design requirements, either in addition to or in variance to those stipulated under the Scheme and R-Codes to be imposed on subsequent development of land. These requirements will often cover aspects including dwelling placement and design, solar orientation, private open space, setbacks, garage placement and design, fencing, store areas and service provision. Requirements vary depending on the type of land and design outcome trying to be achieved.

Most important is the LDP's ability to vary R-Code provisions, where such variations are needed to achieve the most optimal design outcome.

The Draft LDP (Attachment B) has been specifically required as a condition of the WAPC subdivision approval for the subject land. Consistent with the Scheme, the Draft LDP establishes design requirements relating to:

1. Dwelling setbacks;
2. Open space;
3. Built form addressing primary and secondary street frontages; and
4. Vehicular access and garages/carports.

15.3 ADOPTION OF LOCAL DEVELOPMENT PLAN – CASSIA NORTH – LOT E6 DURRANT AVENUE, PARMELIA

Built Form and Streetscape

There has been considerable discussion at City Officer and Councillor level about the most appropriate built form and streetscape outcomes for small lot subdivisions with narrow lot frontages. Councillors will be aware via a number of Councillor Forums that the City is presently progressing towards the completion of an Urban Amenity Strategy and a number of accompanying policies. This work is being undertaken in conjunction with key stakeholders to seek to achieve improved urban amenity across the City.

One response being considered by Council has been the application of mandatory two storey development of lots at, or less than, 7.5 metres in width, as well as additional design criteria for lots with widths between 10 metres and 7.5 metres to seek to achieve better amenity outcomes and scaled development.

In this respect, a number of LDPs which are in process have been set aside pending the formulation of a final policy position from Council. It has become apparent however, that many of these LDPs are now urgent and further delay will adversely affect local developers and significantly impact on new lot growth in the City.

As such City Officers have recommended progression of some of the LDPs to finalisation. In some instances, there were relatively minor modifications to previously approved LDPs (where often, lots have already been sold and approvals in place). In these cases, City Officers have not sought to introduce any additional provisions addressing built form.

In other instances however, where the LDPs are for newly created subdivisions (such as this LDP), City Officers have liaised with the applicant and have sought additional provisions aimed at delivering better built form outcomes. This is the case with this LDP which has been at the City for approval since April 2016 and has been deferred to date because of the City's urban amenity concerns. This LDP was included in the Council Forum Presentation as one of the LDPs which has been subject to significant delay.

This application was not presented at the previous Council meetings where a number of similar LDPs were presented for determination as City Officers and the proponent were still discussing the recommended additional design provisions. These additional provisions have now been added to the LDP.

A total of 15 lots on this LDP have frontages of 7.5m or less. In this regard, the following additional provisions have been recommended for inclusion on this LDP;

a) Articulation in the dwelling façade (i.e. varied wall setbacks);
b) A mix of building materials, colours and finishes (e.g. render, brick, cladding);
c) Major habitable room openings, incorporating large windows to provide street surveillance;
d) Roof forms that incorporate either gables, eaves, veranda or a feature portico; and
e) The wall plate height on the front elevation shall be a minimum of 28 courses.

City Officers have reviewed these provisions and believe that they will help contribute to achieving a better quality of streetscape and provide a mix of housing designs.

There are 13 lots on the LDP between 7.785 metres and 10 metres in width. No additional provisions have been applied to these lots.

15.3 ADOPTION OF LOCAL DEVELOPMENT PLAN – CASSIA NORTH – LOT E6 DURRANT AVENUE, PARMELIA

Fire Management

The draft LDP also indicates the lots that are subject to specific building design requirements for bushfire in accordance with the Bush Fire Attack Level (BAL) ratings as specified in the Fire Management Plan for this area. The proposed BALs were reviewed by the City's Fire Consultant who agreed with the findings.

Quiet House Design

The draft LDP specifies quiet house design provisions to mitigate noise transfer between buildings on narrow lots (7.5m wide or less). The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots.

Conclusion

The LDP will be a single point of reference that will provide clarity and certainty to builders, property owners and City Officers.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering financial or impartiality interests, the land owner is the Department of Housing with Satterley Property Group developing the site, and the applicant is CLE Planning.

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*)
- Liveable Neighbourhoods Operational Policy
- WAPC Planning for Bushfire Protection Guidelines (Edition 2) (2010)
- WAPC Draft Planning for Bushfire Risk Management Policy
- Local planning and other related policies.

FINANCIAL/BUDGET IMPLICATIONS:

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

ENVIRONMENTAL IMPLICATIONS:

The LDP encourages the use of passive solar urban design. Quiet house design provisions are included in the LDP.

15.3 ADOPTION OF LOCAL DEVELOPMENT PLAN – CASSIA NORTH – LOT E6 DURRANT AVENUE, PARMELIA

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.

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 LDP seeks to include the construction standards required for bushfire protection. It is anticipated that compliance with the stipulated BAL ratings would reduce the occurrence of and minimise the impact of bushfires thereby reducing the threat to life, property and the environment.

COUNCIL DECISION

351

MOVED CR S MILLS **SECONDED CR B THOMPSON**

That Council approves the Local Development Plan for Cassia North - Lot E6 Durrant Avenue, Parmelia (as per Attachment B), pursuant to Clause 52(1)(a) of Schedule 2 – Deemed Provisions for Local Planning Schemes of the Planning and Development (Local Planning Schemes) Regulations 2015.

CARRIED
5/1

ATTACHMENT A – LOCATION PLAN

LOCAL DEVELOPMENT PLAN

cassia NORTH

RESIDENTIAL DESIGN CODE VARIATIONS

- The provisions detailed below constitute as 'deemed-to-comply' provisions of the Residential Design Codes (R-Codes).
- Unless provided for below, the provisions of the City of Kwinana Town Planning Scheme 2 and the R-Codes apply.
- Compliance with the Local Development Plan (LDP) provisions will not require consultation with adjoining and/or nearby landowners.
- The City may vary the provisions of the LDP where considered appropriate to achieve a specific design outcome.
- The density coding of all lots is R40.

Streetscape

1. For all lots with a frontage of 7.5m or less (as shown on this LDP), dwellings are to provide an appropriate, high quality interface with the surrounding streetscape, through the use of the following architectural features:

   a) Articulation in the dwelling facade (i.e. varied wall setbacks);
   b) A mix of building materials, colours and finishes (e.g. render, brick, cladding);
   c) Major habitable room openings incorporating large windows to provide street surveillance;
   d) Roof forms that incorporate either gables, eaves, veranda or a feature portico;
   e) The wall plate height on the front elevation shall be a minimum of 28 courses.

Street Setback

2. For all lots with vehicle and/or garages access from the primary street, the dwelling shall be set back a minimum of 3m and a maximum of 5m from the primary street.
3. For all laneway lots, the dwelling shall be set back a minimum of 2m and a maximum of 4m from the primary street.
4. A porch, balcony, veranda or the equivalent may project not more than 1m into the primary street setback area, provided that the total of such projections does not exceed 50% of the frontage at any level.

Garages

5. For all lots with vehicle and/or garages access from the primary street, garages shall be set back a minimum of 4m and a maximum of 5m from the primary street.
6. For all lots with rear (laneway) access, garages shall be set back a minimum of 0.5m and a maximum of 1m from the rear (laneway) boundary.
7. All garages shall have doors to enclose them.

Lot Boundary Setbacks

8. For all laneway lots, boundary walls are permitted to both side boundaries for a maximum length prescribed by the front and rear.
9. Boundary walls are not permitted to a secondary street.

Site Cover

10. Site cover shall not exceed 70% of the site area, subject to the provision of an outdoor living in accordance with the R-Codes.

Quiet House Design:

11. All dwellings on the laneway lots shall be constructed with the following minimum quiet house design requirements:
12. 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.
13. Windows shall be minimum 4mm laminated glazing in a high quality residential grade frame to achieve a minimum Rw+Ctr23 acoustic rating.
14. Roof/Ceiling - to be minimum 10mm thick plasterboard with R2.0 insulation between ceiling joists. Combined with roof, acoustic performance to be minimum Rw42.
15. Eaves are to be enclosed using a minimum 4mm thick compressed cement sheeting or equivalent.
16. 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.
17. Any alternative construction methods shall be supported by a report undertaken by a suitably qualified acoustic consultant.

Fire Management

18. All properties are subject to compliance with the approved Fire Management Plan. Dwellings constructed on lots identified as being at risk of bushfire attack under the approved Fire Management Plan or within 100m from any bushland, equal to or greater than 1ha in area, shall be constructed to the appropriate Bushfire Attack Level (BAL) rating, in accordance with AS3959.
19. A proposed reduction to the nominated BAL rating as specified within the Fire Management Plan for any development will require a planning application for consideration. The applicant will be required to undertake a new BAL assessment by a suitably qualified consultant, as part of the building and planning approval process to determine the bushfire attack level in accordance with AS3959 and WAPC Guidelines Planning for Bushfire Protection Policy.
20. For all lots, where an incursion into the building setback area is proposed, a reassessment of the BAL is required.

LEGEND

- LDP Boundary
- R40
- No Vehicular Access
- Retaining Wall
- Designated Garage Location
- BAL 12.5
- BAL 19
- BAL 29
- # Streetscape Articulation Required *(refer clause 1)*

This Detailed Site Plan has been adopted by Council and signed by the Manager of Planning Services.

Principal Planner..... Date.....

City of Kwinana

CLE TOWN PLANNING + DESIGN

ATTACHMENT B

15.4 Adoption of Local Development Plan No. 5 – Stages 3-5 Honeywood Rise Estate, Wandi

SUMMARY:

A Draft Local Development Plan (LDP) No. 5 for Stages 3-5 Honeywood Rise Estate, Wandi has been received for consideration under the City of Kwinana Town Planning Scheme No. 2 (Scheme) (refer Attachment A for Location Plan). This LDP was the subject of a presentation to Councillors at their Council Forum held on the 8 August 2016 which addressed it and a number of other pressing and urgent LDPs. It has taken some time however, to finalise this LDP as City Officers and the proponent have been liaising on appropriate design provisions to be included.

Subdivision approval was granted for this lot by the Western Australian Planning Commission (WAPC Reference: 150060) on 14 October 2014 with a condition requiring preparation of an LDP for the subject lots. The Draft LDP sets out design requirements for the development of the lots indicated within the LDP boundaries. These requirements apply in addition to normal Scheme and State Planning Policy No. 3.1 (Residential Design Codes of Western Australia) (R-Codes) requirements and will permit certain variations in order to achieve an optimal form of development.

Councillors will be aware via a number of Councillor Forums that the City is presently progressing towards the completion of an Urban Amenity Strategy and a number of accompanying policies focused on 'Landscape and Tree Retention' and 'Built form and Streetscapes'. This work is being undertaken in conjunction with key representatives of the local development industry and the Department of Planning to seek to achieve improved urban amenity across the City.

One response being considered by Council has been the application of mandatory two storey development of lots at, or less than, 7.5 metres in width, as well as additional design criteria for lots with widths between 10 metres and 7.5 metres to seek to achieve better amenity outcomes and scaled development. City staff and Councillors have acknowledged however, that this is a complex matter and, in keeping with the City's practice, wish to partner with industry and State Government to develop the best policy framework possible with these stakeholders.

In this respect, a number of LDPs which are in process have been set aside pending the formulation of a final policy position from Council. These included LDPs with lots less than 7.5 metres in width including this LDP. It has become apparent however, that many of these LDPs are now urgent and further delay will adversely affect local developers and significantly impact on new lot growth in the City.

As such, City Officers have recommended progression of some of these LDPs to finalisation and this was discussed with Councillors at the Council Forum held on the 8 August 2016. In some instances, there were relatively minor modifications to previously approved LDPs (where often, lots have already been sold and approvals in place). In these cases, City Officers have not sought to introduce any additional provisions addressing built form.

15.4 ADOPTION OF LOCAL DEVELOPMENT PLAN NO. 5 – STAGES 3-5 HONEYWOOD RISE ESTATE, WANDI

In other instances however, where the LDPs are for newly created subdivisions, City Officers have liaised with the applicant and have sought additional provisions aimed at delivering better built form outcomes. This is the case with this LDP which has been at the City for approval since July 2016 and has been deferred to date because of the City's urban amenity concerns. This LDP was included in the Council Forum Presentation as one of the LDPs which has been subject to significant delay.

Unlike a number of other similar LDP applications which were presented at the Forum, and further considered at previous Council meetings for determination, this LDP has not been considered to date due to ongoing discussion between City Officers and the proponent to finalise the recommended additional design provisions. These provisions have now been added to the LDP.

For this LDP, a total of 8 lots have frontages of 7.5m or less with 15 lots being between 8.2 metres and 10 metres in width. There are no 5m wide lots on this LDP. City Officers have liaised with the applicant who has agreed to introduce some additional provisions for built form to help contribute to achieving a good quality of streetscape and provide a mix of housing designs.

The draft LDP also specifies quiet house design provisions to mitigate noise transfer between buildings on narrower lots (7.5m wide or less). The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots.

The Draft LDP (refer Attachments B & C) has been assessed and supported by City Officers on the basis of these amendments.

OFFICER RECOMMENDATION:

That Council approves Local Development Plan No. 5 for Stages 3-5 Honeywood Rise Estate, Wandi (as per Attachments B and C), pursuant to Clause 52(1)(a) of Schedule 2 – Deemed Provisions for Local Planning Schemes of the Planning and Development (Local Planning Schemes) Regulations 2015.

DISCUSSION:

Land Status

Metropolitan Region Scheme:	'Urban' Zone
Town Planning Scheme No. 2:	Residential R20, R25, R30 and R60

A LDP is a planning tool which allows certain design requirements, either in addition to or in variance to those stipulated under the Scheme and R-Codes to be imposed on subsequent development of land. These requirements will often cover aspects including dwelling placement and design, solar orientation, private open space, setbacks, garage placement and design, fencing, store areas and service provision. Requirements vary depending on the type of land and design outcome trying to be achieved.

Most important is the LDP's ability to vary R-Code provisions, where such variations are needed to achieve the most optimal design outcome.

15.4 ADOPTION OF LOCAL DEVELOPMENT PLAN NO. 5 – STAGES 3-5 HONEYWOOD RISE ESTATE, WANDI

The Draft LDP (Attachments B & C) has been specifically required as a condition of the WAPC subdivision approval for the subject land. Consistent with the Scheme, the Draft LDP establishes design requirements relating to:

1. Dwelling setbacks;
2. Open space;
3. Built form addressing primary and secondary street frontages; and
4. Vehicular access and garages/carports.

Built Form and Streetscape

There has been considerable discussion at City Officer and Councillor level about the most appropriate built form and streetscape outcomes for small lot subdivisions with narrow lot frontages. Councillors will be aware via a number of Councillor Forums that the City is presently progressing towards the completion of an Urban Amenity Strategy and a number of accompanying policies. This work is being undertaken in conjunction with key stakeholders to seek to achieve improved urban amenity across the City.

One response being considered by Council has been the application of mandatory two storey development of lots at, or less than, 7.5 metres in width, as well as additional design criteria for lots with widths between 10 metres and 7.5 metres to seek to achieve better amenity outcomes and scaled development.

In this respect, a number of LDPs which are in process have been set aside pending the formulation of a final policy position from Council. It has become apparent however, that many of these LDPs are now urgent and further delay will adversely affect local developers and significantly impact on new lot growth in the City.

As such City Officers have recommended progression of some of the LDPs to finalisation. In some instances, there were relatively minor modifications to previously approved LDPs (where often, lots have already been sold and approvals in place). In these cases, City Officers have not sought to introduce any additional provisions addressing built form.

In other instances however, where the LDPs are for newly created subdivisions (such as this LDP), City Officers have liaised with the applicant and have sought additional provisions aimed at delivering better built form outcomes. This is the case with this LDP which has been at the City for approval since July 2016 and has been deferred to date because of the City's urban amenity concerns. This LDP was included in the Council Forum Presentation as one of the LDPs which has been subject to significant delay.

This application was not presented at the previous Council meetings where a number of similar LDPs were presented for determination as City Officers and the proponent were still discussing the recommended additional design provisions. These additional provisions have now been added to the LDP.

In response to ongoing issues regarding builders/landowners removing street trees, the approximate location of street trees has been shown on the draft LDP. The street trees will be provided by the developer and maintained for a minimum of two years. The LDP states that the street trees are not be relocated or removed by landowners. City Officers are supportive of this provision as it would alert potential purchasers/landowners to the location of street trees and the need for their continued protection.

A total of 8 lots on this LDP have frontages of 7.5m or less. In this regard, the following additional provisions have been recommended for inclusion on this LDP;

a) Articulation in the dwelling façade (i.e. varied wall setbacks);
b) A mix of building materials, colours and finishes (e.g. render, brick, cladding);
c) Major habitable room openings, incorporating large windows to provide street surveillance;
d) Roof forms that incorporate either gables, eaves, veranda or a feature portico; and
e) The wall plate height on the front elevation shall be a minimum of 28 courses.

City Officers have reviewed these provisions and believe that they will help contribute to achieving a better quality of streetscape and provide a mix of housing designs.

There are 15 lots on the LDP between 8.2 metres and 10 metres in width. No additional provisions have been applied to these lots.

Fire Management

The draft LDP also indicates the lots that are subject to specific building design requirements for bushfire in accordance with the Bush Fire Attack Level (BAL) ratings as specified in the Fire Management Plan for this area. The proposed BALs were reviewed by the City's Fire Consultant who agreed with the findings.

Noise Management

The draft LDP also identifies lots potentially affected by noise emanating from the Kwinana Freeway and Anketell Road. A Noise Assessment was undertaken which identifies the lots that are subject to Noise Package requirements. Dwellings on these lots are to be constructed as per the 'Deemed to Comply Noise Insulation Package A' specifications in accordance with State Planning Policy (SPP) 5.4.

Quiet House Design

The draft LDP specifies quiet house design provisions to mitigate noise transfer between buildings on narrow lots (7.5m wide or less). The proposed provisions are consistent with those that have been applied to other LDPs within the City of Kwinana containing narrow lots.

Conclusion

The LDP will be a single point of reference that will provide clarity and certainty to builders, property owners and City Officers.

LEGAL/POLICY IMPLICATIONS:

For the purpose of Councillors considering financial or impartiality interests, the land owner is Satterley Property Group and the applicant is Rowe Group.

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

15.4 ADOPTION OF LOCAL DEVELOPMENT PLAN NO. 5 – STAGES 3-5 HONEYWOOD RISE ESTATE, WANDI

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

FINANCIAL/BUDGET IMPLICATIONS:

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

ENVIRONMENTAL IMPLICATIONS:

The LDP encourages the use of passive solar urban design. Quiet house design provisions are included in the LDP.

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.

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 LDP seeks to include the construction standards required for bushfire protection. It is anticipated that compliance with the stipulated BAL ratings would reduce the occurrence of and minimise the impact of bushfires thereby reducing the threat to life, property and the environment.

COUNCIL DECISION

352

MOVED CR P FEASEY **SECONDED CR R ALEXANDER**

That Council approves Local Development Plan No. 5 for Stages 3-5 Honeywood Rise Estate, Wandi (as per Attachments B and C), pursuant to Clause 52(1)(a) of Schedule 2 – Deemed Provisions for Local Planning Schemes of the Planning and Development (Local Planning Schemes) Regulations 2015.

CARRIED
6/0

ATTACHMENT A – LOCATION PLAN

honeywood rise

Make a natural connection.

The following provisions apply to lots depicted:

R-Coding	R20
Minimum Open Space	45%
Site Cover	55%

Dwelling Setbacks	Minimum (m)	Maximum (m)
Primary Street	4.0	5.0
Secondary Street	1.0	-

- No average setbacks apply.

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	-

- 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	3.0	5.0
Secondary Street	1.0	-

- No average setbacks apply.

The following provisions apply to lots depicted:

R-Coding	R60
Minimum Open Space	30%
Site Cover	70%

Dwelling Setbacks	Minimum (m)
Secondary Street	1.0
Rear Laneway	0.5

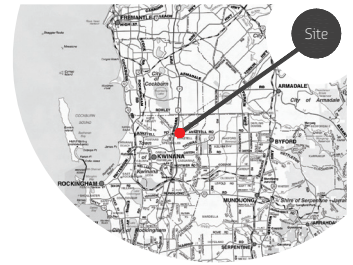
- No average setbacks apply.

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 LDP
- Stage Boundary
- 0.5m Setback Line
- 1.0m Setback Line
- 3.0m Setback Line
- 4.0m Setback Line
- Public Open Space
- R20
- R25
- R30
- R60
- Indicative Layout
- Outdoor Living Area
- Designated Garage Locations
- Dwellings to be constructed to comply with BAL rating 12.5 in accordance with AS3959
- Dwellings to be constructed to comply with BAL rating 19 in accordance with AS3959
- Protected Courtyard
- Dwelling Orientation
- Noise Insulation - Package A
- Approximate street tree location. Refer approved landscape plans (available from City) for detail. Street trees are not to be removed or relocated by landowners.

0 30 60 Metres

REVISIONS

Rev	Date	Drawn
K	2016.07.25	W. Clements
L	2016.07.26	W. Clements
M	2016.09.06	M. Sullivan
N	2016.09.09	W. Clements

ROWEGROUP
PLANNING DESIGN DELIVERY

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

Date Drawn:	2014-12-01
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley
Designer:	R. Cumming
Drawn:	W. Clements
Projection:	PCG 94
Plan ID:	7926-LDP-05-N

Cadastre supplied by McMullen Nolan

Local Development Plan 5

Stages 3-5 (Plan 1 of 2)
Wandi South

N:\TOWN PLANNING\7000-7999\7926\DRAFTING\A-CAD\7926_LDP05N_20160909_WANDI SOUTH [STAGE].DWG
Matt Sullivan 20 September 2016

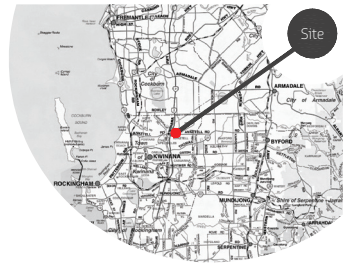
ATTACHMENT B

honeywood rise

Make a natural connection.

*Preliminary - Subject to Council Approval

Planning Design Delivery



This Local Development Plan (LDP) applies to all lots within Stages 3 to 5 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.

Minimum Open Space and Outdoor Living

1. Site cover may be increased to 55% (for R20 Lots) subject to the provision of 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 60% (for R25 Lots) subject to the provision of 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.

3. Site cover may be increased to 65% (for R30 Lots) subject to the provision of 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.

4. Site cover may be increased to 70% (for R60 Lots) subject to the provision of 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.

Garages

5. 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.

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

7. All garages shall be enclosed with a door.

8. The City of Kwinana, at the discretion of the Manager-Planning and Development may vary the locations of garages designated on this LDP.

Setbacks

9. For all lots, a nil side setback is permissible 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 2153 to 2160. 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.

10. 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.

11. 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.

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

13. 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.

14. 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.

15. 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.

Streetscape

16. 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.

17. 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 laneway lots.

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

19. Where porticos are provided they may be setback a minimum of 2 metres from the primary street.

20. In accordance with City Policy, a minimum of one street tree per lot is required. Street trees will be provided by the developer within the road verge, and maintained for a minimum of two years until established. Street trees are to be generally located as shown on this Local Development Plan, subject to detailed landscape design. Refer approved landscape plans (available from City) for detail. Street trees are not to be relocated or removed by landowners.

Design Elements

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

22. 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.

