Millars Landing (North)
LOCAL STRUCTURE PLAN

Part Two | Explanatory Report

CLE Town Planning + Design

February 2022

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1.0 PLANNING BACKGROUND

1.1 Introduction and Purpose

The Millars Landing (North) Local Structure Plan ('the structure plan') has been prepared by CLE Town Planning and Design on behalf of the landowner, Cedar Woods Properties. The structure plan is prepared in accordance with Clause 15 of Schedule 2 – *Deemed Provisions of the Planning and Development (Local Planning Schemes) Regulations 2015*, which form part of the City of Rockingham Town Planning Scheme No. 2.

The structure plan provides a framework to guide the future subdivision and development of Lots 447 and 459 St Albans Road, Baldivis and Lot 709 Baldivis Road, Baldivis (collectively referred to as 'the structure plan area'). The structure plan refines and adds to the planning detail in the East Baldivis District Structure Plan, ensuring that all relevant environmental, social and economic matters are appropriately addressed before urban development proceeds.

The format of the structure plan accords with the Western Australian Planning Commission (WAPC) Structure Plan Framework (2015). The structure plan consists of three parts:

Part 1: Implementation Section – contains the Structure Plan Map and the planning provisions and requirements that will facilitate implementation of the initiatives described in the Explanatory Section. These provisions will guide future subdivision and development applications in the structure plan area.

Part 2: Explanatory Section – discusses the key outcomes and planning implications of the background and technical reports and describes the vision and planning justification for the structure plan area.

Part 3: Technical Appendices – includes the following technical reports, which have been prepared in order to demonstrate the conformance of the structure plan with all statutory requirements and inform key land-use elements:

1. Environmental Assessment and Management Strategy (RPS);
2. Bushfire Management Plan (Strategen-JBS&G);
3. Landscape Master Plan (Plan E);
4. Local Water Management Strategy (RPS);
5. Traffic Impact Assessment (Cardno);
6. Transport Noise Assessment (Lloyd George Acoustics);
7. Retail Needs Assessment (Taktics4); and
8. Engineering Servicing Report (Tabec).

The structure plan will facilitate growth of the emerging Baldivis community through the creation of approximately 650 lots.

Preparation of this structure plan has been undertaken in consultation with the City of Rockingham, the Department of Planning, Lands and Heritage, the Department of Biodiversity, Conservation and Attractions, the Department of Water and Environmental Regulation and relevant service authorities in accordance with the requirements of the Structure Plan Framework.

The following figures are included with this report:

Figure 1	Location Plan;
Figure 2	Context Plan;
Figure 3	Site Plan;
Figure 4	MRS Plan;
Figure 5	Plan showing proposed Baldivis Road realignment;
Figure 6	North-East Baldivis Structure Plan;
Figure 7	TPS 2 Plan;
Figure 8	East Baldivis District Structure Plan;
Figure 9	Concept Master Plan;
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Figure 11	Internal road hierarchy;
Figures 12-15	POS reference plan and extracts from the Landscape Master Plan;
Figure 16	Post-development Bushfire Hazard Level Assessment; and
Figure 17-18	Post-development transport noise contours.