23. Dwellings on Lots 2153 to 2160 are to provide the appropriate, high quality interface with the adjoining POS, through the use of flowing architectural features:

    a. Articulation in the dwelling facade (i.e. varied wall setbacks);

    b. A mix of building materials, colours and finishes (e.g. render, brick, cladding);

    c. Major habitable room openings, incorporating large windows to POS surveillance;

    d. Roof forms that incorporate either gables, eaves, verandah or a feature portico; and

    e. The wall plate height on the front elevation shall be a minimum of 28 courses.

Fire Management

24. 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.

25. This LDP shall be read in conjunction with the approved Fire Management Plan, and BAL assessment (Strategen 2016)

26. A proposed reduction 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.

27. For all lots, where an incursion (including minor incursions) into the building setback area is proposed, a reassessment of the Bushfire Attack Level is required.

Noise Management

28. For those lots potentially affected by noise emanating from the Kwinana Freeway and Anketell Road, dwellings are to be constructed with the relevant 'Deemed to Comply Noise Insulation Package' specified on this LDP. Noise Insulation Package requirements are set out under the Implementation Guidelines for State Planning Policy 5.4 (SPP5.4) and Australian Standard AS2107-2000.

29. For those lots identified on the LDP as requiring a protected courtyard, the main outdoor living area is to be located on the most protected facade of the lot/dwelling. Where the main outdoor living area is situated fronting or siding on to a noise source (exceeding 60 dB(A)Leq(16-hour)), a solid 2m high fence (eg. Hardifence pinelap or Colorbond) is required between the outdoor living area and the road for the length of the outdoor living area or as long as required to fully screen the line of view from the outdoor living area to the noise source.

30. All dwellings on lots 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.

Noise Insulation Package	Dwellings to be constructed to comply with Noise Insulation Package in accordance with SPP 5.4 and AS2107-2000.
Package A	Lots 2243 - 2244, 2293 - 2294, 2295 - 2296, 2321 - 2322 and 2323 - 2325

*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: _____

REVISIONS

Rev	Date	Drawn
K	2016.07.25	W. Clements
L	2016.07.26	W. Clements
M	2016.09.06	M. Sullivan
N	2016.09.09	W. Clements

ROWEGROUP
PLANNING DESIGN DELIVERY

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

Date Drawn:	2014-12-01
Job Ref:	7926
Scale:	1:2000 @ A3
Client:	Satterley
Designer:	R. Cumming
Drawn:	W. Clements
Projection:	PCG 94
Plan ID:	7926-LDP-05-N

Cadastre supplied by McMullen Nolan

Local Development Plan 5

Stages 3-5 (Plan 2 of 2)
Wandi South

N:\TOWN PLANNING\7000-7999\7926\DRAFTING\A-CAD\7926_LDP05N_20160909_WANDI SOUTH (STAGE 3).DWG
Matt Sullivan 12 September 2016

ATTACHMENT C

16 Reports – Civic Leadership

16.1 Budget Variations to restrict funds for 2015/2016 projects and rebudget in 2016/2017 budget

SUMMARY:

To amend the 2016/2017 budget to reflect various adjustments to the General Ledger with nil effect to the overall budget as detailed below due to incomplete projects at 30 June 2016.

OFFICER RECOMMENDATION:

1. That the required budget variations to the Adopted Budget for 2016/2017 as outlined below be approved.

NOTE: AN ABSOLUTE MAJORITY OF COUNCIL IS REQUIRED

DISCUSSION:

As part of the budget process a preliminary carried forward budget of expected capital and operating projects that would not be completed by the 30 June 2016 was approved by Council at the 11 May 2016 Ordinary Council Meeting to transfer these funds into the Restricted Grants and Contributions Reserve to be used in the 2016/2017 financial year. The amounts presented to Council to be transferred into reserve were a 30 June estimate at the time of the 11 May 2016 Ordinary Council Meeting.
As the accounts for the financial year ending 30 June 2016 have now been finalised, the actual carried forward amounts for each of the capital and operating projects have been determined. The following budget variations are required to correct the relevant revenue and offsetting expenditure accounts that will allow these projects to be completed in the 2016/2017 financial year.
These changes are simply a 'tidying up' exercise to show accuracy in the carried forward projects, there is nil impact on the 2016/2017 budget.

Key:
Adopted Budget: Included in Adopted Budget 2016/2017 at Special Council Meeting 6 July 2016

Revised Budget: Revised amount to appear in the 2016/2017 Budget which has been derived from actual balance of project for year ending 30 June 2016

Variation: Required amendment to Budget 2016/2017

Adopted Budget 2016/2017

Grants and Contributions:

1.	Calista Destination Park - Adventure Playground - Tender 590KWN15 awarded on 14/10/2015. Contractor delays extended estimated date of practical completion to September 2016, with a three month maintenance period to December 2016.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	1,700,000	1,280,000	420,000	Future Community
Revised	2,125,719	1,280,000	845,719	Future Community and various DCAs (detailed below in item 2 of the budget variations)
Variation	425,719	-	425,719	

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

2.	Water Wise Project – water efficiency measures for Council facilities. Confirmation of funding (Water Corporation) not received in time to commence or complete this project within the 2015/2016 budget year.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	22,000	-	22,000	Restricted Grants and Contributions
Revised	22,000	3,602	18,398	Restricted Grants and Contributions
Variation	-	3,602	(3,602)	

3.	Kwinana Outdoor Youth Space KOYS - Grant funded project incomplete at 30 June 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	1,470,505	700,000	770,505	Future Community Infrastructure
Revised	1,270,505	500,000	770,505	Future Community Infrastructure
Variation	(200,000)	(200,000)	-	

Additional Projects for 2016/2017 Budget

As part of the finalisation of the accounts for financial year 30 June 16 the following projects were identified as being required to be carried forward. These projects were not submitted as possible carried forward at the time of the 11 May 2016 Ordinary Council Meeting or are funds for 2016/2017 financial year which were received in advance in 2015/2016 financial year. These amounts will be transferred to or are currently in the Restricted Grants and Contributions Reserve to be used in the 2016/2017 financial year. The following budget variations are required to correct the relevant revenue and offsetting expenditure accounts that will allow these projects to be completed in the 2016/2017 financial year.

Grants and Contributions:

1.	Supply and installation of 25 CCTV's Safer Streets Program - Grant funded project incomplete at 30 June 2016 due to pit and conduit issue within the City Centre. Grant funding extension has been granted by the Office of the Attorney General.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	126,236	15,000	111,236	Restricted Grants and Contributions
Variation	126,236	15,000	111,236	Restricted Grants and Contributions

2.	DFES ESL Grant 16/17 - Department of Fire & Emergency Services Quarter1 paid in 2015/16			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	154,750	154,750	-	
Revised	154,750	116,062	38,688	Restricted Grants and Contributions
Variation	-	(38,688)	38,688	Restricted Grants and Contributions

3.	Sloans Reserve Outdoor Fitness Equipment Project - Grant funded project (Federal funding) incomplete at 30 June 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	37,348	-	37,348	Restricted Grants and Contributions.
Variation	37,348	-	37,348	Restricted Grants and Contributions

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

4.	Johnson Road Urban Streetscape Project - Grant funded project (Federal funding) incomplete at 30 June 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	3,088	-	3,088	Restricted Grants and Contributions
Variation	3,088	-	3,088	Restricted Grants and Contributions

5.	Challenger Beach Rehabilitation Project - Grants funds (Alcoa) received for 2016/17 project in prior financial year.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	16,000	16,000	-	
Revised	16,000	-	16,000	Restricted Grants and Contributions
Variation	-	(16,000)	16,000	Restricted Grants and Contributions

6.	BP Coastcare – BP Refinery - Incomplete grant funded project - funds received for the calendar year ending December 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	1,812	-	1,812	Restricted Grants and Contributions
Variation	1,812	-	1,812	Restricted Grants and Contributions

7.	SMCC Challenger Beach Coastal Rehabilitation Project - Incomplete grant funded (Alcoa) project that operates for a calendar year			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	10,937	-	10,937	Restricted Grants and Contributions
Variation	10,937	-	10,937	Restricted Grants and Contributions

8.	SMCC Kwinana Industrial Area Coastcare in the KIA - Incomplete grant funded (KIC)project with a completion date as per the agreement of July 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	13,250	-	13,250	Restricted Grants and Contributions
Variation	13,250	-	13,250	Restricted Grants and Contributions

9.	SMCC Tronox Adopt a Beach Community project - Grant funded project - Incomplete at 30 June 2016. Project has now been approved by Tronox for 2017.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	712	-	712	Restricted Grants and Contributions
Variation	712	-	712	Restricted Grants and Contributions

10.	SMCC Degremont (proAlliance) Adopt a Beach Partnership - Grant funded project - Incomplete at 30 June 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	5,958	-	5,958	Restricted Grants and Contributions
Variation	5,958	-	5,958	Restricted Grants and Contributions

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

11.	Perth Region NRM Support for South Metro Coastcare - Incomplete grant funded (Natural Resource Management) project that operates for a calendar year and will be continued in the next financial year.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	4,646	-	4,646	Restricted Grants and Contributions
Variation	4,646	-	4,646	Restricted Grants and Contributions

12.	Swan Alcoa Landcare Program – Lake Magenup Revegetation and Regeneration Wandi - Grant funded project - Incomplete at 30 June 2016.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	4,549	-	4,549	Restricted Grants and Contributions
Variation	4,549	-	4,549	Restricted Grants and Contributions

13.	Caring for the Coast in the Kwinana/Rockingham Region – BHP Billiton - Grant funded project - Incomplete at 30 June 2016			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	446	-	446	Restricted Grants and Contributions
Variation	446	-	446	Restricted Grants and Contributions

14.	Connections Your Next Step Youth Forum - 2016/17 grant funded (National Disability Services) project received in advance			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	2,000	2,000	-	
Revised	2,000	-	2,000	Restricted Grants and Contributions
Variation	-	(2,000)	2,000	Restricted Grants and Contributions

15.	Freakfest - 2016/17 grant funded (International Power) project received in advance			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	5,000	5,000	-	
Revised	5,000	-	5,000	Restricted Grants and Contributions
Variation	-	(5,000)	5,000	Restricted Grants and Contributions

16.	Silversport - 2016/17 grant funded (Department of Sport and Recreation) program that was paid in advance			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	77,500	77,500	-	
Revised	77,500	-	77,500	Restricted Grants and Contributions
Variation	-	(77,500)	77,500	Restricted Grants and Contributions

17.	Community Energy Efficiency Grant Round 2 (CEEP) - Grant funded project incomplete at 30 June 2016 due to significant delays with the pool plant refit and the main Recquatic switchboard. Monitoring can not be completed until these issues are rectified.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	4,512	-	4,512	Restricted Grants and Contributions
Variation	4,512	-	4,512	Restricted Grants and Contributions

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

18.	NAIDOC Week 2016 - Grant funded project incomplete at 30 June 2016.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	1,635	-	1,635	Restricted Grants and Contributions
Variation	1,635	-	1,635	Restricted Grants and Contributions

19.	Noongar Coastal Trail - Grant funded (Natural Resource Management) project incomplete at 30 June 2016: the remaining grant funds from Perth NRM will be used to finalise the installation and the launch of the project.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	3,649	-	3,649	Restricted Grants and Contributions
Variation	3,649	-	3,649	Restricted Grants and Contributions

20.	SMCC Local Government Contribution to Coastcare 2013/2014 - Grant funded (Natural Resource Management) project. Incomplete at 30 June 2016.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	5,071	-	5,071	Restricted Grants and Contributions
Variation	5,071	-	5,071	Restricted Grants and Contributions

Works not completed in 2015/16:

1.	Admin Building Recabling - 2015/16 project incomplete at 30 June 2016. Not complete due to contractor going into liquidation.			
	Total Cost	**Grants and Contrib.**	**Tfr from Reserve**	**Name of Reserve**
Adopted	-	-	-	
Revised	21,852	-	21,852	Restricted Grants and Contributions
Variation	21,852	-	21,852	Restricted Grants and Contributions

The following budget items require variations to the adopted budget 2016/2017:

ITEM #	LEDGER ACCOUNT	DESCRIPTION	OPERATING BUDGET	INCREASE/ DECREASE	REVISED BUDGET
1	900024.178	Surplus Brought Forward 1 July	1,000,000	241,890	1,241,890
	800002.1813	Transfer To Reserve – Restricted Grants and Contributions	Nil	(241,890)	(241,890)
		Transfer $241,890 from Surplus to Restricted Grants and Contributions Reserve.			
2	700019.1918	Transfer From Reserve - DCA 9 - Soft Infra - Wandi/Anketell	230,000	46,307	276,307
	700019.1920	Transfer From Reserve - DCA 11 - Soft Infra - Wellard East	Nil	18,441	18,441
	700019.1922	Transfer From Reserve - DCA 13 - Soft Infrastructure - Bertram	Nil	10,121	10,121
	700019.1923	Transfer From Reserve - DCA 14 - Soft Infra - Wellard/Leda	Nil	59,912	59,912
	700019.1924	Transfer From Reserve - DCA 15 - Soft Infrastructure - Townsite	Nil	7,620	7,620
	700019.1917	Transfer From Reserve - Future Community Infrastructure	790,031	283,318	1,073,349
	600008.1568	Capital Expense	(4,061,862)	(425,719)	(4,487,581)

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

	Reason:	***Recreation and Culture Grounds – transfer of funds from the Future Community Infrastructure Reserve and various DCA Reserves for the Calista Destination Park in 2016/2017.*** ***(Refer Adopted Budget 2016/2017 - Grants and Contributions Item 1)***			
3		Transfer From Reserve – Restricted Grants and			
	700019.1813	Contributions	446,324	37,348	483,672
	600008.1568	Capital Expense	(4,487,581)	(37,348)	(4,524,929)
	Reason:	***Recreation and Culture Grounds – transfer of funds from the Restricted Grants and Contributions Reserve for the Public open space upgrade Sloans Reserve in 2016/2017.*** ***(Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 3)***			
4	300142.1003	Capital Revenue	2,030,000	(200,000)	1,830,000
	600008.1568	Capital Expense	(4,524,929)	200,000	(4,324,929)
	Reason:	***Recreation and Culture Grounds – revenue less than adopted budget for the Kwinana Outdoor Youth Space skate park in 2016/2017.*** ***(Refer Adopted Budget 2016/2017 - Grants and Contributions Item 3)***			
5		Transfer From Reserve - Restricted Grants and			
	700013.1813	Contributions	107,810	(3,602)	104,208
	300147.1002	Capital Revenue	25,000	3,602	28,602
	Reason:	***Recreation and Culture Facility – revenue less than adopted budget for the Water Wise project in 2016/2017.*** ***(Refer Adopted Budget 2016/2017 - Grants and Contributions Item 2)***			
6		Transfer From Reserve - Restricted Grants and			
	700044.1813	Contributions	Nil	111,236	111,236
	300178.1002	Capital Revenue	Nil	15,000	15,000
	600016.1002	Capital Expense	(15,334)	(126,236)	(141,570)
	Reason:	***Law Order and Public Safety Facility – transfer of funds from the Restricted Grants and Contributions Reserve and revenue in excess of adopted budget for the CCTV Safer Streets project in 2016/2017.*** ***(Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 1)***			
7		Transfer From Reserve - Restricted Grants and			
	700068.1813	Contributions	Nil	38,688	38,688
	300114.1314	Operating Revenue	154,750	(38,688)	116,062
	Reason:	***FESA ESL Grant – transfer of funds from the Restricted Grants and Contributions Reserve for the FESA ESL Grant in 2016/2017, grant income received in 2015/2016.*** ***(Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 2)***			
8		Transfer From Reserve - Restricted Grants and			
	700002.1813	Contributions	217,745	21,852	239,597
	600002.1001	Capital Expense	(255,245)	(21,852)	(277,097)
	Reason:	***Computing Infrastructure – transfer of funds from the Restricted Grants and Contributions Reserve for the Administration building recabling in 2016/2017.*** ***(Refer Additional Projects for 2016/2017 Budget - Works Not completed Item 1)***			
9		Transfer From Reserve - Restricted Grants and			
	700090.1813	Contributions	Nil	3,088	3,088
	600009.1568	Capital Expense	(100,000)	(3,088)	(103,088)
	Reason:	***Transport Grounds – transfer of funds from the Restricted Grants and Contributions Reserve for the Johnson Road Urban Streetscape Project in 2016/2017.*** ***(Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 4)***			

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

10		Transfer From Reserve - Restricted Grants and			
	700015.1813	Contributions	Nil	77,500	77,500
	300158.1600	Operating Revenue	216,750	(77,500)	139,250
	Reason:	***CDO Recreation and Leisure – transfer of funds from the Restricted Grants and Contributions Reserve for the Silver Sport program in 2016/2017, grant income received in 2015/2016. (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 16)***			
11	700024.1813	Transfer from Reserve - Restricted Grants and Contributions	13,636	51,893	65,529
	400567.1600	Operating Expense	(347,886)	(51,893)	(399,779)
	Reason:	***Natural Environment – transfer of funds from the Restricted Grants and Contributions Reserve for the following projects in 2016/2017 – BP Coastcare Project SMCC Challenger Beach Coastal Rehabilitation SMCC KIA Coastcare in the KIA SMCC Tronox Adopt a Beach SMCC Degremont Adopt a Beach Perth Region NRM Support for South Metro Coastcare Swan Alcoa Landcare Program Caring for the Coast in the Kwinana/Rockingham Region Community Energy Efficiency Round 2 (CEEP) SMCC Local Government Contribution to Coastcare (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Items 6-13,17,20)***			
12	700024.1813	Transfer from Reserve - Restricted Grants and Contributions	65,529	16,000	81,529
	300130.1600	Operating Revenue	77,250	(16,000)	61,250
	Reason:	***Natural Environment – transfer of funds from the Restricted Grants and Contributions Reserve for the Challenger Beach Rehabilitation Project in 2016/2017, grant income received in 2015/2016. (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 5)***			
13		Transfer From Reserve - Restricted Grants and			
	700037.1813	Contributions	Nil	10,284	10,284
	400089.1600	Operating Expense	(187,486)	(10,284)	(197,770)
	Reason:	***CDO Arts and Culture – transfer of funds from the Restricted Grants and Contributions Reserve for the following projects in 2016/2017 – NAIDOC Week 2016 Noongar Coastal Trail (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 18-19)***			
14		Transfer From Reserve - Restricted Grants and			
	700042.1813	Contributions	Nil	5,000	5,000
	300129.1600	Operating Revenue	46,550	(5,000)	41,550
	Reason:	***Youth Centre – transfer of funds from the Restricted Grants and Contributions Reserve for the Freakfest event in 2016/2017, grant income received in 2015/2016. (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 15)***			
15		Transfer From Reserve - Restricted Grants and			
	700042.1813	Contributions	5,000	2,000	7,000
	300129.1600	Operating Expense	41,550	(2,000)	39,550
	Reason:	***Youth Centre – transfer of funds from the Restricted Grants and Contributions Reserve for the Connections Your Next Step forum in 2016/2017, grant income received in 2015/2016. (Refer Additional Projects for 2016/2017 Budget - Grants and Contributions Item 14)***			

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

LEGAL/POLICY IMPLICATIONS:

The Local Government Act 1995 Part 6 Division 4 s 6.8 (1) requires the local government not to incur expenditure from its municipal fund for an additional purpose except where the expenditure-

(b) is authorised in advance by resolution*

"additional purpose" means a purpose for which no expenditure estimate is included in the local government's annual budget.

*requires an absolute majority of Council.

6.11. Reserve accounts

(1) Subject to subsection (5), where a local government wishes to set aside money for use for a purpose in a future financial year, it is to establish and maintain a reserve account for each such purpose.

(2) Subject to subsection (3), before a local government —

(a) changes* the purpose of a reserve account; or

(b) uses* the money in a reserve account for another purpose,

it must give one month's local public notice of the proposed change of purpose or proposed use.

* *Absolute majority required.*

(3) A local government is not required to give local public notice under subsection (2) —

(a) where the change of purpose or of proposed use of money has been disclosed in the annual budget of the local government for that financial year; or

(b) in such other circumstances as are prescribed.

(4) A change of purpose of, or use of money in, a reserve account is to be disclosed in the annual financial report for the year in which the change occurs.

(5) Regulations may prescribe the circumstances and the manner in which a local government may set aside money for use for a purpose in a future financial year without the requirement to establish and maintain a reserve account.

Local Government (Financial Management) Regulations 1996

18. When local public notice not required for change of use of money in reserve account (Act s. 6.11(3)(b))

A local government is not required to give local public notice of a proposed change of use of money in a reserve account —

(a) where the money is to be used to meet expenditure authorised by the mayor or president under section 6.8(1)(c); or

(b) where the total amount to be so used does not exceed $5 000 in a financial year.

FINANCIAL/BUDGET IMPLICATIONS:

The financial implications have been detailed in this report.

*NOTE: All figures are exclusive of GST

16.1 BUDGET VARIATIONS TO RESTRICT FUNDS FOR 2015/2016 PROJECTS AND REBUDGET IN 2016/2017 BUDGET

ASSET MANAGEMENT IMPLICATIONS:

The allocation of funds towards the upgrading and renewal of existing City assets in the capital expenditure items is in line with the Asset Management Strategy and will reduce the current asset management gap.

ENVIRONMENTAL IMPLICATIONS:

No environmental implications have been identified as a result of this report or recommendation.

STRATEGIC/SOCIAL IMPLICATIONS:

Council's Strategic Community Plan for the period 2015 to 2025 provides that Council will ensure the future sustainability of the City of Kwinana through the implementation of sound revenue and expenditure policies, and seeking additional revenue sources.

RISK IMPLICATIONS:

Refer to Legal/Policy comments for risk implications.

COUNCIL DECISION

353

MOVED CR S MILLS **SECONDED CR R ALEXANDER**

1. **That the required budget variations to the Adopted Budget for 2016/2017 as outlined below be approved.**

CARRIED BY AN ABSOLUTE MAJORITY OF COUNCIL 6/0

16.2 Accounts for Payment up to 30 September 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 30 September 2016 be noted.

DISCUSSION:

The following list of accounts summarises all cheques and electronic funds transfer (EFT) drawn for the period to 30 September 2016. It is in agreement with the attached List of Accounts.

FUND	**CHEQUE NO**	**AMOUNT**	**TOTAL**
MUNICIPAL A/C	Cheque #200000 to 200081 EFT # 3344 to 3359		
	Creditors Cheques and EFT	$ 5,956,872.53	
	Non Creditors Cheques	$ 26, 591.54	
	Payroll 14/09/16, 28/09/16, Payroll interim 19/09/2016	$ 1,246,856.15	
TRUST A/C	**EFT NO**	$ N/A	
TOTAL PAID			$7,230,320.22
Cancelled Cheques/EFT		$ 1,225.60	

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.

16.2 ACCOUNTS FOR PAYMENT UP TO 30 SEPTEMBER 2016

FINANCIAL/BUDGET IMPLICATIONS:

Various, but understood to be consistent with budget/budget review position and allowable variations therein

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

354

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

That the List of Accounts paid for the period ended 30 September 2016 be noted.

CARRIED
6/0

Warrant Listing

Warrants between

1/09/2016 to 30/09/2016

Program - ci_ap001 3/10/2016 10:12:56AM

Minimum Amount: **$0.00**

Cancelled

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
00200009	02/09/2016	1490	Town Of Kwinana - Pay Cash	********** C A N C E L L E D ******	$709.90
00200011	02/09/2016	1490	Town Of Kwinana - Pay Cash	********** C A N C E L L E D ******	$515.70

Total:	Cancelled	2	$1,225.60

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
00017313	01/09/2016	5223	Go Go On-Hold Pty Ltd	Monthly On-Hold Messages Service - August	$264.00
00200000	02/09/2016	7705	APG Homes Pty Ltd	Refund sec dep-L37 Magenup Drive	$1,456.00
00200001	02/09/2016	8257	Wong Wee Kuan	C/over subsidy rebate-L178 Mariala Way,	$540.00
00200002	02/09/2016	862	Kwinana Men's Support Service	Tuesday 2 August 2016 Gifts to new citi	$455.00
00200003	02/09/2016	5180	Sandra Elizabeth Low	Refund Kwinana Festival Fees-Application	$50.00
00200004	02/09/2016	980	Midway Drycleaners	Darius Wells Library and Resource Centre	$91.00
00200005	02/09/2016	6586	Peel Riding for the Disabled Associ	2016/17 Community Development Fund - Rou	$1,000.00
00200006	02/09/2016	267	Schweppes Pty Ltd	Water, soft drink and fruit juice for ca	$254.04
00200007	02/09/2016	8251	Raymond Peter Sorensen	C/over subsidy rebate-L159 Blacksmith Dv	$660.00
00200008	02/09/2016	1456	The Salvation Army	Round 1 2016/17-Community Develeopment	$2,500.00
00200010	02/09/2016	1592	Water Corporation	Trade waste charges-Annual and F & F Rec	$4.70
00200013	05/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to 18/8/16-Recquatic	$709.90
00200014	05/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to 22/8/16-D/W Lib & R	$515.70
00200015	07/09/2016	5109	Building Commission (Department of	Building Services Levy for month of Augu	$25,171.60
00200016	07/09/2016	1767	Construction Training Fund	CTF levy for month of August 2016	$25,164.14
00200017	07/09/2016	2052	Kwinana District Football Club	Kidsport - Jason Cockie	$200.00
00200018	07/09/2016	8111	South Thornlie Redsox Softball Club	Kidsport voucher - Monique Clinkers	$200.00
00200019	07/09/2016	1832	Southern Districts BMX Raceway	Kidsport vouchers x 2	$400.00
00200020	07/09/2016	3390	SSB Pty Ltd T/A Content Living - Th	Refund sec dep-L57 Surbiton Approach	$1,500.00
00200021	07/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to 26/8/2016-Library	$374.15
00200022	07/09/2016	1592	Water Corporation	Charges to 230816 0KL Old St Johns Ambul	$2,159.70
00200023	07/09/2016	1592	Water Corporation	Charges to 230816 0KL Orelia Oval Bore	$3,138.95
00200024	07/09/2016	1592	Water Corporation	Charges to 23/8/16 13KL - Hall at Harley	$948.89
00200049	08/09/2016	1487	City of Kwinana	2016/17 Rubbish Charges-Council owned pr	$52,808.00
00200050	14/09/2016	8295	Ramasawmy Boyrangee	C/over subsidy rebate-L725 Windell Sreet	$360.00
00200051	14/09/2016	3374	Commissioner of State Revenue	Refund Rates Pension & ESL concessions	$541.86
00200052	14/09/2016	3786	HALPD Pty Ltd T/A Affordable Living	Refund sec dep-L2030 Needlewood Loop	$1,456.00
00200053	14/09/2016	8296	Travis Luke Morris	C/over subsidy rebate-L733 Windell Stree	$360.00
00200054	14/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to 8/9/16 - Recq Admin	$495.00
00200055	14/09/2016	8159	Webb & Brown-Neaves Homes	Refund sec dep-L706 Geikie Glade	$2,912.00
00200061	21/09/2016	8282	Mary Colley	Refund of pool membership due to relocat	$94.50
00200062	21/09/2016	6418	Home Group WA Pty Ltd	Refund sec dep-L2007 Honeywood Ave	$1,456.00
00200063	21/09/2016	2052	Kwinana District Football Club	Refund bond-Hall hire 9/9/16	$2,000.00
00200064	21/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to18/9/16-Village	$149.45
00200065	21/09/2016	4405	Vinsan Corporation	Refund verge permit application fee	$164.00
00200066	21/09/2016	1592	Water Corporation	Charges to 8/9/16 - Offices at Stidworth	$282.28
00200069	28/09/2016	5000	Compact Mobile Entertainment	DJ & MC - Bushfire Brigades Annual Award	$750.00
00200070	28/09/2016	429	CSR Building Products Limited	Plasterboard ceiling tiles	$105.31
00200071	28/09/2016	862	Kwinana Men's Support Service	Tuesday 30 August 2016 Gifts for new ci	$455.00
00200072	28/09/2016	980	Midway Drycleaners	Darius Wells Library and Res Cnt 6 table	$130.00
00200073	28/09/2016	1490	Town Of Kwinana - Pay Cash	Petty cash recoup to 28/09/2016	$1,144.35
00200074	28/09/2016	1592	Water Corporation	Service charges to 31/10/16-Shops at 24/	$8,302.96
00200075	28/09/2016	1592	Water Corporation	Charges to 8/09/16 1047KL - Recq & Zone	$9,732.49
00200076	28/09/2016	1592	Water Corporation	Charges to 08/09/16 407KL - Tennis Club/	$3,630.02
00200079	30/09/2016	3037	Colonial First State Investments Li	Superannuation-August2016-18	$5,187.64
00200080	30/09/2016	4101	IOOF Global One Retirement Solution	Superannuation-September16-29	$55.71
00200081	30/09/2016	3442	One Path - formerly ING Life Limite	Superannuation-August2016-24	$14,013.91
020916	12/09/2016	8212	Commonwealth Bank	Corporate credit card transactions 3/8/16-2/9/	$1,047.60
10	21/09/2016	7690	Wright Express Australia Pty Ltd	Fleet Fuel 29/7/16-31/8/16	$4,056.42
1641612A	20/09/2016	549	Esanda	Monthly lease fees for KWN700 2/9-1/10/16	$1,294.70
310816	01/09/2016	179	Bankwest Visa	Corporate credit card transactions 30/7/16-31	$4,070.53
31360836	06/09/2016	4805	TPG Internet Pty Ltd	Monthly Internet Kwinana South Station 3/9-2	$49.99
3344.153-01	05/09/2016	153	Australian Taxation Office	Taxation	$185,874.00
3345.7367-01	05/09/2016	7367	ClickSuper Pty Ltd	Superannuation-August2016-03	$326,825.30
3346.130-01	07/09/2016	130	Australasian Performing Rights	Payment of Licence fee - 02083494	$1,064.09
3346.1423-01	07/09/2016	1423	Telstra	Usage to 27/8/16 - Mobile TMB	$620.82
3346.1478-01	07/09/2016	1478	Toolmart Australia Pty Ltd	paslode angled gas bradder nail gun	$729.00
3346.1649-01	07/09/2016	1649	Dennis Cleve Wood	Meeting Fees	$2,905.33
3346.1652-01	07/09/2016	1652	Woolworths Ltd	Lunch Special Ingredients Cafe Splash	$480.15
3346.1689-01	07/09/2016	1689	Sandra Elizabeth Lee	ICT Allowance	$3,273.47
3346.1760-01	07/09/2016	1760	Hanson Construction Materials Pty L	Pace Road Tavern Carpark 0.4m3	$420.20
3346.1762-01	07/09/2016	1762	Officeworks BusinessDirect	Sharpie fine electro pop	$59.94
3346.1948-01	07/09/2016	1948	Alleasing Pty Ltd	All Leasing hire fees period to 31/12/16	$72,313.34
3346.2125-01	07/09/2016	2125	Synergy	Usage to 170816 2967U Chipperton Park	$22,526.80
3346.2914-01	07/09/2016	2914	Lesley Vivienne Barrett	Kwinana Adventure Playground-Art project	$6,000.00
3346.2931-01	07/09/2016	2931	Ruth Elizabeth Alexander	ICT Allowance	$2,905.33
3346.2981-01	07/09/2016	2981	Peter Edward Feasey	ICT Allowance	$4,756.66
3346.30-01	07/09/2016	30	Carol Elizabeth Adams	ICT Allowance	$11,617.50
3346.3031-01	07/09/2016	3031	Specialised Security Shredding	Specialised Security Shredding - GC Bin	$20.24

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3346.3084-01	07/09/2016	3084	Outsource Business Support Solution	Onsite consulting - 31/8/2016	$1,320.00
3346.3155-01	07/09/2016	3155	PFD Food Services Pty Ltd	Chips, squeeze sauce & nuggets - Cafe	$205.95
3346.3375-01	07/09/2016	3375	Starlight Children's Foundation of	Lyrik Awards round 21 - Blake Worrall	$50.00
3346.3452-01	07/09/2016	3452	WA Recycling Service	Greenwaste collection - Area 2	$31,860.77
3346.3474-01	07/09/2016	3474	Patrica Rawlings	Senior Security Subsidy Scheme App 20160	$100.00
3346.3502-01	07/09/2016	3502	Patricia Clarke	Senior Security Subsidy Scheme App 20160	$100.00
3346.3530-01	07/09/2016	3530	Dorothy Hill	Senior Security Subsidy Scheme App 20160	$100.00
3346.3607-01	07/09/2016	3607	Hays Specialist Recruitment Pty Ltd	Temp staff w/e 28/8/16 - Lisa Russell	$1,315.67
3346.410-01	07/09/2016	410	Council On The Ageing (WA) Inc	Living longer living stronger annual fee	$1,320.00
3346.4135-01	07/09/2016	4135	Shrapnel Urban Planning	INV#201633 - Leda RSA Review - (1) Plann	$5,975.77
3346.4279-01	07/09/2016	4279	Data #3 Limited	8x Adobe Creative Cloud Subscriptions An	$9,644.09
3346.4412-01	07/09/2016	4412	JB Hi-Fi Rockingham	Epson Expression Home XP630 Multi-Functi	$149.00
3346.4664-01	07/09/2016	4664	AMPAC Debt Recovery (WA) Pty Ltd	Commissions & costs for month of Sept 20	$378.09
3346.4790-01	07/09/2016	4790	Spotlight Pty Ltd	Pin it - Made It materials Term 3	$29.98
3346.5143-01	07/09/2016	5143	Wendy Gaye Cooper	ICT Allowance	$2,905.33
3346.5410-01	07/09/2016	5410	St Vincents Netball Club	Kidsport vouchers x 2	$400.00
3346.5454-01	07/09/2016	5454	Bibra Lake Junior Football Club	Kidsport voucher - Connor Bunting	$200.00
3346.5468-01	07/09/2016	5468	Associates Rugby Union Football Clu	Kidsport voucher - Alexander Masibaka	$200.00
3346.5656-01	07/09/2016	5656	Owen Consulting	Quantity Surveying services	$3,850.00
3346.5701-01	07/09/2016	5701	Ruth Long	Goods & Services	$100.00
3346.5872-01	07/09/2016	5872	Kwinana Junior Knights Football clu	Kidsport Invoice 20	$13,545.00
3346.5962-01	07/09/2016	5962	Rockingham PCYC	Kidsport x 5	$1,400.00
3346.6223-01	07/09/2016	6223	Robert Thompson	ICT Allowance	$2,905.33
3346.6227-01	07/09/2016	6227	Ana Behrendt	Reimb of catering for JDAP meeting	$98.20
3346.640-01	07/09/2016	640	Gilden Tree Farm	Plant 100L trees - Parmelia, Wandi, Orel	$3,630.00
3346.6460-01	07/09/2016	6460	Artistralia	Darius Wells - movie licence for "The Dr	$132.00
3346.6462-01	07/09/2016	6462	Rockingham Coastal Sharks	Kidsport Invoice 1004	$5,720.00
3346.6502-01	07/09/2016	6502	Breakers Netball Club	Kidsport voucher - Alisha Canas	$200.00
3346.6559-01	07/09/2016	6559	Secret Harbour Dockers	Kidsport voucher - Jack Kirkwood	$200.00
3346.6688-01	07/09/2016	6688	Rockingham Basketball and Recreatio	Kidsporrt vouchers x 6	$1,200.00
3346.6697-01	07/09/2016	6697	Vixens Netball Club	Kidsport vouchers x 5	$1,000.00
3346.6698-01	07/09/2016	6698	Hammond Park Jnr Football Club	Kidsport vouchers x 3	$600.00
3346.69-01	07/09/2016	69	Alinta Gas	Usage to 30/8/16 327U - Medina Oval chan	$1,255.45
3346.7047-01	07/09/2016	7047	Assassins Netball Club	Kidsport voucher x 2	$400.00
3346.7058-01	07/09/2016	7058	Wallangarra Riding & Pony Club	Kidsport voucher - Georgina Clarke	$200.00
3346.7186-01	07/09/2016	7186	Kwinana Wolves Sports Club	Kidsport vouchers x 14	$2,800.00
3346.7277-01	07/09/2016	7277	Settlers Netball Club Inc	Kidsport vouchers x 3	$600.00
3346.7388-01	07/09/2016	7388	Morris Jacobs	Facilitate art class-6/9/16 - Watercolou	$491.00
3346.7419-01	07/09/2016	7419	Saints Basketball Club	Kidsport vouchers x 6	$600.00
3346.7557-01	07/09/2016	7557	Sheila Mills	ICT Allowance	$2,985.75
3346.7744-01	07/09/2016	7744	Allsortz Netball Club	Kidsport voucher - Brodie Tuhakaraina	$600.00
3346.7976-01	07/09/2016	7976	Fresh Coast Sports Club Inc	Kidsport voucher - Kaditja Beyan	$200.00
3346.8031-01	07/09/2016	8031	TJ's Gymsports	Kidsport vouchers x 2	$400.00
3346.8035-01	07/09/2016	8035	Techworks Electrical Solutions	Balance of works - Cat6a data upgrade	$18,848.74
3346.8101-01	07/09/2016	8101	Elite Sporting Concepts	Events Plan and Funding database 2016/20	$3,240.00
3346.8213-01	07/09/2016	8213	John Morris Group	As per estimate EA00001998 dated 16/6/16	$598.40
3346.8243-01	07/09/2016	8243	Brackson Construction Pty Ltd	Deposit for materials for Calista Oval s	$3,671.64
3346.8263-01	07/09/2016	8263	LJ Hooker Subiaco	Rates Refund	$516.78
3346.8265-01	07/09/2016	8265	Skilled Fencing	Indoor Cage storage-Thomas Kelly Pav-50%	$1,375.00
3346.8266-01	07/09/2016	8266	Wendy Ellen Tanoa	Rates Refund	$41.52
3346.8267-01	07/09/2016	8267	Margaret Fawkes Feaver	Rates Refund	$80.39
3346.8269-01	07/09/2016	8269	Kelmscott Junior Football Club	Kidsport voucher - Kurtis Denham	$131.00
3346.8270-01	07/09/2016	8270	Stellar Calisthenics Club	Kidsport voucher - Bella Wood	$200.00
3346.8271-01	07/09/2016	8271	1st Rockingham Scout Group	Kidsport vouchers x 2-J Baragry & Kyana-	$400.00
3346.8272-01	07/09/2016	8272	Baldivis Netball Club	Kidsport voucher - Che Lynch	$200.00
3346.8273-01	07/09/2016	8273	Lawrence Tuhaka	Travel Assistance for Alliance Cup in Ql	$175.00
3346.8275-01	07/09/2016	8275	Mildred Libanan Dogello	Refund bond-Hall hire 27/8/16	$1,000.00
3346.8276-01	07/09/2016	8276	Suzanne Frances Logan	Refund bond-Hall hire 1/9/16	$1,000.00
3346.8277-01	07/09/2016	8277	Luke Daniel Pember	Rates Refund	$52.12
3346.835-01	07/09/2016	835	Kwinana Golf Club Inc	Siversport Club members x 3	$600.00
3346.848-01	07/09/2016	848	Kwinana Roller Hockey Club	Kidsport vouchers x 3	$600.00
3346.849-01	07/09/2016	849	Kwinana Scout Group	Kidsport vouchers x 18	$3,096.00
3346.850-01	07/09/2016	850	Gilmore College	Round 1 of 2016/17 Community Development	$2,000.00
3346.854-01	07/09/2016	854	Kwinana Swimming Club	Kidpsort vouchers x 3	$600.00
3346.855-01	07/09/2016	855	Kwinana Tigers Junior Hockey Club	Kidsport vouchers x 19	$2,645.00
3346.859-01	07/09/2016	859	Kwinana United Junior Soccer	Kidsport voucher x 3	$600.00
3346.888-01	07/09/2016	888	Les Mills Australia	Lesmills monthly licensing fees Sept 201	$431.56
3346.903-01	07/09/2016	903	Lo-Go Appointments	Staff coverage w/e 20/8/16 - Geoffrey Co	$884.49
3347.1034-01	14/09/2016	1034	North Lake Electrical Pty Ltd	Check irrigation system - Wandi Equistri	$374.00

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3347.1079-01	14/09/2016	1079	Parmelia Delivery Round	The West Australian newspaper - 3/9/16	$46.00
3347.1186-01	14/09/2016	1186	Red Dot	Frame element	$34.93
3347.134-01	14/09/2016	134	Australia Post	Agency commission fees for rates - perio	$6,276.39
3347.1423-01	14/09/2016	1423	Telstra	Usage to 21/8/16 - Depot Direct line/Bur	$146.60
3347.1524-01	14/09/2016	1524	Turfmaster Facility Management	Broadleaf Weed Control to various Reserv	$19,184.00
3347.1589-01	14/09/2016	1589	Waste Stream Management Pty Ltd	D8 - Class 1 account, Bobcat screen acco	$538.93
3347.1652-01	14/09/2016	1652	Woolworths Ltd	Food for Adventure Playground Program	$1,821.00
3347.1669-01	14/09/2016	1669	Zipform Pty Ltd	Printing of Cheques (Muni and Trust)	$1,774.30
3347.1762-01	14/09/2016	1762	Officeworks BusinessDirect	Ajax cream cleanser	$513.60
3347.1856-01	14/09/2016	1856	Cornerstone Legal	Legal Fees-Medina Revitalisation Project	$712.80
3347.1869-01	14/09/2016	1869	United Cinemas Rockingham	Excursion on 4/09/16. $6.00/ child. 50 C	$308.00
3347.2048-01	14/09/2016	2048	Palm Lakes Gardens & Landscape Serv	BP - villa 5, 20 & 21, supply and instal	$1,771.00
3347.2125-01	14/09/2016	2125	Synergy	Usage to 31/8/16 14364.72U - The Zone	$153,494.10
3347.2224-01	14/09/2016	2224	Prestige Catering & Event Hire	Catering 5/9/16	$394.40
3347.2256-01	14/09/2016	2256	GlobalX Information Services Pty Lt	Health - Legal Name Searches for August	$50.93
3347.2652-01	14/09/2016	2652	Modern Teaching Aids Pty Ltd	Craft materials for Bertram After school	$450.40
3347.270-01	14/09/2016	270	Caltex Australia Petroleum Pty Ltd	Caltex card - August 2016	$4,959.57
3347.2817-01	14/09/2016	2817	Medina Aboriginal Cultural Centre	Kwinana Adventure Playground Community A	$3,500.00
3347.3155-01	14/09/2016	3155	PFD Food Services Pty Ltd	Vegetable Oil, Gravy Mix, Diced Chicken,	$248.25
3347.3212-01	14/09/2016	3212	Marketforce Pty Ltd	Advert - 1 & 8/0/2016	$667.15
3347.3391-01	14/09/2016	3391	Ventura Home Pty Ltd T/A Aussie Liv	Refund sec dep-L207 Indigo Bend	$1,456.00
3347.4245-01	14/09/2016	4245	ED Property Services	BP - villa 45, repair external wall dama	$1,430.00
3347.4329-01	14/09/2016	4329	Fiona Audrey Hodgson	Reimb for Farewell function-Anette Foote	$100.00
3347.4465-01	14/09/2016	4465	Medina Residents Group	Contribution-2016 Medina Community Festi	$3,000.00
3347.4861-01	14/09/2016	4861	Big W	Kitchen ware, plastic containers and out	$459.55
3347.5033-01	14/09/2016	5033	Baileys Fertilisers	Application of GT Green Plus	$2,215.95
3347.5071-01	14/09/2016	5071	JB HiFi Commercial Division	2x Belkin HDMI to VGA Adaptor with Audio	$245.13
3347.5269-01	14/09/2016	5269	Karate For Life	Kidsport voucher	$400.00
3347.5576-01	14/09/2016	5576	Cockburn City Soccer Club	Kidsport vouchers x 3	$600.00
3347.572-01	14/09/2016	572	Fire & Emergency Services, Dept of	2016/17 ESL Qtr 1-Option B Agreement	$1,403,165.39
3347.583-01	14/09/2016	583	Flexi Staff Pty Ltd	Temp staff w/e 3/9/16 - Bryce Law	$1,405.18
3347.5962-01	14/09/2016	5962	Rockingham PCYC	Kidsport voucher x 2 - M Curran & T Hame	$840.00
3347.6020-01	14/09/2016	6020	Kristen Wendy Metcher	Prep and presentation-Internet Safety se	$270.00
3347.6046-01	14/09/2016	6046	Mundijong Centrals Junior Football	Kidsport vouchers x 3	$600.00
3347.6383-01	14/09/2016	6383	Alicia Jane McKenzie	Reimbursement of internet	$79.90
3347.6506-01	14/09/2016	6506	Projex Management & Construction Pt	Refund sec dep-L114 Mornington Cres	$1,456.00
3347.6571-01	14/09/2016	6571	SPP Consulting (WA) Pty Ltd	Consultancy Services	$5,018.50
3347.6698-01	14/09/2016	6698	Hammond Park Jnr Football Club	Kidsport voucher - Chelsea Lankford	$200.00
3347.6703-01	14/09/2016	6703	Lucor Pty Ltd	Catering - 07/09/2016	$770.00
3347.6707-01	14/09/2016	6707	Labourforce Impex Personnel Pty Ltd	Temp staff w/e 28/8/16 - Glenn Snook	$1,653.55
3347.6768-01	14/09/2016	6768	Peel Metropolitan Horse & Pony Club	Kidsport voucher - Lauren Worrall	$200.00
3347.6791-01	14/09/2016	6791	Alison Barbara Scott	Ingredients for Father's Day	$77.10
3347.6826-01	14/09/2016	6826	Beeliar Spirit Soccer Club	Kidsport voucher - Kim J Phipps	$200.00
3347.69-01	14/09/2016	69	Alinta Gas	Usage to 18/8/16 175162U - Recquatic	$10,814.80
3347.7047-01	14/09/2016	7047	Assassins Netball Club	Kidsport voucher x 3	$600.00
3347.7418-01	14/09/2016	7418	Warnbro Swans Football Club Inc	Kidsport voucher - Trevor Vincent	$150.00
3347.746-01	14/09/2016	746	Institute Of Public Works Engineeri	Integrated Traffic Management Plan Cours	$20.00
3347.7521-01	14/09/2016	7521	Strategen Environmental Consultants	Strategic Advice - Urban Amenity Strate	$4,578.75
3347.7669-01	14/09/2016	7669	Calibre Consulting	Modification to LPS mapping	$665.50
3347.7851-01	14/09/2016	7851	Rockingham City Football Club	Kidsport voucher - Nalson Sula Cosmas	$200.00
3347.7914-01	14/09/2016	7914	Jandakot Jets Junior Football Club	Kidsport vouchers x 3	$515.00
3347.7939-01	14/09/2016	7939	Mackay Urban Design	Residential Streetscape and Built Form	$4,950.00
3347.7976-01	14/09/2016	7976	Fresh Coast Sports Club Inc	Kidsport voucher - Marata Tipiwai	$200.00
3347.7993-01	14/09/2016	7993	EdgyX Pty Ltd	Incursion on 6 October 2016. 50% deposit	$247.50
3347.8027-01	14/09/2016	8027	Fiona Susan Bettesworth	Reimb refreshments - RAP meeting & works	$25.60
3347.8200-01	14/09/2016	8200	Swing 'N Sway	Silversport - Joy Gibbons	$200.00
3347.8280-01	14/09/2016	8280	Femantle Dancers Inc	Silversport x 1 - Jean Thomas	$48.00
3347.8281-01	14/09/2016	8281	Jack Heremia Ngamoki	Reimb of HR drivers licence	$44.00
3347.8282-01	14/09/2016	8282	Mary Colley	Refund of Hydro Pool passes due to trave	$94.50
3347.8283-01	14/09/2016	8283	Kerryn Proctor	Refund of gym membership due to relocati	$133.76
3347.8284-01	14/09/2016	8284	Black Swan State Theatre Company Lt	Shadowboxing performance & workshop-1/8/	$2,450.00
3347.8285-01	14/09/2016	8285	Trevor Owen Martin Jones	Reimb for passport photos for Security L	$16.95
3347.8286-01	14/09/2016	8286	Bendigo and Adelaide Bank	Bank audit fee-2015/2016 Fin Year-City o	$30.00
3347.8290-01	14/09/2016	8290	Leda Education Support Centre	Refund bond-Hall hire 5/9/16	$700.00
3347.8291-01	14/09/2016	8291	Sarah Freemantle	Refund bond-hall hire 13/8/16	$2,000.00
3347.8292-01	14/09/2016	8292	Courtney Arron Lee Smith	C/over subsidy rebate-L370 Aquinnah Way,	$540.00
3347.8293-01	14/09/2016	8293	Jonathon Charles Donnelly	C/over subsidy rebate-L420 Coleford Rd,W	$360.00
3347.8294-01	14/09/2016	8294	Prashan Kumar Puttoo	C/over subsidy rebate-L1167 Jarrow Court	$360.00
3347.8297-01	14/09/2016	8297	Ravens Basketball Club	Kidsport voucher - Koby Hay	$200.00

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3347.8298-01	14/09/2016	8298	Riding For The Disabled Oakford	Kidsport voucher - Kayla Iannucci	$200.00
3347.8299-01	14/09/2016	8299	Kalamunda Canning Rugby League Foot	Kidsport vouchers x 2	$400.00
3347.830-01	14/09/2016	830	Kwinana District Diamond Sports Ass	Kidsport voucher - Xavier Giles	$60.00
3347.959-01	14/09/2016	959	McLeods Barristers & Solicitors	Legal fees - Matter No.39678	$2,466.49
3348.1491-01	14/09/2016	1491	Works Social Club	Payroll Deduction	$235.00
3348.151-01	14/09/2016	151	Australian Services Union	Payroll Deduction	$758.51
3348.2853-01	14/09/2016	2853	Maxxia Pty Ltd	Being Employee Net ITC for period 1/8 to	$5,800.85
3348.3376-01	14/09/2016	3376	Health Insurance Fund of WA (HIF)	Payroll Deduction	$1,857.70
3348.3719-01	14/09/2016	3719	Town of Kwinana - Xmas fund	Payroll Deduction	$6,540.00
3348.487-01	14/09/2016	487	Child Support Agency	Payroll Deduction	$3,164.50
3348.892-01	14/09/2016	892	LGRCEU	Payroll Deduction	$859.47
3349.565-01	14/09/2016	565	Bright Futures Family Day Care - Pa	FDC payroll 29/8/16-11/9/16	$106,996.53
3349.568-01	14/09/2016	568	Bright Futures In Home Care - Payro	IHC Payroll 29/8/16-11/9/16	$52,322.05
3350.565-01	15/09/2016	565	Bright Futures Family Day Care - Pa	FDC payroll 29/8/16-11/9/16 File 1	$640.50
3351.8304-01	16/09/2016	8304	Bella 103 1 Pty Ltd	Bouncy Castle & attendance (3hrs)-Wild W	$490.00
3352.568-01	16/09/2016	568	Bright Futures In Home Care - Payro	IHC payroll 29/8/16-11/9/16 File 1	$213.00
3353.153-01	19/09/2016	153	Australian Taxation Office	Taxation	$184,432.00
3354.1059-01	21/09/2016	1059	Vodafone Messaging	Alpha network access fee	$176.00
3354.11-01	21/09/2016	11	ABA Automatic Gates	Airkey transmitter AKTX2 (boom gate remo	$675.00
3354.1227-01	21/09/2016	1227	Rockingham Holden	Holden Summit Dual cab	$108,731.52
3354.1408-01	21/09/2016	1408	Sylvia Ayton Snowden	Reimb of catering - FDC Milestone	$100.00
3354.1423-01	21/09/2016	1423	Telstra	Usage to 27/8/2016 - Mobile whole organi	$10,581.83
3354.1621-01	21/09/2016	1621	Western Australian Treasury Corpora	Loan #101-Interest-New Loan borrowing-Ci	$24,721.76
3354.1652-01	21/09/2016	1652	Woolworths Ltd	Depot Morning Tea Supplies	$102.69
3354.1937-01	21/09/2016	1937	Coles Myer Ltd - Gift Card Accounti	Gift cards x 30	$3,309.85
3354.2125-01	21/09/2016	2125	Synergy	Usage to 1/9/2016 4208.79U-Lambeth Park	$1,049.40
3354.2460-01	21/09/2016	2460	Allcom Communications	Volume pot - TX4400	$327.25
3354.2652-01	21/09/2016	2652	Modern Teaching Aids Pty Ltd	Thrifty chair 30cm	$29.59
3354.2971-01	21/09/2016	2971	Local Community Insurance Services	Public liability insurance-Buskers & Per	$660.00
3354.3031-01	21/09/2016	3031	Specialised Security Shredding	GC Bin Exchange - 22/8/16	$20.24
3354.3084-01	21/09/2016	3084	Outsource Business Support Solution	System & Reporting Support-Finance 15/9/	$825.00
3354.3358-01	21/09/2016	3358	Homebuyers Centre Pty Ltd	Refund sec dep-L1127 Tidowrth Grange	$1,456.00
3354.3359-01	21/09/2016	3359	J Corp Pty Ltd	Refund sec dep-L891 Honeywood Ave	$1,456.00
3354.3607-01	21/09/2016	3607	Hays Specialist Recruitment Pty Ltd	Temp staff w/e 4/9/16 - Lisa Russell	$1,999.59
3354.3768-01	21/09/2016	3768	Rockingham & Districts Netball	Kidsport voucher - Kiara McCartney	$105.00
3354.412-01	21/09/2016	412	Courier Australia	Courier charges to 29/7/16	$114.40
3354.4166-01	21/09/2016	4166	Alison Dymond	Reimb of mobile phone expenses 13 Jul-12	$50.00
3354.533-01	21/09/2016	533	Eclipse Resources	Tipping-green/grass waste-Djilba View/Gi	$3,476.00
3354.544-01	21/09/2016	544	Environmental Industries Pty Ltd	Kwinana Adventure Playground-Claim 10	$1,070,323.23
3354.5670-01	21/09/2016	5670	Tracey Jane Gooden	Reimb of purchases for WA Breakdancin Co	$190.90
3354.583-01	21/09/2016	583	Flexi Staff Pty Ltd	Temp staff w/e 10/9/16	$1,051.28
3354.6576-01	21/09/2016	6576	Kylie Ilana Jesus	Set Up, Pack Down and Facilitator Servic	$540.00
3354.6688-01	21/09/2016	6688	Rockingham Basketball and Recreatio	Kidsport vouchers x 3	$600.00
3354.6707-01	21/09/2016	6707	Labourforce Impex Personnel Pty Ltd	Temp staff w/e 11/9/16 - Glenn Snook	$3,282.61
3354.6749-01	21/09/2016	6749	Australia Post	Postage for period ending 31/8/2016	$7,971.04
3354.6764-01	21/09/2016	6764	Willagee Rugby League Football Club	Kidsport vouchers x 2	$240.00
3354.7200-01	21/09/2016	7200	Allyce Rosamond Paulsen	Program Assistant-Friday Cupcake Classes	$405.00
3354.738-01	21/09/2016	738	OCLC (UK) Ltd	Amlib Annual Maintenance - Amlib 18 CAL	$10,521.21
3354.7419-01	21/09/2016	7419	Saints Basketball Club	Kidsport voucher - Blake Sherry	$100.00
3354.7670-01	21/09/2016	7670	Southshore Swimming Club	Kidsport voucher - Tiana Kosovich	$200.00
3354.7737-01	21/09/2016	7737	Kat Morasutti	Darius Wells - facilitate Snr Social Gro	$1,665.00
3354.8105-01	21/09/2016	8105	Sydney Fricker	Travel Assistance - WA Women's Ice Hocke	$175.00
3354.8113-01	21/09/2016	8113	Alicia Kelly	Travel assistance-WA women's Ice Hockey	$175.00
3354.830-01	21/09/2016	830	Kwinana District Diamond Sports Ass	Kidsport vouchers x 7	$1,109.00
3354.8307-01	21/09/2016	8307	Victor Jr Vita Fortuna	Refund bond-Hall hire 10/9/16	$1,000.00
3354.8308-01	21/09/2016	8308	Anjum Qaisrani	Refund bond-Hall hire 4/9/16	$200.00
3354.8309-01	21/09/2016	8309	Kunal Puri	Refund bond-Hall hire 10/9/2016	$2,000.00
3354.8310-01	21/09/2016	8310	Tudorview Holdings Pty Ltd	Refund bond-Hall hire	$299.20
3354.8311-01	21/09/2016	8311	Suraj Sahani	C/over subsidy rebate-L1245 Bellingham P	$360.00
3354.8312-01	21/09/2016	8312	Keyurkumar Sureshbhai Patel	C/over subsidy rebate-L752 Parmelia Ave,	$900.00
3354.8313-01	21/09/2016	8313	Aaron Patrick Diver	C/over subsidy rebate-L499 Coleford Rd,	$540.00
3354.8314-01	21/09/2016	8314	Carmel Mary Seaman	C/over subsidy rebate-L11 Sapphire Chase	$540.00
3354.8315-01	21/09/2016	8315	Gregory John Bartrop	C/over subsidy rebate-L95 Sapphire Chase	$1,080.00
3354.8316-01	21/09/2016	8316	Natalie Anne Klepzig	Lyrik Awards Rnd 21-Award Incentive Paym	$250.00
3354.8317-01	21/09/2016	8317	WA Disabled Sports	Lyrik Awards Rnd 21-Donation by Jackson	$50.00
3354.835-01	21/09/2016	835	Kwinana Golf Club Inc	Silversport - Kwinana Gold Club members	$400.00
3355.3660-01	23/09/2016	3660	Peggy Winifred Beckingham	Tenure Sum Re-payment for Villa 62	$210,938.69
3356.1022-01	28/09/2016	1022	Naval Base Concrete Pty Ltd	2x Soakwell 1800x1200, 2000 diameter, gu	$1,731.57
3356.1033-01	28/09/2016	1033	Nilfisk Pty Ltd	Recquatic - Rental Contract period for A	$1,333.20

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3356.1044-01	28/09/2016	1044	Oakford Agricultural & Garden Suppl	Weed and feed 12.5kg, 10L watering can,	$953.73
3356.1046-01	28/09/2016	1046	OCE Australia Ltd	Monthly Charges for ColorWave 550 - Scan	$212.06
3356.1061-01	28/09/2016	1061	Otis Elevator Company Pty Ltd	Margaret Fielman Centre - Quarterly main	$1,429.00
3356.1071-01	28/09/2016	1071	Pagett & Co Barrister & Solicitor	BP - legal advice for pre contractual Fo	$2,329.91
3356.1072-01	28/09/2016	1072	Paint Industries	White Road Marking streamline paint 1lt	$962.80
3356.1078-01	28/09/2016	1078	Parks And Leisure Australia	Corporate Membership Nele Johnson	$665.50
3356.11-01	28/09/2016	11	ABA Automatic Gates	Repairs to the Depot boom gate	$66.00
3356.1130-01	28/09/2016	1130	Port Printing Works	Reoccurring business card orders - stand	$367.88
3356.1141-01	28/09/2016	1141	Davidson Trahaire Corpsych	Onsite Support-Health Environment Team 2	$4,108.50
3356.115-01	28/09/2016	115	Asphalt Surfaces Pty Ltd	Asphalt in a bag one pellet. 50 bags-Col	$2,326.44
3356.1186-01	28/09/2016	1186	Red Dot	Items to fill Term 4 school holidays gif	$180.71
3356.1189-01	28/09/2016	1189	Reece Pty Ltd	Medina Hall - H2 Zero Cleaning fluid - 5	$998.88
3356.1206-01	28/09/2016	1206	Ritz Party Hire	Hiring of BBQ Burner for Homelessness Sl	$316.00
3356.1227-01	28/09/2016	1227	Rockingham Holden	PL433, KWN1958 COLORADO CREW CAB 4	$451.30
3356.1228-01	28/09/2016	1228	Rockingham Mower & Chainsaw Centre	Repairs to reel mower	$241.50
3356.1249-01	28/09/2016	1249	Royal Life Saving Society	Aquatics Certificates	$2,555.00
3356.1265-01	28/09/2016	1265	Sai Global Ltd	Subscription for the NCC + Standards (On	$2,549.62
3356.1276-01	28/09/2016	1276	Satellite Security Services	Depot - Security panel displaying low ba	$5,275.20
3356.1277-01	28/09/2016	1277	Savage Garden Services	General maintenance-Various areas Sept 1	$22,663.90
3356.1313-01	28/09/2016	1313	Daimler Trucks Perth	Filter kit & fuel filter	$903.32
3356.1317-01	28/09/2016	1317	Bullivants Pty Ltd	26 tonne recovery strap. 9 metres long	$352.00
3356.1335-01	28/09/2016	1335	Rockingham Kwinana Chamber of Comme	RKCC Regional Business Awards - Saturday	$320.00
3356.1360-01	28/09/2016	1360	Saint John Ambulance Australia (WA)	First Aid Cover for We are one homelessn	$1,508.50
3356.1370-01	28/09/2016	1370	State Library of Western Australia	Cost of Lost and Damaged items from 1 Ju	$8,646.00
3356.1375-01	28/09/2016	1375	Stewart & Heaton Clothing Co Pty Lt	Cargo Pants x 3	$670.12
3356.1393-01	28/09/2016	1393	Sunny Sign Company Pty Ltd	MACEDONIA STREET X 1, CRYSTAL TERR	$445.50
3356.14-01	28/09/2016	14	Flick Anticimex Pty Ltd	Washroom Services - August 2016	$2,239.25
3356.1423-01	28/09/2016	1423	Telstra	Usage to 13/9/2016 - Alarm for Hutchins	$42.21
3356.1444-01	28/09/2016	1444	The Good Guys	Hisense HR6TFF350 350L Top Mount Refrig	$625.00
3356.1481-01	28/09/2016	1481	Total Eden Pty Ltd	Valve duo wafer and butterfly tablet	$306.90
3356.1485-01	28/09/2016	1485	T-Quip	Toro Groundsmaster Turn Mowers 7200	$55,596.85
3356.1528-01	28/09/2016	1528	Twights Plumbing Pty Ltd	William Bertram Community Centre - Blocke	$9,959.38
3356.1569-01	28/09/2016	1569	WA Hino Sales & Service	HT-S156072200 ELEMENT SET,OIL FILTER	$599.37
3356.1572-01	28/09/2016	1572	Western Australian Local Government	NAMN Forum on Urban Fauna Management ·	$2,505.99
3356.1614-01	28/09/2016	1614	Westbooks	Children's book week notable books and W	$18.74
3356.1652-01	28/09/2016	1652	Woolworths Ltd	School Holiday Program Supplies term 3	$1,386.16
3356.1655-01	28/09/2016	1655	Worksense Safety & Workwear Pty Ltd	Building Maintenance Staff - G. Fitzmaur	$138.67
3356.1718-01	28/09/2016	1718	Qualcon Laboratories Pty Ltd	Pavement Layer Thickness Testing- Lipsco	$544.50
3356.1726-01	28/09/2016	1726	Kyocera Document Solutions Australi	Taskalfa 7551CI to 31/8/2016 - Admin (Re	$5,324.00
3356.1760-01	28/09/2016	1760	Hanson Construction Materials Pty L	210 Saphire Chase/ Corner of Johnson Rd	$1,536.70
3356.1762-01	28/09/2016	1762	Officeworks BusinessDirect	Items for John Wellard Community Ctre	$173.35
3356.1832-01	28/09/2016	1832	Southern Districts BMX Raceway	Kidsport voucher - Kynana Abraham	$200.00
3356.1869-01	28/09/2016	1869	United Cinemas Rockingham	Excursion on 10/10/16 to United Cinema.	$300.00
3356.188-01	28/09/2016	188	Beaurepaires Tyres Kwinana	AS_679008 PUNCTURE TRUCK, AS_65599	$1,539.14
3356.1898-01	28/09/2016	1898	Eastern Press Pty Ltd	Enrolment contracts 300 duplicate sets f	$384.00
3356.194-01	28/09/2016	194	Benara Nurseries	Plants for roundabouts	$3,055.77
3356.1998-01	28/09/2016	1998	Stratco	Recquatic - Superdek 1800gsm F/Glass Cle	$224.73
3356.2021-01	28/09/2016	2021	Subway Kwinana	1 x Subway Platter	$57.00
3356.2096-01	28/09/2016	2096	Orelia Primary School	Bus hire-Orelia Primary excursion	$264.00
3356.2097-01	28/09/2016	2097	Beaver Tree Services Aust Pty Ltd	Sloans Drive between Gilmore Ave Uplifts	$140,633.33
3356.21-01	28/09/2016	21	Accidental First Aid Supplies	First Aid Kit service & replenishment Jo	$118.54
3356.2115-01	28/09/2016	2115	Asbestos Masters WA	Removal of asbestos from Postans Road Ho	$1,210.00
3356.2125-01	28/09/2016	2125	Synergy	Usage to 11/08/2016 0U - Darius top floo	$3,844.95
3356.218-01	28/09/2016	218	Bob Jane T-Mart	KWN1914-Alignment & Tyres	$4,430.00
3356.2197-01	28/09/2016	2197	Lock Joint Australia	Bitumen Fibre Expansion Joint 100mm x 2.	$502.70
3356.2224-01	28/09/2016	2224	Prestige Catering & Event Hire	Catering - 21/09/2016	$696.00
3356.2247-01	28/09/2016	2247	Rankine Mosquito Management	Mosquito monitoring for August 2016	$2,029.50
3356.2301-01	28/09/2016	2301	Good Reading Magazine P/L	Annual subscription to "Good Reading Onl	$957.00
3356.2321-01	28/09/2016	2321	Civic Legal	Solicitors Representation letter-Financi	$3,054.42
3356.2339-01	28/09/2016	2339	Totally Confidential Records Manage	Monthly Account - Storage, Retrieval and	$496.39
3356.24-01	28/09/2016	24	Accuweigh Pty Ltd	Check and calibration of Volvo L35 - sma	$519.75
3356.2410-01	28/09/2016	2410	ABCO Products	Darius Wells LIb & Res Cnt-Cost Bathroom	$7,690.86
3356.2432-01	28/09/2016	2432	Lindsay Calyun	Kwinana Adventure Playground - Elder fee	$750.00
3356.2463-01	28/09/2016	2463	Battery World	APU - smoke alarm batteries	$200.00
3356.248-01	28/09/2016	248	Bunnings Building Supplies	Administration - Polish for chrome counc	$3,219.58
3356.2507-01	28/09/2016	2507	Ixom Operations Pty Ltd	Chlorine Cylinder Fees	$1,040.93
3356.2540-01	28/09/2016	2540	Erections WA	Repair W-Beam barrier at Wellard Rd and	$2,292.40
3356.2546-01	28/09/2016	2546	Sigma Chemicals	Citric Acid - 2Kg Container	$4,535.85
3356.2563-01	28/09/2016	2563	Tutt Bryant Hire	Hoist engine	$124.30

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3356.264-01	28/09/2016	264	Cabcharge Australia Ltd	Cabcharge Service Fees (no vouchers used	$6.00
3356.2646-01	28/09/2016	2646	Neverfail Springwater	Bottled water account for admin bldg. 15	$159.65
3356.2652-01	28/09/2016	2652	Modern Teaching Aids Pty Ltd	Percussion pack 31 pieces with stand + d	$700.54
3356.2674-01	28/09/2016	2674	Fire & Safety WA	Scott Full-face mask cartridges part 044	$990.00
3356.2698-01	28/09/2016	2698	Wilson Security Pty Ltd	BP 12 - Emergency call out 13/8/16	$1,606.70
3356.2807-01	28/09/2016	2807	PLE Computers Pty Ltd	1x Alogic 10M SC-SC Single Mode Fibre Le	$441.00
3356.2817-01	28/09/2016	2817	Medina Aboriginal Cultural Centre	Kwinana Adventure Playground Community A	$1,375.00
3356.2877-01	28/09/2016	2877	Tox Free Australia Pty Ltd	Removal of waste chemicals from site	$287.65
3356.2903-01	28/09/2016	2903	Insight Call Centre Services	Call Monitoring - July 2016	$1,874.75
3356.2960-01	28/09/2016	2960	Australian Plant Wholesalers	Various native plants 130mm for Kelly Pa	$915.20
3356.2999-01	28/09/2016	2999	Sign a Rama	Daintree Park - Workman ahead signs	$676.19
3356.303-01	28/09/2016	303	Challenge Chemicals Australia	Methylated Spirits 5L	$256.41
3356.3105-01	28/09/2016	3105	Poly Pipe Traders	PVC Tee 80mm, PVC Red bush 80mm x 50m	$2,271.79
3356.3117-01	28/09/2016	3117	Western Power Connections Manager	Installation new street lighting at 6 Bo	$1,945.00
3356.313-01	28/09/2016	313	Children's Book Council Of Australi	22 X sticker sheets 9 Children's Book We	$96.00
3356.3144-01	28/09/2016	3144	Canon Australia Pty Ltd	2x Cyan Toner Pearls for OCE Colourwave	$1,924.31
3356.3152-01	28/09/2016	3152	Charles Service Company	Cleaning services for August 2016	$53,673.04
3356.3212-01	28/09/2016	3212	Marketforce Pty Ltd	Advertising Seek Online-Educator Support	$4,399.00
3356.3311-01	28/09/2016	3311	FCT Surface Cleaning	Removal graffiti - brick wall behind Med	$4,246.00
3356.3312-01	28/09/2016	3312	Daniels Printing Craftsmen	2016/17 Interim Rates Brochures x 2000	$616.00
3356.3338-01	28/09/2016	3338	AAA Blinds Port Kennedy	Recquatic - "Fish bowl office" Blind ins	$284.00
3356.335-01	28/09/2016	335	City of Rockingham	Tip fees to 30/08/2016	$254,143.60
3356.342-01	28/09/2016	342	CJD Equipment Pty Ltd	V3831236 ENGINE OIL FILTER, V20805349	$413.02
3356.3450-01	28/09/2016	3450	West Coast Shade	Recquatic - Carry out factory repairs to	$352.00
3356.3452-01	28/09/2016	3452	WA Recycling Service	Greenw waste collection Go Backs	$38,851.49
3356.346-01	28/09/2016	346	Clean Sweep	Depot Yard - monthly sweep	$14,806.00
3356.347-01	28/09/2016	347	Cleanaway Pty Ltd	Waste Cleaning - August 2016	$150,315.60
3356.349-01	28/09/2016	349	Clever Designs	Screen print shirts to our requirements.	$2,312.75
3356.357-01	28/09/2016	357	BullAnt Security Pty	Administration - CEO's office door lock	$487.26
3356.3580-01	28/09/2016	3580	HECS Fire	Recquatic - Reported PA system not wor	$1,721.50
3356.358-01	28/09/2016	358	Coastline Mower World	LABOUR Workshop STRIPPED AND SERVI	$1,398.40
3356.3589-01	28/09/2016	3589	Envirocare Systems Pty Ltd	Urinal servicing - Requatic	$264.00
3356.3596-01	28/09/2016	3596	KLMedia Pty Ltd	DVDs - Library	$354.63
3356.3607-01	28/09/2016	3607	Hays Specialist Recruitment Pty Ltd	Temp staff w/e 18/9/16 - Lisa Russell	$3,819.51
3356.3788-01	28/09/2016	3788	Bunnings Building Supplies O'Connor	Soldering iron woodburning kit-Adventure	$248.36
3356.3819-01	28/09/2016	3819	Wialki Electronics	Wialki Electronics Battery Charger CC 12	$297.76
3356.3834-01	28/09/2016	3834	Pegi Williams BookShop	Collection Development for children's co	$370.64
3356.3863-01	28/09/2016	3863	Chamber Of Commerce & Industry	EBA project - City of Kwinana	$2,310.00
3356.3878-01	28/09/2016	3878	Risk Managment Technologies Pty Ltd	ChemAlert Training 17 August 2016 - Juli	$1,955.00
3356.3900-01	28/09/2016	3900	Rockingham Books	Books x 2	$400.00
3356.3916-01	28/09/2016	3916	Kwinana Industries Council	KIC School Based Trainee - S Ashton W/E	$613.40
3356.3977-01	28/09/2016	3977	MRP Osborne Park-General Pest/Termi	General Pest/Termite Division 4307	$4,447.76
3356.3999-01	28/09/2016	3999	Wizard Training Solutions	Dealing with Antisocial Behaviour Traini	$2,310.00
3356.4002-01	28/09/2016	4002	Savage Surveying	Detailed Survey - Leda Boulevard Street	$847.00
3356.4003-01	28/09/2016	4003	Infiniti Group	Cleaning Supplies Recquatic	$1,282.66
3356.4007-01	28/09/2016	4007	Digitales	1 year subscription to "Road to IELTS" -	$1,841.50
3356.4026-01	28/09/2016	4026	Redink Homes Pty Ltd	Refund verg permit VP379-duplicate of VP	$628.00
3356.4057-01	28/09/2016	4057	Kelyn Training Services	Chainsaw and Polesaw Operations -Environ	$765.00
3356.4069-01	28/09/2016	4069	Eureka 4WD Training	Quad Bike Training - 17 August 2016 - Ri	$1,950.00
3356.407-01	28/09/2016	407	Staples Australia	Stationery - Depot - August 2016	$1,700.21
3356.4077-01	28/09/2016	4077	Commarine	VW Amarok Rego: KWN1892 and KWN2063	$5,170.00
3356.4106-01	28/09/2016	4106	Kennards Hire Rockingham - Generato	Hire sub pump - recquatic	$456.00
3356.412-01	28/09/2016	412	Courier Australia	Courier charges-WA Hino & Daimler Truck	$211.94
3356.4125-01	28/09/2016	4125	LD Total	Maint additional work-Wellard Lake Pac-A	$77,858.74
3356.413-01	28/09/2016	413	Covs Parts Pty Ltd	10-32V RotaLED Series LED Warning Beaco	$2,700.49
3356.4182-01	28/09/2016	4182	Arthur Collard	Kwinana Adventure Playground Community a	$2,500.00
3356.42-01	28/09/2016	42	Adventure World	payment for attendance for October schoo	$588.00
3356.4230-01	28/09/2016	4230	Paul & David Auto Accessories	UBD Perth Street Directory 2017 x 7	$199.82
3356.4245-01	28/09/2016	4245	ED Property Services	APU-unit 11, repairs to base of new vani	$572.00
3356.4246-01	28/09/2016	4246	Atom Supply	x50 Pro Bloc SPF 30+ Sunscreen for new e	$258.51
3356.4387-01	28/09/2016	4387	Kott Gunning	Lawyers Letter of Audit Fin Yr 15/16	$704.00
3356.4412-01	28/09/2016	4412	JB Hi-Fi Rockingham	Wii Remote Plus Controllers	$374.89
3356.4453-01	28/09/2016	4453	Carringtons WA	Traffic counters 16/8/16 - Traffic manag	$7,918.07
3356.4477-01	28/09/2016	4477	Trophy Express	RJ301 - Fireman Trophy, Perpetual Trophy	$951.20
3356.4630-01	28/09/2016	4630	Jaybro Civil & Safety Products	14-MPB Marker post blue 1350mm, 09-DR10	$2,002.00
3356.4664-01	28/09/2016	4664	AMPAC Debt Recovery (WA) Pty Ltd	Commission and Costs for month of Sept 2	$177.24
3356.4719-01	28/09/2016	4719	Complete Office Supplies Pty Ltd	August stationery order	$2,326.86
3356.4739-01	28/09/2016	4739	Dalwallinu Concrete	Supply & delivery of 1800mm high x 1200	$1,848.00
3356.4743-01	28/09/2016	4743	Artcom Fabrication	Darius Wells Art exhibitions 2016	$599.50

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3356.4755-01	28/09/2016	4755	University Co-operative Bookshop Lt	Title - The Australian Political System	$135.85
3356.483-01	28/09/2016	483	Landgate	Rating Interim Schedules 020816	$9,054.15
3356.4861-01	28/09/2016	4861	Big W	Darius Wells - prizes for social group 8	$2,314.00
3356.4918-01	28/09/2016	4918	Fairfax Digital Australia & NZ Pty	TenderLink - Tender 610KWN16	$385.00
3356.5035-01	28/09/2016	5035	Quell Cleen	BP-34, attend to water damaged carpet &	$802.00
3356.5062-01	28/09/2016	5062	Tony Aveling & Associates Pty Ltd	OSH Representative Training - Ian Pope	$990.00
3356.5071-01	28/09/2016	5071	JB HiFi Commercial Division	For the purchase or SanDisk Extreme Pro	$6,858.01
3356.5073-01	28/09/2016	5073	Badge-A-Minit	500 Badge Component Kit and clear discs	$303.37
3356.537-01	28/09/2016	537	Educational Art Supplies Co	Storytime Supplies	$199.87
3356.5520-01	28/09/2016	5520	Master Lock Service	BP - villa 60 replace lock front fly scr	$1,087.50
3356.560-01	28/09/2016	560	Goodchild Enterprises	Bosch 125D31L-S5 battery	$702.90
3356.5627-01	28/09/2016	5627	Tyrecycle Pty Ltd	Tyre disposal August 2016. See invoice f	$583.95
3356.5742-01	28/09/2016	5742	In Safe Hands Educators In Safety P	On line training credits for Child Prote	$1,006.50
3356.5743-01	28/09/2016	5743	Programmed Maintenance Services Ltd	Garden & Turf maintenance - Aug 2016	$9,245.61
3356.5750-01	28/09/2016	5750	Kev's Wheelie Kleen	Administration - Rubbish Bin Cleans	$646.50
3356.5816-01	28/09/2016	5816	Shane Aston Massara	Refund of overcharged fee	$14.00
3356.583-01	28/09/2016	583	Flexi Staff Pty Ltd	Temp staff w/e 10/9/2016 - B Law	$1,696.63
3356.598-01	28/09/2016	598	Forpark Pty Ltd	Djilba Playground - SW55 - Swing-a-way S	$1,719.30
3356.6000-01	28/09/2016	6000	Scott Printers Pty Ltd	Print and delivery of the September 2016	$3,712.50
3356.60-01	28/09/2016	60	Air Liquide	MEDICAL OXYGEN CYLINDER FEES	$102.03
3356.6018-01	28/09/2016	6018	ALSCO Pty Ltd	Table linen for Council dinners, citizen	$260.61
3356.6091-01	28/09/2016	6091	Kilo Holdings Pty Ltd	Darius Wells Library & Resource Centre-P	$110.00
3356.6110-01	28/09/2016	6110	Castrol Lubricants	Oil for Depot	$1,041.87
3356.614-01	28/09/2016	614	Fridgair Industries	Admin Build-Service Ice Machine in Counc	$277.75
3356.6181-01	28/09/2016	6181	Expressions Painters and Decorators	Painting works foyer and side corridor-R	$6,033.50
3356.6224-01	28/09/2016	6224	The Grant Finder	D/W after school activities - August 16	$660.00
3356.6332-01	28/09/2016	6332	Drainflow Services Pty Ltd	Gully educting Burlington Street Naval B	$693.00
3356.6335-01	28/09/2016	6335	Ideal Homes Pty Ltd	Refund sec dep-L1136 Bellingham Pde	$1,500.00
3356.6370-01	28/09/2016	6370	Elexacom	Recquatic-Repair faulty exhaust fan in s	$25,491.16
3356.6371-01	28/09/2016	6371	KDAire Mechanical Services Pty Ltd	Koorliny - Monthly Maintenance	$33,786.01
3356.6381-01	28/09/2016	6381	Textile Traders	Fabric for Pin It Made It	$236.50
3356.6395-01	28/09/2016	6395	Web for Small Business	Darius Wells - facilitation of homework	$346.50
3356.6534-01	28/09/2016	6534	Beacon Equipment	Supply of 1 x 42" tow behind lawn sweepe	$658.80
3356.6566-01	28/09/2016	6566	Isentia Pty Limited	Media monitoring - extra coverage - Augu	$166.56
3356.6576-01	28/09/2016	6576	Kylie Ilana Jesus	Facilitating, set up,clean up-John Welar	$180.00
3356.664-01	28/09/2016	664	Greenway Enterprises	Materials for the Coastcare Program	$4,569.18
3356.6693-01	28/09/2016	6693	Uneeda Locksmith Pty Ltd	Dual key barrels for toolbox KWN1957	$66.00
3356.6700-01	28/09/2016	6700	Sprayking WA Pty Ltd	August- Chemical weed control of Hardsta	$11,585.65
3356.6707-01	28/09/2016	6707	Labourforce Impex Personnel Pty Ltd	Glen Snook w/e 18/09/16	$2,070.00
3356.671-01	28/09/2016	671	Gym Care	call out onsite service	$33.00
3356.682-01	28/09/2016	682	Harmony Software	Transition Fee to Harmony Web	$275.00
3356.684-01	28/09/2016	684	Hart Sport	Assorted goods for Recquatic Centre	$514.10
3356.6872-01	28/09/2016	6872	Schindler Lifts Australia Pty Ltd	John Wellard Community Centre - Lift and	$591.72
3356.6885-01	28/09/2016	6885	World Book	12 month subscription to World Book Web	$2,090.00
3356.69-01	28/09/2016	69	Alinta Gas	Usage to 7/9/16 332U - Leda Hall	$77.60
3356.6923-01	28/09/2016	6923	A Bonza Bounce	2 Bouncy Castles for Recquatic Open Day	$680.00
3356.6972-01	28/09/2016	6972	Go Doors Pty Ltd	Bertam Community Centre - Door Sensors A	$786.50
3356.7-01	28/09/2016	7	AAA Windscreens & Tinting	Repair stone chip to windscreen KWN1955	$66.00
3356.7062-01	28/09/2016	7062	UES International	RJ60 WATER RESERVOIR	$183.70
3356.7151-01	28/09/2016	7151	AMNS Designs	Pin It facilitation Term 3 2016	$1,163.75
3356.7165-01	28/09/2016	7165	Sprayline Spraying Equipment	Fitting comp. 1/2" OD F Gun	$161.66
3356.7168-01	28/09/2016	7168	Exit Waste	Fiona Harris Pavilion - Greastrap Cleani	$2,101.00
3356.7186-01	28/09/2016	7186	Kwinana Wolves Sports Club	Kidsport voucher - Joshua Skinner	$200.00
3356.7198-01	28/09/2016	7198	Karen Hulls Social Work Services	What's in the Box Training - T Halliday	$324.50
3356.7200-01	28/09/2016	7200	Allyce Rosamond Paulsen	Program Assistant - SHP preparation - 23	$135.00
3356.72-01	28/09/2016	72	All Lines & Signs	Mark out and paint 22 parking bays Moult	$1,100.00
3356.7202-01	28/09/2016	7202	Source My Parts Pty Ltd	V11708294 HYDRAULIC O-RING KIT, V1112	$1,353.00
3356.723-01	28/09/2016	723	Vermeer	VM 257541001, SWITCH-SPDT 3 POSITION	$35.90
3356.7236-01	28/09/2016	7236	Wheelers Book Club Ltd	Purchase books	$881.73
3356.7340-01	28/09/2016	7340	Echelon Productions	Musical Performance -"Fairdinkum" for Ch	$1,072.50
3356.7366-01	28/09/2016	7366	REDiMED Pty Ltd	Pre employment medical C Stoneham	$715.00
3356.7386-01	28/09/2016	7386	Planning Solutions (Aust) Pty Ltd	Prepare updates on Indian Ocean Gateway	$1,190.20
3356.7388-01	28/09/2016	7388	Morris Jacobs	Darius wells - Water colour Art lesson -	$320.00
3356.7419-01	28/09/2016	7419	Saints Basketball Club	Kidsport voucher - Alex C Canalaro	$100.00
3356.7436-01	28/09/2016	7436	Action Glass Pty Ltd	APU - unit 61, install new shower screen	$2,143.15
3356.7445-01	28/09/2016	7445	Mustang Welding & Fabrication	P477, KWN2044, FABRICATE STEPS FOR T	$957.00
3356.746-01	28/09/2016	746	Institute Of Public Works Engineeri	Integrated Traffic Management Plan Cours	$20.00
3356.7520-01	28/09/2016	7520	Sharon Knight	Logo design for Friends of Fremantle Bea	$250.00
3356.7521-01	28/09/2016	7521	Strategen Environmental Consultants	Urban Amenity Policy	$5,236.00

Program - ci_ap001 3/10/2016 10:13:22AM
Minimum Amount: **$0.00**

Creditors

Cheque No.	Chq Date	Creditor	Payee	Description	Amount
3356.7524-01	28/09/2016	7524	Artbeat Publishers	Illustrator Presentation for Children's	$1,320.00
3356.7552-01	28/09/2016	7552	Audiovault Events	payment for silent disco equipment hire	$330.00
3356.7573-01	28/09/2016	7573	Ken Spillman	Author Presentation for Children's Book	$880.00
3356.7574-01	28/09/2016	7574	Premier Photo Booths	Photo booth for the Christmas party	$999.00
3356.7575-01	28/09/2016	7575	Pickles Auctions	Vehicle pickup 1APG128 - 10/8/16	$55.00
3356.7605-01	28/09/2016	7605	Flying Canape	Catering for Peter McKenzie's Retirement	$3,345.00
3356.762-01	28/09/2016	762	Blackwood & Sons Ltd	0048 0020 - Socks Xtra thick BTA Bamboo	$1,394.38
3356.7625-01	28/09/2016	7625	Flex Industries Pty Ltd	Carry out Defect Inspection-Toyota Landc	$23,859.59
3356.7667-01	28/09/2016	7667	Havenesky Ventures	Sewing Facilitation for Term 3 2016	$704.00
3356.7689-01	28/09/2016	7689	VARIDESK	Anti Fatigue Mat for Stand Up workstatio	$95.00
3356.7696-01	28/09/2016	7696	Allied Pumps Pty Ltd	Wandi 'The Pavilion' Community Centre -	$374.00
3356.7737-01	28/09/2016	7737	Kat Morasutti	Darius Wells - facilitation of social gr	$105.00
3356.7808-01	28/09/2016	7808	EEO Specialists	Contact Officer Training (in house) - 20	$4,400.00
3356.7823-01	28/09/2016	7823	T & L Training Consultants	Confined Space Entry & Gas Test Atmosphe	$600.00
3356.7833-01	28/09/2016	7833	Kwinana Veterinary Hospital Pty Ltd	Dogs - Microchipping 6/08/16	$130.00
3356.7847-01	28/09/2016	7847	Strata Specialists	Quarterly Levies/Reserve Fund Kwinana Tr	$4,827.00
3356.789-01	28/09/2016	789	Jtagz Pty Ltd	500 x Green 2017 Cat Registration Tags,	$1,650.00
3356.7895-01	28/09/2016	7895	Sainiana Naulu Temo	Darius Wells - assistance in community p	$297.50
3356.7957-01	28/09/2016	7957	Palmyra Rugby Union Club (Inc)	Kidsport voucher - Korree Johnson	$200.00
3356.7994-01	28/09/2016	7994	Rockingham Mazda	Oil Filter, SH0114302A, Oil Filter, SH01	$1,159.02
3356.80-01	28/09/2016	80	Alltype Roof Repairs & Restorations	Recquatic . supply and it stall 3 whirly	$825.00
3356.806-01	28/09/2016	806	Kearns Garden & Hardware Supplies	Supplies to repair playground equipment	$847.35
3356.8064-01	28/09/2016	8064	Hannah - Rose Winter	Darius wells - Facilitating assisting	$507.50
3356.8078-01	28/09/2016	8078	Parmelia Hilton Perth	Final Payments of balance from deposits.	$5,033.75
3356.8092-01	28/09/2016	8092	Hunter Valley Martial Arts Centre	purchase of rock and water curved strike	$1,104.25
3356.8101-01	28/09/2016	8101	Elite Sporting Concepts	Additional Funding submissions for Kwina	$1,500.00
3356.8103-01	28/09/2016	8103	RAEZ	School holiday activity - Ludicrous Cogz	$419.00
3356.8133-01	28/09/2016	8133	Glen Flood Group Pty Ltd	City of Kwinana - Depot service delivery	$8,176.63
3356.8194-01	28/09/2016	8194	Sports Turf Association (WA) Inc	Cricket Wicket Seminar 7 September 2016	$110.00
3356.8215-01	28/09/2016	8215	Bungaree Primary School	Bus hire for the Coastcare excursion Aug	$319.00
3356.8217-01	28/09/2016	8217	Steelstruct Engineering	Calista Bore Headwork Pipe Strip and Re-	$220.00
3356.822-01	28/09/2016	822	Kone Elevators Pty Ltd	Depot - Service Fee for period 1/4/16 to	$2,576.44
3356.8225-01	28/09/2016	8225	Aventedge	WA Procurement Congress 14/10/16 Fiona H	$1,183.05
3356.8240-01	28/09/2016	8240	MRA Consulting Group Pty Ltd	Consultancy Dev Services-Waste Mangemen	$4,950.00
3356.8265-01	28/09/2016	8265	Skilled Fencing	Indoor Cage storage-Thomas Kelly Pav-fin	$1,375.00
3356.8323-01	28/09/2016	8323	McDonald's Australia Limited	Refund of application fees for outdoor d	$656.30
3356.851-01	28/09/2016	851	Kwinana Signs & Engraving	Bus zone signs 300x600mm x2	$132.00
3356.903-01	28/09/2016	903	Lo-Go Appointments	Temp staff w/e 17/9/2016 - Geoffrey Cop	$20,498.78
3356.905-01	28/09/2016	905	Local Government Managers Australia	Effective Asset and Workforce Planning U	$1,480.00
3356.926-01	28/09/2016	926	Main Roads Western Australia	Install & signage & pavements markings-	$7,803.65
3356.928-01	28/09/2016	928	Major Motors	8982169220 PAD KIT CALIPER, 894248117[illegible]	$1,326.98
3356.959-01	28/09/2016	959	McLeods Barristers & Solicitors	Concessional Mass Loads Permit Fees and	$21,366.68
3357.2853-01	28/09/2016	2853	Maxxia Pty Ltd	Payroll Deduction	$5,265.21
3357.3376-01	28/09/2016	3376	Health Insurance Fund of WA (HIF)	Payroll Deduction	$1,857.70
3357.3719-01	28/09/2016	3719	Town of Kwinana - Xmas fund	Payroll Deduction	$6,480.00
3358.565-01	28/09/2016	565	Bright Futures Family Day Care - Pa	FDC payroll 12/9/16-25/9/16	$107,662.09
3358.568-01	28/09/2016	568	Bright Futures In Home Care - Payro	IHC payroll 12/9/16-25/9/16	$56,298.88
3359.565-01	29/09/2016	565	Bright Futures Family Day Care - Pa	FDC payroll 12/9/16-25/9/16 File 1	$366.29
347375	29/09/2016	2765	Toyota Financial Services	Monthly Lease fees - 1EWZ823 & 1EYT548	$1,194.07
81018611	15/09/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Senior Citizens 14/9-14/10/1[illegible]	$39.95
81123380	01/09/2016	727	Ii Net Technologies Pty Ltd	Internet Bertram Community Centre 1/9-1/10/	$59.95
81416740	12/09/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Zone Training 12/9-12/10/16	$59.95
81416756	12/09/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Darius Training 12/9-12/10/1	$59.95
81666326	20/09/2016	727	Ii Net Technologies Pty Ltd	Monthly Internet Kwinana Village 20/9-20/10/[illegible]	$39.95
81839487	26/09/2016	727	Ii Net Technologies Pty Ltd	Internet Wellard Community Centre 25/9-25/1	$59.95
9426194	21/09/2016	229	BP Australia Pty Ltd	Fleet fuel 1/8/16-31/8/16	$15,566.56

Total:	Creditors	539	$5,956,872.53

Program - ci_ap001 3/10/2016 10:13:22AM

Minimum Amount: **$0.00**

Non-Creditors

Cheque No.	Chq Date	Payee	Description	Amount
00200012	02/09/2016	Sunil Shrestha	Refund of application fees-outdoor dining	$412.00
00200025	07/09/2016	Benjamin Leith Delaney & Cameron Ja	City of Kwinana Rates Incentive Prize	$1,000.00
00200026	07/09/2016	Penelope Wilma Bishop	City of Kwinana Rates Incentive Prize	$1,000.00
00200027	07/09/2016	Malcolm Mills & Tiani Jade Mills	City of Kwinana Rates Incentive Prize	$1,000.00
00200028	07/09/2016	Peter John Staliorius	City of Kwinana Rates Incentive Prize	$1,000.00
00200029	07/09/2016	Kenneth Rowe & Sandra Elizabeth Row	City of Kwinana Rates Incentive Prize	$1,000.00
00200030	07/09/2016	Town of Mosman Park	YACtivate! 2016 Conference attendance fees	$420.00
00200031	07/09/2016	John Clark	Snr Security Subsidy scheme - 20160101	$100.00
00200032	07/09/2016	Donald Davies	Snrs Security Subsidy Scheme-Application 20	$100.00
00200033	07/09/2016	Sunil Shrestha	Credit for Cancellation Outdoor Dining Applica	$292.00
00200034	07/09/2016	Donald Raymond Campbell	Rates Refund	$340.59
00200035	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200036	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200037	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200038	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200039	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200040	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200041	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200042	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200043	07/09/2016	Housing Authority	Rates Refund	$1,136.20
00200044	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200045	07/09/2016	Housing Authority	Rates Refund	$1,528.41
00200046	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200047	07/09/2016	Norman Walter Chester	Rates Refund	$69.63
00200048	07/09/2016	Housing Authority	Rates Refund	$1,114.00
00200056	14/09/2016	Grant Newton Harri& Christine May H	Rates Refund	$690.76
00200057	14/09/2016	Holly Louise Groves	Rates Refund	$389.95
00200058	14/09/2016	Dept of Child Protection & Family S	Refund bond-hall hire 8/9/16	$1,000.00
00200059	16/09/2016	Darinka Langrish	Rates Refund	$779.90
00200060	16/09/2016	Dave Nicholson	1 hour MUsical Entertainment-Wild Wild West	$200.00
00200067	21/09/2016	Bernabe Borje	Refund-adjustment of hire days	$42.10
00200068	21/09/2016	Ben Trager Homes Pty Ltd	Refund sec dep-L220 Ampton Cnr	$1,456.00
00200077	28/09/2016	Lisa A Garbellini	Refund of Death of Dog-Receipt # 883418	$80.00
00200078	28/09/2016	Allsortz Netball Club	Refund bond-Hall hire 22/9/2016	$300.00

Total:	Non-Creditors	34	$26,591.54

Grand Total:	575	$5,984,689.67

Additional Page 11 to include Payroll Payments

28/09/2016	City of Kwinana	Payroll f/e 28/09/2016		$565,944.13
19/09/2016	City of Kwinana	Payroll interim f/e 19/09/2016		$96,501.51
14/09/2016	City of Kwinana	Payroll f/e 14/09/2016		$584,410.51
Total: Payroll			5	$1,246,856.15
Total: Creditors, Non Creditors			507	$5,984,689.67
Less Cancelled Cheques				-$1,225.60
Grand Total:			**512**	**$7,230,320.22**

16.3 Monthly Statement of Financial Activity for the Period Ending 31 August 2016

SUMMARY:

The Monthly Statement of Financial Activity and explanation of material variances for the period ending 31 August 2016 has been prepared for Council acceptance.

OFFICER RECOMMENDATION:

That Council accepts:

1. The Monthly Statements of Financial Activity for the period ending 31 August 2016; and

2. The explanations for material variances for the period ending 31 August 2016.

DISCUSSION:

Variance percentages between budget estimates to the end of August and actual amounts to the end of August have been presented in the attached Statement of Financial Activity.

The material variances that are required to be reported on are:

Description	Actual	Y-T-D Budget		Variance (%)
Directorate Corporate and Engineering Services Revenue	1,791,546	1,602,997	▲	11.76%
Directorate City Development Revenue	895,309	1,157,379	▼	22.64%
Directorate City Living Expenditure	(4,029,753)	(5,089,588)	▼	20.82%
Directorate City Development Expenditure	(478,923)	(763,891)	▼	37.30%
Contributions for the Development of Assets	1,436,113	340,935	▲	321.23%
Purchase Transportation Vehicles	(63,751)	(238,000)	▼	73.21%
Transfers to Reserves	11,676	504,604	▼	97.69%

Note: A negative (%) variance indicates additional expenditure or reduced revenue than budgeted. A positive % variance indicates additional revenue or reduced expenditure than budgeted.

Directorate Corporate and Engineering Services Revenue – 11.76%
This area shows increased income mainly due to the following areas:

a. Financial Services *(Finance)* – the final dividend relating to matter number NSD 656 of 2013 was received on 1 July 2016. No budget was included as it was uncertain whether the Class action would be successful or finalised; nor was the likely value of any payment known at the setting of the budget.

16.3 MONTHLY STATEMENT OF FINANCIAL ACTIVITY FOR THE PERIOD ENDING 31 AUGUST 2016

Directorate City Development Revenue – 22.64%
This area shows reduced revenue mainly due to the following areas:

a. Planning and Building Services *(Developer Contributions Administration)* – developer contributions towards soft infrastructure within Wandi and Anketell (Honeywood Rise Stage 6 - DCA 9) and Bertram (Cassia North - DCA 15) are lower than anticipated as development has not occurred as planned. These areas will likely be included in the annual budget review if current trend continues.

Directorate City Living Expenditure – 20.82%
This area shows reduced expenditure mainly due to the following areas:

a. Community Development *(CDO Arts and Culture)* – employee costs associated with the vacant Place and Partnerships Co-ordinator role have resulted in savings to date and projects to be undertaken by this person are yet to commence resulting in a timing variance.
b. Community Services *(Community Services Admin)* – employee costs associated with the vacant Engagement Officer role have resulted in savings to date.
c. Environmental Health Services *(Waste Management)* – consultancy costs associated with waste management planning are yet to be realised.
d. Facilities Management *(Building Services)* – purchase orders are in the system and works are underway.

Directorate City Development Expenditure – 37.30%
This area shows reduced expenditure mainly due to the following areas:

a. Planning and Building Services *(Building Control/Approvals)* – recruitment of the vacant Building Surveyor position has been deferred pending the submission of a business case.
b. Planning and Building Services *(Developer Contributions Administration)* – City contributions required under the Wellard Village Agreement are payable upon request for clearance by Developers however no applications had been lodged at reporting date.
c. Planning and Building Services *(Statutory Planning/Approvals)* – recruitment of the vacant Planning Compliance Technical position was deferred due to Officer secondment and a business case is to be prepared.
d. Planning and Building Services *(Strategic Planning)* – consultants have been engaged to undertake works on the Urban Amenities Strategy, purchase orders are in the system and invoices are expected.

Contributions for the Development of Assets – 321.23%
The third milestone payment for the Adventure Park was received from the Department of Infrastructure earlier than had been anticipated resulting in a timing variance.

Purchase Transportation Vehicles – 73.21%
Vehicle purchases anticipated to have occurred during the month were delayed either due to supplier lead time (or as result of the Human Resource (City Vehicles) policy review that occurred late in 2015/16 to provide greater flexibility in makes and models and minimising whole of life costs).

Transfers to Reserves – 97.69%
Transfers to Reserves are processed monthly as funds are received.

16.3 MONTHLY STATEMENT OF FINANCIAL ACTIVITY FOR THE PERIOD ENDING 31 AUGUST 2016

Investment activity August 2016

- *Tier 1* – Investment rates available to the City were not favourable therefore no funds were invested in this tier.
- *Tier 2* – Funds were allocated in accordance with the guidelines of the Investment Policy.
- *Tier 3* – Funds were allocated in accordance with the guidelines of the Investment Policy.
- *Tier 4* – Funds were allocated in accordance with the guidelines of the Investment Policy.

LEGAL/POLICY IMPLICATIONS:

Local Government (Financial Management) Regulations – Clause 34.

FINANCIAL/BUDGET IMPLICATIONS:

As outlined in the 'Discussion' and 'Risk' sections.

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:

Continuous monitoring and review ensures the future sustainability of the City through the implementation of sound revenue and expenditure policies, and seeking additional revenue sources.

RISK IMPLICATIONS:

The report is provided to highlight 'over' and 'under' provisions, revenues and expenditures. Monitoring the City's financials enables the City to suitably manage these financial risks by allowing for suitable responsible adjustments to be proposed if necessary. No such adjustments are considered to be required at this point in time.

16.3 MONTHLY STATEMENT OF FINANCIAL ACTIVITY FOR THE PERIOD ENDING 31 AUGUST 2016

COUNCIL DECISION

355

MOVED CR P FEASEY **SECONDED CR R ALEXANDER**

That Council accepts:

1. **The Monthly Statements of Financial Activity for the period ending 31 August 2016; and**

2. **The explanations for material variances for the period ending 31 August 2016.**

CARRIED
6/0

CITY OF KWINANA

MONTHLY STATEMENT OF FINANCIAL ACTIVITY

FOR THE PERIOD 1 JULY 2016 TO 31 AUGUST 2016

TABLE OF CONTENTS

CITY OF KWINANA
RATE SETTING STATEMENT by DIRECTORATE
FOR THE PERIOD 1 JULY 2016 TO 31 AUGUST 2016

	NOTE	August 2016 Actual $	August 2016 Y-T-D Budget $	2016/17 Revised Budget $		Variance Budget to Actual YTD $	Variance Budget to Actual Y-T-D %
Estimated Surplus/(Deficit) July 1 B/Fwd	7	2,180,925	1,000,000	1,000,000			
Revenues	1						
Directorate City Strategy		139,815	158,116	507,395			
Directorate Corporate & Engineering Services		1,791,546	1,602,997	5,260,171	▲	(188,549)	(11.76%)
Directorate City Living		7,727,528	7,826,029	16,205,012			
Directorate City Development		895,309	1,157,379	8,373,574	▼	262,070	22.64%
		10,554,198	10,744,521	30,346,152			
Expenses	1						
Directorate City Strategy		(607,652)	(659,196)	(4,519,559)			
Directorate Corporate & Engineering Services		(2,177,265)	(2,067,850)	(30,275,750)			
Directorate City Living		(4,029,753)	(5,089,588)	(29,131,601)	▼	(1,059,835)	20.82%
Directorate City Development		(478,923)	(763,891)	(4,324,390)	▼	(284,968)	37.30%
		(7,293,593)	(8,580,525)	(68,251,300)			
NET OPERATING RESULT EXCLUDING RATES		3,260,605	2,163,996	(37,905,148)			
Adjustments for Cash Budget Requirements:							
Non-Cash Expenditure and Revenue							
(Profit) on Asset Disposals	4	-	(16,875)	(214,497)			
Loss on Asset Disposals		-	-	20,557			
Movement in Deferred Pensioner Rates		13,757	-	-			
Movement in Employee Leave Provision		-	-	-			
Depreciation on Assets		-	-	11,316,975			
		13,757	(16,875)	11,123,035			
Capital Revenue							
Grants/Contributions for Development of Assets		1,436,113	340,935	3,916,488	▲	(1,095,178)	(321.23%)
Proceeds from Disposal of Assets	4	82,003	117,500	476,500			
		1,518,116	458,435	4,392,988			
Capital Expenditure							
Purchase Furniture and Equipment	3	(14,288)	(40,820)	(98,820)			
Purchase Computing Equipment	3	(10,470)	(15,000)	(470,245)			
Purchase Plant and Machinery	3	(286,755)	(295,250)	(864,750)			
Purchase Transportation Vehicles	3	(63,751)	(238,000)	(590,000)	▼	(174,249)	73.21%
Purchase Land and Buildings	3	(85,591)	(116,708)	(2,120,084)			
Purchase Reserve Development	3	-	(100,000)	(1,256,527)			
Purchase Playground Equipment	3	(657,521)	-	(3,087,836)			
Purchase Infrastructure - Urban Road Grant	3	-	-	(1,109,133)			
Purchase Infrastructure - Black Spot Grant	3	-	-	(22,000)			
Purchase Infrastructure - Roads to Recovery	3	-	-	(979,398)			
Purchase Infrastructure - Road Resurfacing	3	(1,364)	-	(22,000)			
Purchase Infrastructure - Street Lights	3	(214)	-	(25,000)			
Purchase Infrastructure - Bus Shelters	3	-	-	(50,000)			
Purchase Infrastructure - Footpaths	3	(600)	-	(230,000)			
Purchase Infrastructure - Drainage	3	-	-	(320,000)			
Purchase Infrastructure - Other Structures	3	-	-	-			
Purchase Infrastructure - Municipal Roadworks	3	-	-	(316,558)			
Purchase Infrastructure - Car Parks	3	-	-	(115,000)			
Purchase of Land held for resale	3	-		-			
		(1,120,554)	(805,778)	(11,677,351)			
Financing Expenditure & Revenue							
Repayment of Loans Principal	5	-	-	(640,453)			
Repayment of Liquidity Advance	5	-	-	(2,500,000)			
Proceeds from New Loan Borrowings	5	-	-	2,605,550			
Self-Supporting Loan Principal Revenue	5	6,202	6,264	37,590			
Transfer from Loan Fund for Capital	5	-	-	62,705			
Transfers to Reserves (Restricted Assets)	6	(823,510)	(994,979)	(8,640,389)			
Transfers from Reserves (Restricted Assets)	6	11,676	504,604	7,219,358	▼	492,928	97.69%
		(805,632)	(484,111)	(1,855,639)			
Estimated Surplus/(Deficit) Year to Date	7	39,314,464	36,678,116	-			
Amount Required to be Raised from Rates	8	(34,267,247)	(34,362,449)	(34,922,115)			

This statement is to be read in conjunction with the accompanying notes.

CITY OF KWINANA
STATEMENT OF COMPREHENSIVE INCOME BY PROGRAM
FOR THE PERIOD 1 JULY 2016 TO 31 AUGUST 2016

	NOTE	August 2016 Actual $	August 2016 Y-T-D Budget $	2016/17 Revised Budget $
Revenues	**1**			
General Purpose Funding		35,988,255	35,734,475	38,834,295
Governance		95,562	82,534	113,895
Law, Order, Public Safety		19,330	63,154	446,539
Health		13,370	25,054	384,632
Education and Welfare		1,008,497	1,060,291	6,068,114
Community Amenities		7,075,720	7,267,377	14,012,608
Recreation and Culture		331,828	444,384	3,042,950
Transport		1,166	120,500	261,984
Economic Services		239,588	271,360	1,564,439
Other Property and Services		48,129	20,966	324,314
		44,821,445	45,090,095	65,053,770
Expenses Excluding Finance Costs	**1**			
General Purpose Funding		(867,679)	(1,474,893)	(10,578,854)
Governance		(301,228)	(374,874)	(2,052,203)
Law, Order, Public Safety		(1,463,966)	(1,425,873)	(8,752,118)
Health		(216,889)	(247,275)	(1,590,472)
Education and Welfare		(600,626)	47,018	(4,999,497)
Community Amenities		(180,244)	(257,474)	(1,394,217)
Recreation & Culture		(403,445)	(496,591)	(2,914,573)
Transport		(642,345)	(746,163)	(4,010,038)
Economic Services		(1,943,747)	(2,621,664)	(17,835,900)
Other Property and Services		(690,225)	(902,088)	(12,879,280)
		(7,310,394)	(8,499,877)	(67,007,152)
Finance Costs	**1**			
Governance		632	(3,237)	(63,009)
Education and Welfare		1,216	(5,769)	(96,765)
Recreation & Culture		12,092	(58,522)	(886,255)
Transport		2,861	(13,120)	(177,562)
		16,801	(80,648)	(1,223,591)
		37,527,852	36,509,570	(3,176,973)
Grants/Contributions for the Development of Assets		1,436,113	340,935	3,916,488
Profit on Disposal of Assets	**4**	-	16,875	214,497
(Loss) on Disposal of Assets	**4**	-	-	(20,557)
NET RESULT		38,963,965	36,867,380	933,455
Other Comprehensive Income		-	-	-
TOTAL COMPREHENSIVE INCOME		38,963,965	36,867,380	933,455

This statement is to be read in conjunction with the accompanying notes.

CITY OF KWINANA
STATEMENT OF COMPREHENSIVE INCOME BY NATURE & TYPE
FOR THE PERIOD 1 JULY 2016 TO 31 AUGUST 2016

	NOTE	August 2016 Actual $	August 2016 Y-T-D Budget $	2016/17 Revised Budget $
Revenues	**1**			
Rates	**8**	34,267,247	34,362,449	34,922,115
Operating Grants, Subsidies & Contributions		1,801,051	2,868,910	13,820,217
Reimbursements and Donations		156,988	148,746	586,782
Fines & Penalties		7,539	25,916	186,000
Fees and Charges		7,064,878	7,012,534	11,781,944
Interest Earnings		592,432	371,834	1,967,000
Income from Property		263,105	293,872	1,757,512
Other Revenue		668,205	5,834	32,200
		44,821,445	45,090,095	65,053,770
Expenses Excluding Finance Costs	**1**			
Employee Costs		(3,973,333)	(5,347,269)	(27,345,605)
Materials and Contracts		(2,542,731)	(2,211,786)	(24,025,512)
Utilities Charges (gas, electricity, water, etc)		(277,849)	(384,583)	(2,564,418)
Leases		(4,525)	(53,492)	(320,935)
Depreciation on Non-current Assets		-	-	(11,316,975)
Insurance Expenses		(368,840)	(319,520)	(593,600)
Other Expenditure		(143,116)	(183,227)	(840,107)
		(7,310,394)	(8,499,877)	(67,007,152)
Finance Costs				
Interest Expenses	**5**	16,801	(80,648)	(1,223,591)
		37,527,852	36,509,570	(3,176,973)
Grants/Contributions for the Development of Assets				
Non-operating Grants, Subsidies & Contributions		1,436,113	340,935	3,916,488
Non-operating Reimbursements & Donations		-	-	-
		1,436,113	340,935	3,916,488
Profit/(Loss) on Disposal of Assets	**4**			
Profit on Asset Disposals		-	16,875	214,497
Loss on Asset Disposals		-	-	(20,557)
		-	16,875	193,940
NET RESULT		38,963,965	36,867,380	933,455
Other Comprehensive Income		-	-	-
TOTAL COMPREHENSIVE INCOME		38,963,965	36,867,380	933,455

This statement is to be read in conjunction with the accompanying notes.

1. SIGNIFICANT ACCOUNTING POLICIES

The significant accounting policies which have been adopted in the preparation of this statement of financial activity are:

(a) Basis of Accounting

The budget has been prepared in accordance with applicable Australian Accounting Standards, other mandatory professional reporting requirements and the Local Government Act 1995 (as amended) and accompanying regulations (as amended).

(b) The Local Government Reporting Entity

All Funds through which the Council controls resources to carry on its functions have been included in this statement.

In the process of reporting on the local government as a single unit, all transactions and balances between those funds (for example, loans and transfers between Funds) have been eliminated.

All monies held in the Trust Fund are excluded from the financial statement, but a separate statement of those monies appears at Note 9 to this budget.

(c) Rounding Off Figures

All figures shown in this statement, other than a rate in the dollar, are rounded to the nearest dollar.

(d) Rates, Grants, Donations and Other Contributions

Rates, grants, donations and other contributions are recognised as revenues when the local government obtains control over the assets comprising the contributions. Control over assets acquired from rates is obtained at the commencement of the rating period or, where earlier, upon receipt of the rates.

(e) Goods and Services Tax

In accordance with recommended practice, revenues, expenses and assets capitalised are stated net of any GST recoverable. Receivables and payables are stated inclusive of applicable GST.

(f) Fixed Assets

Property, plant and equipment and infrastructure assets are brought to account at cost or fair value less, where applicable, any accumulated depreciation or amortisation and any accumulated impairment balances.

1. SIGNIFICANT ACCOUNTING POLICIES (Continued)

(g) Depreciation of Non-Current Assets

All non-current assets having a limited useful life are systematically depreciated over their useful lives in a manner which reflects the consumption of the future economic benefits embodied in those assets.

Depreciation is recognised on a straight-line basis, using rates which are reviewed each reporting period. Major depreciation periods are:

ASSET CLASS	ASSSET DESCRIPTION	Economic Life	Depreciation Rate
Land	Land	Nil	
	Vested Land	Nil	
	Other Vested Land	Nil	
Buildings	Fencing	20 to 50	5% to 2%
	Building Structure	40 to 60	2.5% to 1.67%
	Air conditioning	10 to 30	10% to 3.33%
	Soft Furnishings	10	0.10%
	Fixtures	10	0.10%
	Other	10 to 30	10% to 3.33%
	Alarms	3 to 10	33.33% to 10%
Plant & Equipment	Vehicles	5 to 10	20% to 10%
	Major Plant	5 to 10	20% to 10%
	Minor Plant & Equipment	3 to 10	33.33% to 10%
Furniture & Equipment	Computing Equipment	2 to 7	50% to 14.29%
	Office Furniture	7 to 13	14.29% to 7.69%
	Office Equipment	3 to 10	33.33% to 10%
	Audio Visual Equipment	3 to 10	33.33% to 10%
	Specialised Equipment	7 to 13	14.29% to 7.69%
	White Goods	7 to 13	14.29% to 7.69%
	Art Works	Nil	
Infrastructure - Roads		50	0.02%
Infrastructure - Footpaths		50	0.02%
Infrastructure - Drainage	Drainage	75	0.0133%
	Sewerage	75	0.0133%
Infrastructure - Crossovers		50	0.02%
Infrastructure - Car Parks		20 to 40	5% to 2.5%
Infrastructure - Bus Shelters		20	0.05%
Infrastructure - Street Lights	Street Lights	30	0.0333%
	Other Lights	30	0.0333%
Infrastructure – Parks & Ovals	Playground Equipment	5 to 15	20% to 6.67%
	Bores/Pumps/Irrigation	8 to 20	12.5% to 5%
	BBQ's	10 to 20	10% to 5%
	Streetscapes	20 to 50	5% to 2%
	Landscape Surrounds	10 to 50	10% to 2%
	Sportsgrounds - Reticulated	15 to 25	6.67% to 4%
	Public Open Space Not Reticul	20 to 50	5% to 2%
Infrastructure - Other Structures	Jetties	20 to 40	5% to 2.5%
	Other Structures	20 to 50	5% to 2%
	Tennis Courts	30 to 50	3.33% to 2%

2. STATEMENT OF OBJECTIVE

In order to discharge its responsibilities to the community, the City has developed a set of operational and financial objectives. These objectives have been established both on an overall basis, reflected by the City's Vision, and for each of its broad activities/programs.

CITY'S VISION

"Kwinana 2030: Rich in spirit, alive with opportunities, surrounded by nature - it's all here!"

Council operations as disclosed in this budget encompass the following service orientated activities/programmes:

GENERAL PURPOSE FUNDING

Rates Income and Expenditure, Grants Commission and Pensioner Deferred Rates interest and interest on Investments. Principal and Interest payments on borrowing's.

GOVERNANCE

Members of Council and Governance (includes Audit and other costs associated with reporting to council). Administration, Financial and Computing Services are included.

LAW, ORDER, PUBLIC SAFETY

Supervision of various local laws, fire prevention and animal control.

HEALTH

Prevention and treatment of human illness, including inspection of premises/food control, immunisation and child health services.

EDUCATION AND WELFARE

Provision, management and support of services for families, children and the aged and disabled within the community; including pre-school playgroups, day and after school care, assistance to schools, senior citizens support groups, meals on wheels provision and Aged Persons Units and Resident Funded Units.

COMMUNITY AMENITIES

City planning and development, rubbish collection services, stormwater drainage, the provision of public conveniences, bus shelters, roadside furniture and litter control.

RECREATION AND CULTURE

Provision of facilities and support for organisations concerned with leisure time activities and sport, support for the performing and creative arts and the preservation of the national estate. This includes maintenance of halls, aquatic centre, recreation and community centres, parks, gardens, sports grounds and the operation of Libraries.

TRANSPORT

Construction, maintenance and cleaning of streets, roads, bridges, drainage works, footpaths, parking facilities, traffic signs and the City depot, including plant purchase and maintenance.

ECONOMIC SERVICES

Rural services and pest control and the implementation of building controls.

OTHER PROPERTY & SERVICES

Private works, public works overheads, council plant operations, materials, salaries and wages. With the exception of private works, the above activities listed are mainly summaries of costs that are allocated to all works and services undertaken by the council.

3. ACQUISITION OF ASSETS

The following assets are budgeted to be acquired during the period under review:

By Directorate	August 2016 Actual $	2016/17 Revised Budget $
City Strategy		
Furniture & Equipment	-	-
Transportation Vehicles	-	(39,000)
Land & Buildings	-	-
	-	**(39,000)**
Corporate & Engineering Services		
Furniture & Equipment	-	-
Computing Equipment	(10,470.00)	(470,245)
Plant & Equipment	(283,465.00)	(802,500)
Transportation Vehicles	-	(158,000)
Land & Buildings	-	-
Reserve Development	-	(1,256,527)
Playground Equipment	(657,521.00)	(2,967,836)
Urban Road Grant	-	(1,109,133)
Black Spot Grant	-	(22,000)
Roads to Recovery Grant	-	(979,398)
Road Resurfacing	(1,364)	(22,000)
Street Lighting	(214)	(25,000)
Bus Shelter Construction	-	(50,000)
Footpath Construction	(600)	(230,000)
Drainage Construction	-	(320,000)
Municipal Roadworks	-	(316,558)
Carpark Construction	-	(115,000)
	(953,634)	**(8,844,197)**
City Living		
Furniture & Equipment	(14,288)	(98,820)
Plant & Equipment	(3,290)	(62,250)
Transportation Vehicles	(63,751)	(193,000)
Land & Buildings	(85,591)	(2,120,084)
Playground Equipment	-	(120,000)
	(166,920)	**(2,594,154)**
City Development		
Transportation Vehicles	-	(200,000)
	-	**(200,000)**
	(1,120,554)	(11,677,351)

3. ACQUISITION OF ASSETS (Continued)

By Class	August 2016 Actual $	2016/17 Revised Budget $
Furniture and Equipment	(14,288)	(98,820)
Computing Equipment	(10,470)	(470,245)
Plant and Equipment	(286,755)	(864,750)
Transportation Vehicles	(63,751)	(590,000)
Land and Buildings	(85,591)	(2,120,084)
Reserve Development	-	(1,256,527)
Playground Equipment	(657,521)	(3,087,836)
Infrastructure - Urban Road Grant	-	(1,109,133)
Infrastructure - Black Spot Grant	-	(22,000)
Infrastructure - Roads to Recovery	-	(979,398)
Infrastructure - Road Resurfacing	(1,364)	(22,000)
Infrastructure - Street Lights	(214)	(25,000)
Infrastructure - Bus Shelters	-	(50,000)
Infrastructure - Footpaths	(600)	(230,000)
Infrastructure - Drainage	-	(320,000)
Infrastructure - Municipal Roadworks	-	(316,558)
Infrastructure - Carpark	-	(115,000)
	(1,120,554)	(11,677,351)

4. DISPOSALS OF ASSETS

The following assets have been disposed of during the period under review

By Class	Net Book Value August Actual $	Sale Proceeds August Actual $	Profit(Loss) August Actual $
Furniture and Equipment	-	-	-
Plant and Equipment	(82,003)	82,003	-
Transportation Vehicles	-	-	-
Buildings	-	-	-
Reserve Development	-	-	-
Land	-	-	-
Other	-	-	-
	(82,003)	82,003	-

Summary

	August Actual $
Profit on Asset Disposals	-
(Loss) on Asset Disposals	-
	-

5. INFORMATION ON BORROWINGS

(a) Loan Repayments

Particulars	Principal 1-Jul-16	Interest Rate	Maturity Date	New Loans	Principal Repayments		Principal Outstanding		Interest Repayments	
				Aug-16 Actual $	Aug-16 Actual $	2016/17 Budget $	Aug-16 Actual $	2016/17 Budget $	Aug-16 Actual $	2016/17 Budget $
Governance										
Loan 99 - Administration Office Renovations	925,362	6.25%	25-Jun-25	-	-	79,376	925,362	845,986	632	63,009
Education & Welfare										
Loan 96 - Youth Specific Space	193,278	7.53%	19-Jun-23	-	-	21,880	193,278	171,398	440	15,486
Loan 100 -Youth Specific Space	1,521,312	4.67%	25-Jun-28	-	-	-	1,521,312	1,521,312	776	81,279
Recreation & Culture										
Loan 94 - Wellard Sports Pavilion	289,483	6.38%	04-May-22	-	-	41,000	289,483	248,483	2,911	19,836
Loan 95 - Orelia Oval Pavilion	463,867	7.53%	19-Jun-23	-	-	52,512	463,867	411,355	1,056	37,166
Loan 97 - Orelia Oval Pavilion Extension	2,047,558	6.25%	25-Jun-25	-	-	175,636	2,047,558	1,871,922	1,399	139,419
Loan 102 - Resource & Knowledge Centre	7,421,567	4.54%	28-Jun-29	-	-	-	7,421,567	7,421,567	3,662	386,856
Loan 103 - Kwinana Golf Club	297,904	4.07%	25-Jun-23	-	-	37,590	297,904	260,314	132	13,815
Loan 104 - Recquatic Upgrade	3,350,000	4.05%	26-Jun-30	-	-	-	3,350,000	3,350,000	1,475	159,318
Loan 105 - Bertram Community Centre	1,296,840	3.25%	27-Mar-30	-	-	-	1,296,840	1,296,840	458	50,851
Loan 106 - Calista Destination Park	1,700,000	3.14%	24-Jun-31	-	-	90,000	1,700,000	1,700,000	999	70,000
New - Darius Wells Building Solar Panels	-			-	-	35,302	-	191,360	-	8,994
Transport										
Loan 98 - Streetscape Beautification	1,249,239	6.25%	25-Jun-25	-	-	107,157	1,249,239	1,142,082	853	85,062
Loan 101 - City Centre Road Network**	2,500,000	2.18%	27-Sep-16	-	-	2,500,000	2,500,000	-	2,008	92,500
	23,256,410			-	-	3,140,453	23,256,410	20,432,619	16,801	1,223,591

Principal Repayments - Debentures	-	640,453
Liquidity Advance Repayments	-	2,500,000
	-	3,140,453

(*) Self Supporting loan financed by payments from third parties
(**) Short Term Facility Loans
All loan repayments were financed by general purpose revenue.

5. INFORMATION ON BORROWINGS (Continued)

(b) New Debentures

Particulars/Purpose	Amount Borrowed		Institution	Loan Type	Term (Years)	Total Interest & Charges	Interest Rate	Amount Used		Balance Unspent $
	Actual	Budget						Actual	Budget	
Darius Wells Building Solar Panels	-	105,550	WA Treasury	Debenture	10	4,960	4.0% & 0.7%	-	105,550	-
Loan 101 - City Centre Redevelopment	-	2,500,000	WA Treasury	Debenture	5	101,750	4.0% & 0.7%	-	2,500,000	-
	-	2,605,550				106,710		-	2,605,550	-

The City has a $12,578,433 Short Term Loan Facility with Western Australian Treasury Corporation (WATC).

(c) Unspent Debentures

Particulars	Date Borrowed	Balance 1-Jul-16 $	Borrowed During Year $	Expended During Year	Liquidity Repayment $	Balance 31-Aug-16 $
Loan 99 - Administration Office Renovations	25-Jun-10	62,705	-	-		62,705
		62,705	-	-	-	62,705

(d) Self Supporting Loan Repayments

Particulars	Principal 1-Jul-16	New Loans	Principal Repayments		Principal Outstanding		Interest Repayments	
			Aug-16 Actual $	2016/17 Budget $	Aug-16 Actual $	2016/17 Budget $	Aug-16 Actual $	2016/17 Budget $
Recreation & Culture								
Loan 103 - Kwinana Golf Club	297,904	-	6,202	37,590	291,702	260,314	2,226	13,815
	297,904	-	6,202	37,590	291,702	260,314	2,226	13,815

6. RESERVES

Reserve Accounts Transactions

RESERVE FUND DETAILS	Opening Balance 1 July 2016	Transfers			Movements	Closing Balance 31 August 2016
		To Reserve	Interest	From Reserve		
Aged Persons Units Reserve	528,629	-	3,521	-	-	532,150
Asset Management Reserve	1,212,394	-	6,479	-	-	1,218,873
Asset Replacement Reserve	531,373	-	3,539	-	-	534,912
Banksia Park Reserve	72,480	-	483	-	-	72,963
CLAG Reserve	246,658	-	1,643	-	-	248,301
Community Services & Emergency Relief Reserve	25,299	-	168	-	-	25,467
Employee Leave Reserve	4,100,853	-	9,479	-	-	4,110,332
Family Day Care Reserve	1,423,011	-	-	-	-	1,423,011
Future Community Infrastructure Reserve	2,571,524	-	17,129	-	-	2,588,653
Golf Course Cottage Reserve	26,469	-	176	-	-	26,645
Infrastructure Reserve	119,703	-	797	-	-	120,500
Refuse Reserve	8,385,016	-	55,852	-	-	8,440,868
Restricted Grants & Contributions Reserve	2,303,075	-	-	-	-	2,303,075
Settlement Agreement Reserve	157,743	-	-	-	-	157,743
Un-Restricted Reserves Sub Total	21,704,227	-	99,266	-	-	21,803,493

RESERVE FUND DETAILS	Opening Balance 1 July 2016	Transfers			Movements	Closing Balance 31 August 2016
		To Reserve	Interest	From Reserve		
DCA 1 - Hard Infrastructure - Bertram	1,483,289		9,880	-	-	1,493,169
DCA 2 - Hard Infrastructure - Wellard East	1,530,683	206,550	5,897	-	-	1,743,130
DCA 5 - Hard Infrastructure - Wandi	2,846,531		10,498	-	-	2,857,029
DCA 9 - Soft Infrastructure - Wandi/Anketell	9,116,394	21,949	29,661	(638)	-	9,167,366
DCA 11 - Soft Infrastructure - Wellard East	3,647,606	325,250	16,980	(9,357)	-	3,980,479
DCA 12 - Soft Infrastructure - Wellard West	5,779,219		28,325	-	-	5,807,544
DCA 13 - Soft Infrastructure - Bertram	286,381		32,528	-	-	318,909
DCA 14 - Soft Infrastructure - Wellard/Leda	406,289		13,946	-	-	420,235
DCA 15 - Soft Infrastructure - Townsite	137,457	2,299	20,481	(1,681)	-	158,556
Developer Contribution Reserves Sub Total	25,233,849	556,048	168,196	(11,676)	-	25,946,417
Reserves Total	46,938,076	556,048	267,462	(11,676)	-	47,749,910

All of the above reserve accounts are to be supported by money held in financial institutions.

6. RESERVES

	August Actual $	2016/17 Budget $
Cash/Investment Backed Reserves		
(a) Aged Persons Units Reserve		
Opening Balance	528,629	426,000
Amount Set Aside / Transfer to Reserve	-	279,314
Interest Applied to Reserve	3,521	9,488
Amount Used / Transfer from Reserve	-	(210,315)
	532,150	504,487
(b) Asset Management Reserve		
Opening Balance	1,212,394	1,086,200
Amount Set Aside / Transfer to Reserve	-	-
Interest Applied to Reserve	6,479	24,193
Amount Used / Transfer from Reserve	-	(816,174)
	1,218,873	294,219
(c) Asset Replacement Reserve		
Opening Balance	531,373	528,400
Amount Set Aside / Transfer to Reserve	-	250,000
Interest Applied to Reserve	3,539	11,767
Amount Used / Transfer from Reserve	-	(559,000)
	534,912	231,167
(d) Banksia Park DMF Reserve		
Opening Balance	72,480	83,900
Amount Set Aside / Transfer to Reserve	-	-
Interest Applied to Reserve	483	1,869
Amount Used / Transfer from Reserve	-	(85,400)
	72,963	369
(e) CLAG Reserve		
Opening Balance	246,658	206,200
Amount Set Aside / Transfer to Reserve	-	72,306
Interest Applied to Reserve	1,643	4,593
Amount Used / Transfer from Reserve	-	(83,120)
	248,301	199,979
(f) Community Services & Emergency Relief Reserve		
Opening Balance	25,299	25,200
Amount Set Aside / Transfer to Reserve	-	-
Interest Applied to Reserve	168	561
Amount Used / Transfer from Reserve	-	-
	25,467	25,761
(g) Employee Leave Reserve		
Opening Balance	4,100,853	3,695,958
Amount Set Aside / Transfer to Reserve	-	-
Interest Applied to Reserve	9,479	-
Amount Used / Transfer from Reserve	-	-
	4,110,332	3,695,958
(h) Family Day Care Reserve		
Opening Balance	1,423,011	1,301,900
Amount Set Aside / Transfer to Reserve	-	-
Interest Applied to Reserve	-	28,997
Amount Used / Transfer from Reserve	-	(170,570)
	1,423,011	1,160,327
(i) Future Community Infrastructure Reserve		
Opening Balance	2,571,524	1,515,400
Amount Set Aside / Transfer to Reserve	-	518,629
Interest Applied to Reserve	17,129	33,752
Amount Used / Transfer from Reserve	-	(1,702,481)
	2,588,653	365,300

6. RESERVES

		August Actual $	2016/17 Budget $
	Cash/Investment Backed Reserves		
(j)	**Golf Course Cottage Reserve**		
	Opening Balance	26,469	26,349
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	176	577
	Amount Used / Transfer from Reserve	-	-
		26,645	26,926
(k)	**Infrastructure Reserve**		
	Opening Balance	119,703	116,100
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	797	2,586
	Amount Used / Transfer from Reserve	-	-
		120,500	118,686
(l)	**Refuse Reserve**		
	Opening Balance	8,385,016	6,655,700
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	55,852	148,242
	Amount Used / Transfer from Reserve	-	(710,119)
		8,440,868	6,093,823
(m)	**Restricted Grants & Contributions Reserve**		
	Opening Balance	2,303,075	1,633,383
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	-	-
	Amount Used / Transfer from Reserve	-	(1,633,383)
		2,303,075	-
(n)	**Settlement Agreement Reserve**		
	Opening Balance	157,743	-
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	-	-
	Amount Used / Transfer from Reserve	-	-
		157,743	-
	Un-Restricted Reserves Sub Total	21,803,493	12,717,002
	Developer Contributions Reserve - DCA 1 - Hard		
(o)	**Infrastucture Bertram**		
	Opening Balance	1,483,289	1,255,800
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	9,880	27,970
	Amount Used / Transfer from Reserve	-	-
	Movement	-	-
		1,493,169	1,283,770
	Developer Contributions Reserve - DCA 2 - Hard		
(p)	**Infrastucture Wellard**		
	Opening Balance	1,530,683	1,538,600
	Amount Set Aside / Transfer to Reserve	206,550	825,740
	Interest Applied to Reserve	5,897	34,269
	Amount Used / Transfer from Reserve	-	-
		1,743,130	2,398,609
	Developer Contributions Reserve - DCA 5 - Hard		
(q)	**Infrastucture Wandi**		
	Opening Balance	-	-
	Amount Set Aside / Transfer to Reserve	-	305,103
	Interest Applied to Reserve	-	-
	Amount Used / Transfer from Reserve	-	-
		-	305,103
	Developer Contributions Reserve - DCA 5 - Hard		
(r)	**Infrastucture Wandi**		
	Opening Balance	2,846,531	2,637,100
	Amount Set Aside / Transfer to Reserve	-	-
	Interest Applied to Reserve	10,498	58,736
	Amount Used / Transfer from Reserve	-	-
		2,857,029	2,695,836

6. RESERVES

	Cash/Investment Backed Reserves	August Actual $	2016/17 Budget $
	Developer Contributions Reserve - DCA 8 -Soft		
(s)	**Infrastucture Mandogalup**		
	Opening Balance	-	-
	Amount Set Aside / Transfer to Reserve	-	475,303
	Interest Applied to Reserve	-	-
	Amount Used / Transfer from Reserve	-	(16,119)
		-	459,184
	Developer Contributions Reserve - DCA 9 -Soft		
(t)	**Infrastucture Wandi/Anketell**		
	Opening Balance	9,116,394	8,623,100
	Amount Set Aside / Transfer to Reserve	21,949	192,062
	Interest Applied to Reserve	29,661	1,733,961
	Amount Used / Transfer from Reserve	(638)	(311,844)
		9,167,366	10,237,279
	Developer Contributions Reserve - DCA 10 -Soft		
(u)	**Infrastucture Casuarina/Anketell**		
	Opening Balance	-	-
	Amount Set Aside / Transfer to Reserve	-	362,462
	Interest Applied to Reserve	-	-
	Amount Used / Transfer from Reserve	-	(24,502)
		-	337,960
	Developer Contributions Reserve - DCA 11 -Soft		
(v)	**Infrastucture Wellard East**		
	Opening Balance	3,647,606	3,627,500
	Amount Set Aside / Transfer to Reserve	325,250	1,382,313
	Interest Applied to Reserve	16,980	80,796
	Amount Used / Transfer from Reserve	(9,357)	(64,568)
		3,980,479	5,026,041
	Developer Contributions Reserve - DCA 12 -Soft		
	Infrastucture Wellard West		
(w)	Opening Balance	5,779,219	5,513,900
	Amount Set Aside / Transfer to Reserve	-	842,081
	Interest Applied to Reserve	28,325	122,810
	Amount Used / Transfer from Reserve	-	(307,302)
	Movement	-	-
		5,807,544	6,171,489
	Developer Contributions Reserve - DCA 13 -Soft		
(x)	**Infrastucture Bertram**		
	Opening Balance	286,381	295,400
	Amount Set Aside / Transfer to Reserve	-	281,178
	Interest Applied to Reserve	32,528	6,580
	Amount Used / Transfer from Reserve	-	(86,448)
		318,909	496,710
	Developer Contributions Reserve - DCA 14 -Soft		
(y)	**Infrastucture Wellard/Leda**		
	Opening Balance	406,289	326,400
	Amount Set Aside / Transfer to Reserve	-	191,283
	Interest Applied to Reserve	13,946	7,270
	Amount Used / Transfer from Reserve	-	(166,559)
		420,235	358,394
	Developer Contributions Reserve - DCA 15 -Soft		
(z)	**Infrastucture Townsite**		
	Opening Balance	137,457	129,400
	Amount Set Aside / Transfer to Reserve	2,299	320,716
	Interest Applied to Reserve	20,481	2,882
	Amount Used / Transfer from Reserve	(1,681)	(271,454)
		158,556	181,544
	Developer Contributions Reserves Sub Total	25,946,417	29,646,816
	Total Cash/Investment Backed Reserves	47,749,910	42,668,921

All of the above reserve accounts are to be supported by money held in financial institutions.

6. RESERVES

In accordance with council resolutions in relation to each reserve account, the purpose for which the reserves are set aside are as follows:

Aged Persons Units Reserve
This Reserve has been established to provide funds for the capital acquisition and maintenance of the Aged Persons Units, Callistemon Court

Arts Centre Reserve
This Reserve was established to cover any increases in the cost of operations and maintenance for the Kwinana Arts Centre

Asset Management Reserve
This Reserve is utilised to provide funds for renewal projects for the City's building and infrastructure assets.

Asset Replacement Reserve
This Reserve is utilised to replace existing fleet, plant and other City assets

Banksia Park Reserve
This Reserve has been established to provide funds for the capital acquisition and maintenance of the Banksia Park Retirement Village

Carried Forward Projects Reserve
The Reserve is utilised to restrict funds required to complete projects from prior financial years

CLAG Reserve
This Reserve has been established to provide funds for the prevention and education of Mosquito management.

Community Services & Emergency Relief Reserve
This Reserve is established to provide funding to alleviate the effect of any disaster within the City of Kwinana boundaries and to provide funds to develop

Employee Leave Reserve
This Reserve is established for the purpose of ensuring that adequate funds are available to finance employee leave entitlements

Family Day Care Reserve
This Reserve provides for the capital acquisitions and maintenance of this facility

Future Community Infrastructure Reserve
This Reserve is established to accumulate the City's contributions for the capital funding of future community infrastructure in accordance with Town Planning Scheme #2

Golf Course Cottage Reserve
This Reserve was established to provide funds for the maintenance of this building

Infrastructure Reserve
This Reserve was established to be used to provide funds to create new City assets or for the major upgrade of City assets to increase the service level provided by the asset

Refuse Reserve
This Reserve was established to provide funds for the costs and subsidy of Waste Management in the City

Settlement Agreement Reserve
This Reserve was established to provide funds to account for future negotiated settlement agreement payments.

DCA 1 - Hard Infrastructure - Bertram
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 1 - Hard Infrastructure Bertram

DCA 2 - Hard Infrastructure - Wellard
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 2 - Hard Infrastructure Wellard

DCA 5 - Hard Infrastructure - Wandi
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 5 - Hard Infrastructure Wandi

DCA 8 - Soft Infrastructure - Mandogalup
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 8 - Soft Infrastructure Mandogalup

DCA 9 - Soft Infrastructure - Wandi/Anketell
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 9 - Soft Infrastructure Wandi/Anketell

6. RESERVES

DCA 10 - Soft Infrastructure - Casuarina/Anketell
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 10 - Soft Infrastructure Casuarina/Anketell

DCA 11 - Soft Infrastructure - Wellard East
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 11 - Soft Infrastructure Wellard East

DCA 12 - Soft Infrastructure - Wellard West
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 12 - Soft Infrastructure Wellard West

DCA 13 - Soft Infrastructure - Bertram
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 13 - Soft Infrastructure Bertram

DCA 14 - Soft Infrastructure - Wellard/Leda
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 14 - Soft Infrastructure Wellard/Leda

DCA 15 - Soft Infrastructure - Townsite
This Reserve is established to restrict funds received from Developers for contributions towards future infrastructure costs and administrative costs for DCA 15 - Soft Infrastructure Townsite

7. NET CURRENT ASSETS

Composition of Estimated Net Current Asset Position

CURRENT ASSETS	**August 2016 Actual $**	**Brought Forward 1-Jul $**
Cash - Unrestricted	20,199,852	4,948,587
Cash - Restricted (Reserves)	47,749,910	46,938,076
Cash - Restricted (Unspent Loan Funds)	62,705	62,705
Cash - Restricted (Restricted Creditors)	3,315,489	3,408,346
Rates - Current	19,316,621	1,590,578
Sundry Debtors	655,910	475,837
GST Receivable	(27)	554,076
Accrued Receivables	-	410,710
Inventories	21,376	26,163
	91,321,836	58,415,078
LESS: CURRENT LIABILITIES		
Sundry Creditors	(879,268)	(4,674,862)
Accrued payables - Current	-	(1,150,164)
Current Borrowings	(3,105,457)	(3,105,457)
Provisions - Current	(4,545,806)	(4,545,806)
	(8,530,531)	(13,476,289)
Net Current Asset Position (Prior to Adjustment)	82,791,305	44,938,789
Less:		
Cash Restricted - (Unspent Loan Funds)	(62,705)	(62,705)
Cash Restricted - (Restricted Creditors)	(3,315,489)	(3,408,346)
Cash Restricted - (Reserves)	(47,749,910)	(46,938,076)
	(51,128,104)	(50,409,127)
Add Back:		
Cash Backed Leave Reserve - Current	4,545,806	4,545,806
Current Loan Liability	3,105,457	3,105,457
	7,651,263	7,651,263
	$ 39,314,464	$ 2,180,925

8. RATING INFORMATION

RATE TYPE Differential General Rate	Rate in $	Number of Properties	Rateable Value $	2016/17 Actual Rate Revenue $	2016/17 Actual Interim Rates $	2016/17 Back Rates $	2016/17 Total Revenue $	2016/17 Total Budget $
Gross Rental Value (GRV)								
Improved Residential	0.07303	10,615	184,561,500	13,478,527	264,454	-	13,742,981	14,150,127
Vacant Residential	0.17974	555	8,674,147	1,559,091	(29,156)	-	1,529,935	1,559,091
Improved Special Rural	0.06385	716	16,868,756	1,077,070	152,469	-	1,229,539	1,077,070
Light Industrial and Commercial	0.09082	146	22,148,306	2,011,509	5,296	-	2,016,805	2,011,509
General Industry and Service Commercial	0.07961	318	33,469,413	2,664,500	3,087		2,667,587	2,664,500
Large Scale General Industry and Service Commercial	0.08260	48	52,329,591	4,322,424	-		4,322,424	4,322,424
Improved Value (UV)								
General Industrial	0.02639	3	121,200,000	3,198,468		-	3,198,468	3,198,468
Rural	0.00464	187	184,212,000	854,744	(357,500)		497,244	854,744
Mining	0.00793	13	27,291,000	216,418	13,486	-	229,904	216,418
Urban/Urban Deferred	0.00612	65	171,510,000	1,049,641	(35,404)	-	1,014,237	1,049,641
		12,666	822,264,713	30,432,392	16,732	-	30,449,124	31,103,992

.. RATING INFORMATION (Continued)

Minimum Payments	Minimum $	Number of Properties	Rateable Value $	2016/17 Actual Rate Revenue $	2016/17 Actual Interim Rates $	2016/17 Back Rates $	2016/17 Total Revenue $	2016/17 Total Budget $
Gross Rental Value (GRV)								
Improved Residential	943	2,679	31,546,688	2,526,297	-	-	2,526,297	2,526,297
Vacant Residential	943	1,220	5,290,264	1,150,460	-	-	1,150,460	1,150,460
Improved Special Rural	943	5	68,260	4,715			4,715	4,715
Light Industrial and Commercial	1226	18	168,008	22,068	-	-	22,068	22,068
General Industry and Service Commercial	1226	37	299,688	45,362	-	-	45,362	45,362
Large Scale General Industry and Service Commercial	1226	0	-	-			-	-
Improved Value (UV)								
General Industrial	1226	0	-	-	-		-	-
Rural	943	11	1,453,000	10,373			10,373	10,373
Mining	1226	1	15,000	1,226	-		1,226	1,226
Urban/Urban Deferred	1226	47	7,786,600	57,622	-	-	57,622	57,622
Sub-Totals		4,018	46,627,508	3,818,123	-	-	3,818,123	3,818,123
							34,267,247	34,922,115
Specified Area Rates							-	-
Totals		16,684	868,892,221	34,250,515	16,732	-	34,267,247	34,922,115

The City of Kwinana raises rates on all land within it's boundaries, except exempt land, using a combination of dual rating and differential rating. Generally land within the urban area is rated at Gross Rental Value (GRV) and land within the rural area being rated with Unimproved Valuations (UV). Certain Town Planning zonings have attracted different rates so as to achieve greater equity within the urban and rural sectors.

The general rates detailed above for the 2015/16 financial year have been determined by Council on the basis of raising the revenue required to meet the deficiency between the total estimated expenditure proposed in the budget and the estimated revenue to be received from all sources other than rates and also bearing considering the extent of any increase in rating over the level adopted in the previous year.

The minimum rates have been determined by Council on the basis that all ratepayers must make a reasonable contribution to the cost of the Local Government services/facilities.

9. TRUST FUNDS

Funds held at balance date over which the Municipality has no control and which are not included in this financial statements are as follows:

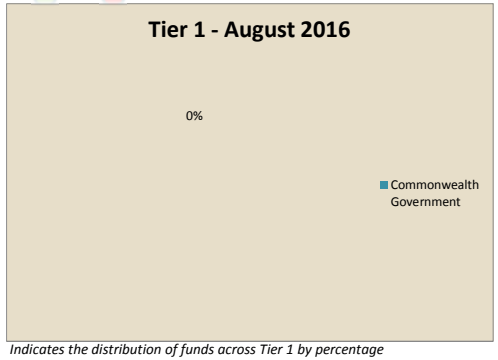
	Balance 1-Jul-16 $	Amounts Received $	Amounts Paid $	Balance 2016/17 $
	-	-	-	-
	-	-	-	-
	-	-	-	-

City of Kwinana
Statement of Investments
For the Period Ending 31 August 2016

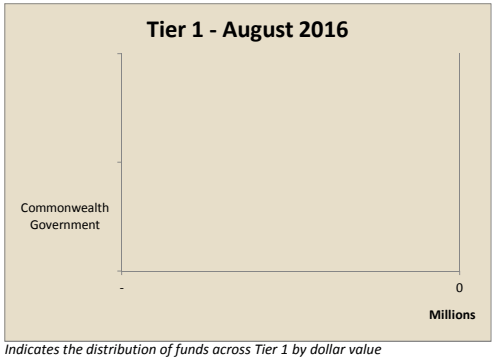
	Rating	Compliance Indicators

Tier 1 - AAA rated authorised institutions
Direct Investment Maximum 100%
Per Institution Maximum Limit 45% of Total Portfolio

1	Commonwealth Government	AAA	-
2			
			-



Indicates the distribution of funds across Tier 1 by percentage

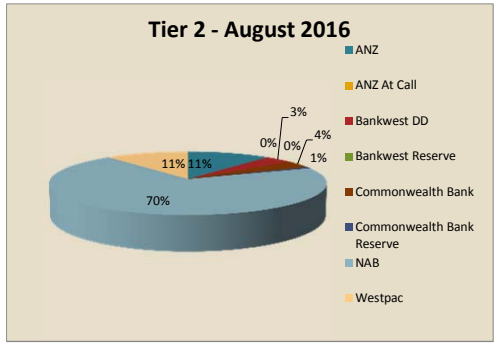


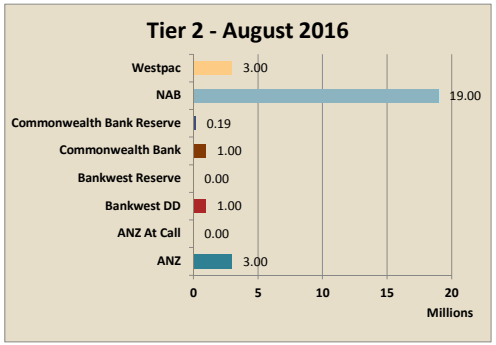
Indicates the distribution of funds across Tier 1 by dollar value

Comment: Tier 1 rates available to the City were not favourable and therefore no funds were invested in this tier.

Tier 2 - AA rated issuers that are incorporated in Australia
Direct Investment Maximum 100%
Per Institution Maximum Limit 35% of Total Portfolio

1	ANZ	AA-	3,000,000.00
2	ANZ At Call	AA-	1,083.24
3	Bankwest DD	AA-	1,000,000.00
4	Bankwest Reserve	AA-	20.16
5	Commonwealth Bank	AA-	1,000,000.00
6	Commonwealth Bank Reserve	AA-	189,903.75
7	NAB	AA-	19,000,000.00
8	Westpac	AA-	3,000,000.00
			27,191,007.15



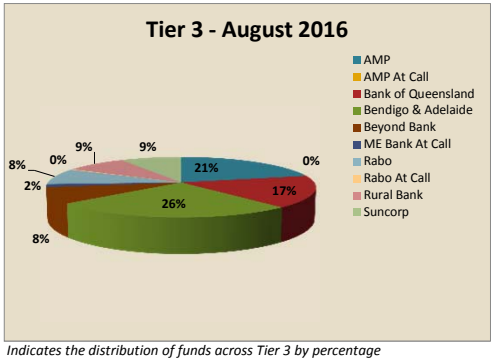


Comment: Funds were allocated in accordance with the guidelines of Investment Policy.

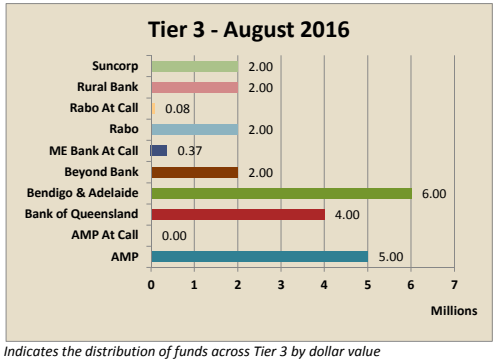
City of Kwinana
Statement of Investments
For the Period Ending 31 August 2016

Tier 3 - other investment grade authorised institutions
Direct Investment Maximum 40%
Per Institution Maximum Limit 20% of Total Portfolio

1	AMP	A+	5,000,000.00
2	AMP At Call	A+	195.34
3	Bank of Queensland	A-	4,000,000.00
4	Bendigo & Adelaide	A-	6,000,000.00
5	Beyond Bank	BBB	2,000,000.00
6	ME Bank At Call	BBB	368,680.71
7	Rabo	AA-	2,000,000.00
8	Rabo At Call	AA-	84,976.60
9	Rural Bank	A-	2,000,000.00
10	Suncorp	A+	2,000,000.00
			23,453,852.65



Indicates the distribution of funds across Tier 3 by percentage

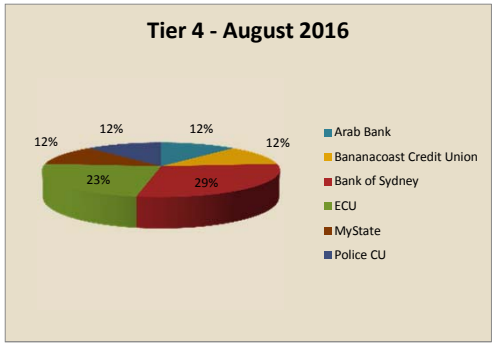


Indicates the distribution of funds across Tier 3 by dollar value

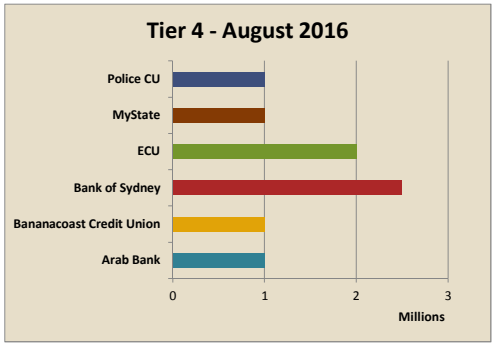
Comment: Funds were allocated in accordance with the guidelines of Investment Policy.

Tier 4 - other compliant authorised institutions
Direct Investment Maximum 30%
Per Institution Maximum Limit 5% of Total Portfolio

	Term Deposits		
1	Arab Bank	UR	1,000,000.00
2	Bananacoast Credit Union	UR	1,000,000.00
3	Bank of Sydney	UR	2,500,000.00
4	ECU	UR	2,000,000.00
5	MyState	UR	1,000,000.00
6	Police CU	UR	1,000,000.00
			-
	CDOs		-
	MA S6-7 (Parkes IA'AAA')	NR	
	MA S6-7 (Parkes IIA'AAA')	NR	
			8,500,000.00
			$ 59,144,859.80



Indicates the distribution of funds across Tier 4 by percentage



Indicates the distribution of funds across Tier 4 by dollar value

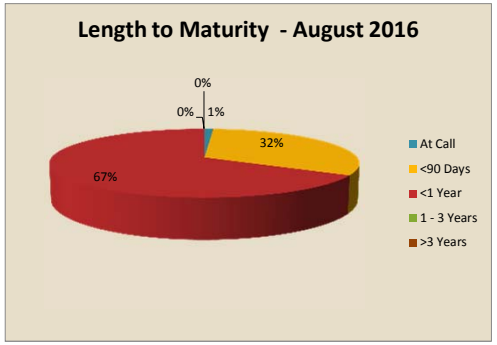
Comment: Funds were allocated in accordance with the guidelines of Investment Policy.

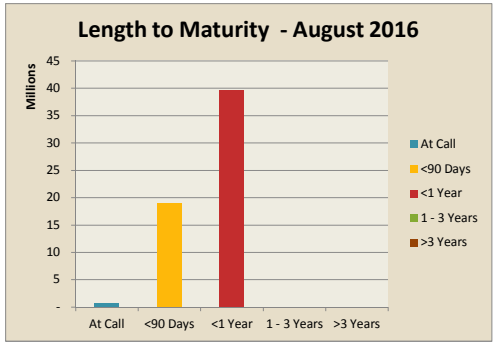
Legend

FRNs	Floating Rate Notes
CDOs	Collateralised Debt Obligations

City of Kwinana
Statement of Investments
For the Period Ending 31 August 2016

At Call	644,859.80
<90 Days	19,000,000.00
<1 Year	39,500,000.00
1 - 3 Years	-
>3 Years	-
	$ 59,144,859.80





Portfolio Term to Maturity Limits

	At Call	<90 Days	<1 Year	1-3 Years	>3 Years
At Call investment	$ 644,859.80				
	1.09%				
Compliance Indicator	✓				
Funds invested for 90 days or less		$ 19,000,000.00			
100% (with 10% minimum) of Total Portfolio		32.12%			
Compliance Indicator		✓			
Funds invested for between 90 days and up to 1 year			$ 39,500,000.00		
100% (with 40% minimum) of Total Portfolio			66.79%		
Compliance Indicator			✓		
Funds invested for between 1 and 3 years				$ -	
60% (Bonds Only) of Total Portfolio				0.00%	
Compliance Indicator				✓	
Funds invested for greater than 3 years					$ -
0% of Total Portfolio					0.00%
Compliance Indicator					✓

Comment: Portfolio compliant with the Policy

City of Kwinana
Statement of Investments
For the Period Ending 31 August 2016

Portfolio Credit Framework

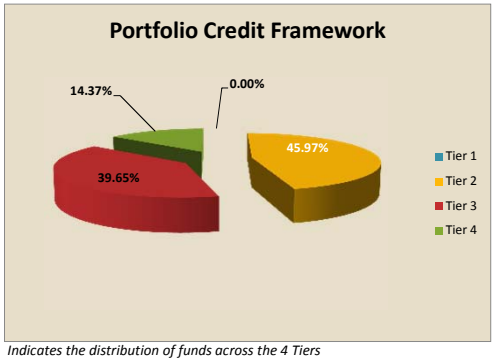
Direct Investment Maximum 100%
Per Institution Maximum Limit 45% of Total Portfolio

Direct Investment Maximum 100%
Per Institution Maximum Limit 35% of Total Portfolio

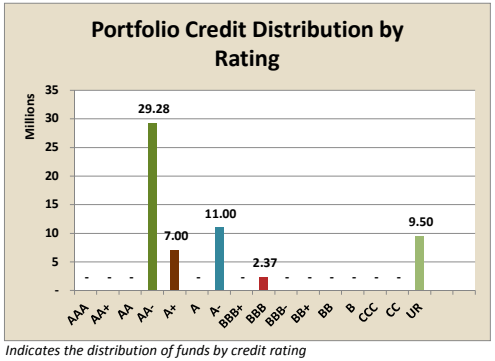
Direct Investment Maximum 40%
Per Institution Maximum Limit 20% of Total Portfolio

Direct Investment Maximum 30%
Per Institution Maximum Limit 5% of Total Portfolio

Tier 1	Tier 2	Tier 3	Tier 4
0.00% ✓			
	45.97% ✓		
		39.65% ✓	
			14.37% ✓

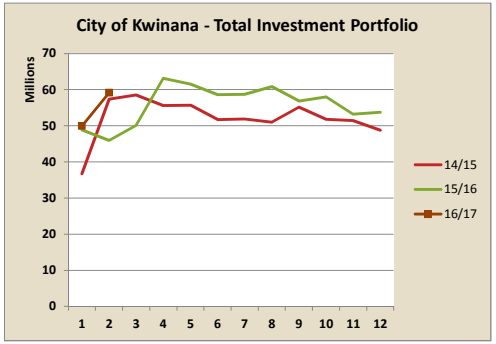


Indicates the distribution of funds across the 4 Tiers

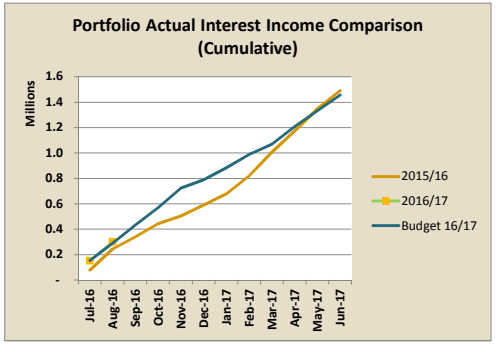


Indicates the distribution of funds by credit rating

Comment: Funds held in this tier exceeded allowable amounts at month end partially due to the allocation of interest and cash requirements. This will be recitifed during the month of June 2016.



Indicates the total amount invested at the report date compared to prior years



Indicates the amount of interest earnt on investments for the period to report date

17 Urgent Business

Nil

18 Councillor Reports

18.1 Councillor Ruth Alexander

Councillor Ruth Alexander reported that she attended the Gilmore College Year 12 Graduation and that it was fantastic to see so many students graduating.

18.2 Councillor Dennis Wood

Councillor Dennis Wood reported that he had attended the Returned and Services League (RSL) and 80th birthday celebrations for one of its members.

Councillor Wood advised that he had attended the Kwinana Adventure Playground Grand Opening and that it was great.

Councillor Wood mentioned that he had attended the Alcoa Children's Party and that it was excellent.

19 Response to Previous Questions

Nil

20 Mayoral Announcements (without discussion)

Mayor Carol Adams reported that she attended the Tianqui Lithium Ground Breaking Ceremony with the Premier and Minister for State Development.

The Mayor advised that she had attended the Tianqui Lithium Cocktail Function to celebrate the $440 million dollar company being established in the Kwinana Industrial Area.

The Mayor mentioned that she had attended the 25th Anniversary Alcoholics Anonymous (AA) Nostalgia Day.

The Mayor reported that the Industrial Arts Initiative Working Group is up and running and that she attended an industrial area bus trip.

The Mayor advised that she had attended the South West Group Regional Briefing of South Metro Labor on infrastructure priority projects.

The Mayor mentioned that she had attended the City of Kwinana Citizenship Ceremony.

The Mayor reported that she had attended two Indian Ocean Gateway Briefings.

The Mayor advised that she had attended the Leda Primary School Expo.

20 MAYORAL ANNOUNCEMENTS (WITHOUT DISCUSSION) CONTINED

The Mayor mentioned the Kwinana Filipino-Australian Basketball Summer Season and that there are 4 volleyball and 16 basketball teams.

The Mayor reported that she had attended the 17th Annual Alcoa Children's Party and that it was bigger and better.

The Mayor advised that she had attended the Gilmore College Valedictory Ceremony and passed on her congratulations to Brayden Annsell for being presented with the Most Improved Senior Student Award.

The Mayor mentioned that she had attended the Kwinana Industrial Council (KIC) 'I Diversity' Graduation.

The Mayor tabled her speech from the Kwinana Adventure Park Grand Opening –

Five years ago the Rotary Club of Kwinana came to us with an idea. Today Kwinana is home to Perth's newest - and in the opinion of many, its best – Adventure Playground.

In order to really understand the journey we've been on, a short history lesson is in order.

We start in the early months of 2011. Kwinana was well and truly underway with our most ambitious infrastructure campaign ever – the Looking Forward initiative. It was here when representatives from Kwinana Rotary approached Council with a concept for a Children's Adventure Park.

Over the course of several months, Council worked through the proposals preliminary details before officially endorsing the project at a Council Meeting on the 14th of September 2011. From there, detailed research was undertaken to assist the City in securing funding.

Those efforts were realised in January 2013, when news broke of a $2million federal funding commitment for the Adventure Park. This was a pivotal moment for the project.

Special mention must be given to former federal liberal candidate for Brand, Donna Gordin. It was Ms Gordin who fought hard for the City of Kwinana as part of the 2013 Federal Election and without her efforts we would not have received this essential funding and we likely wouldn't be celebrating here today.

What followed was a period of comprehensive community consultation and design planning.

Fast forward to the end of 2014 and the City had awarded the tender for detailed design to Josh Byrnes and Associates, in partnership with Jeavons Landscape Architects. From here a complete project plan was developed and in November 2015, following the construction contract being awarded to Environmental Industries, the project officially began.

And now, less than 12 months later, Kwinana is home to one of Western Australia's premier family destination.

It is truly remarkable.

20 MAYORAL ANNOUNCEMENTS (WITHOUT DISCUSSION) CONTINED

I mentioned just now, before the ribbon was cut, Kwinana's incredible transformation over the past several years, in particular the $340million City Centre revitalisation which saw the opening of numerous new facilities, the upgrade and beautification of road networks and the introduction of modern city centric housing.

We've spent a great deal of effort over the past several years putting Kwinana 'on the map' but this adventure playground, in addition to providing our existing community with an outstanding new local destination, will also act as a major drawcard for regional visitors and will provide a much awaited boost to local businesses.

The Kwinana Adventure Park will draw in thousands of visitors from outside of the community every year. Many of these people will have never been to Kwinana and I imagine many will be amazed when they discover a modern, diverse and stunning City Centre. This will have a profound impact on the City's reputation in a broad range of areas, including tourism and economic development.

However the reason for their visit will be this Park. And they will be treated to an incredible display of architectural and construction brilliance.

You need only look at the long list of credentials. Starting with the environment.

The design employs a strong focus on sustainability, with solar panels installed to power the park and recycled materials used wherever possible.

We have taken every precaution to ensure the existing natural features at Calista Oval, such as trees which are several hundred years old, have been retained and protected. The health of each individual tree was checked by a tree pathologist, with some even receiving tree injections to ensure they remain healthy, and the park was carefully designed to ensure construction did not impact on tree roots. The large mature trees not only provide shade but create a sense of place unique to Kwinana, and really are what make the playground so special.

The phrase 'Nature Play' has never been more accurate.

I am also incredibly proud at the level of thought that has gone into ensuring the Park is fully accessible. It has been designed as a space for all ages and abilities. All of the paths are fully compliant with Standards for Access and Mobility and in fact the layout of the entire playground has been designed with careful consideration for mobility requirements.

The Tree Maze can be accessed with a wheelchair from end to end. So too the Splash Pad. All toilets and communal picnic areas are also universally accessible. Few playgrounds of this scale anywhere in Australia can boast this kind of accessibility.

We really cannot overstate the level of sophistication at this park - the size of it, the diversity of its design or the carefulness with which it was planned.

Literally thousands of people played a part. From the 80 school children who planted some of the almost 20,000 native plants, to the contractor who installed the hand railings, to the soft fall company, to the security providers and on and on. It's breathtaking the level of detail and consideration that has gone into these 11,000 square metres of playspace.

20 MAYORAL ANNOUNCEMENTS (WITHOUT DISCUSSION) CONTINED

All of this has not gone unnoticed.

Before the Park even opened it was the subject of amazing commentary, with media reviews exceeding expectations.

I'd like to share a comment from one such review.

"The Kwinana Adventure Park is TOTALLY AMAZING! It is as if someone handed them a wish list of what the ultimate playground should be and they've gone ahead and created it. Not only that – they exceeded all expectations!"

Feedback doesn't get much better than that. We can talk for hours about the measurable benefits of this venue, but it's the mums and dads and the boys and girls who will determine if it's up to scratch.

In closing I must make special mention of some of the key organsiations which made today possible.

To the Rotary Club of Kwinana, thank you for providing the inspiration for this incredible facility. Your efforts, passion and never-say-die attitude during the early stages of the project set the all important foundation.

To Josh Byrnes and Associates and Jeavons Landscape Architects, especially Morgan Gilham of JBA, for all your time, creativity and imagination put into designing such an incredible play space. You have approached the project with passion and unwavering enthusiasm from the beginning to the end. It's worth especially mentioning the great challenge to integrate such a complex project with fragile mature trees. This level of complexity has not been achieved in any other West Australian playground.

To the crew at Environmental Industries, what you have achieved here is phenomenal. The level of complexity which was thrown at you would have sent other companies running. But you met the challenge with passion and ingenuity. Thank you.

To the residents of Walgreen Crescent, thank you for your patience while throughout this project. Not many homes can boast that they are across the road from Perth's BEST playspace. – we hope you agree.

To the Australian Government, thank you for your generous $2million contribution which was essential in making this Park a reality. And again thank you to Donna Gordin for making this happen.

To the local primary schools who contributed to the project, including planting many of the trees here today. Thank you

To the young Aboriginal students of Gilmore College for incredible pieces of art, and to the artists and groups who supported them. Thank you.

To my fellow councillors, past and present, thank you for your shared passion for this project.

And to the staff at the City of Kwinana, thank you for keeping the ship moving in the right direction. From all accounts this has been one of the most successful projects ever undertaken by the City. You've done an amazing job.

20 MAYORAL ANNOUNCEMENTS (WITHOUT DISCUSSION) CONTINED

To every single person who played a role in making today a reality – be proud of what you have achieved.

Every aspect of the Kwinana Adventure Park has exceeded our wildest expectations and the Kwinana community, indeed the state of Western Australia, will benefit from it for decades to come.

Thank you and once again, congratulations.

21 Matters Behind Closed Doors

Nil

22 Meeting Closure

The Mayor declared the meeting closed 7:25pm.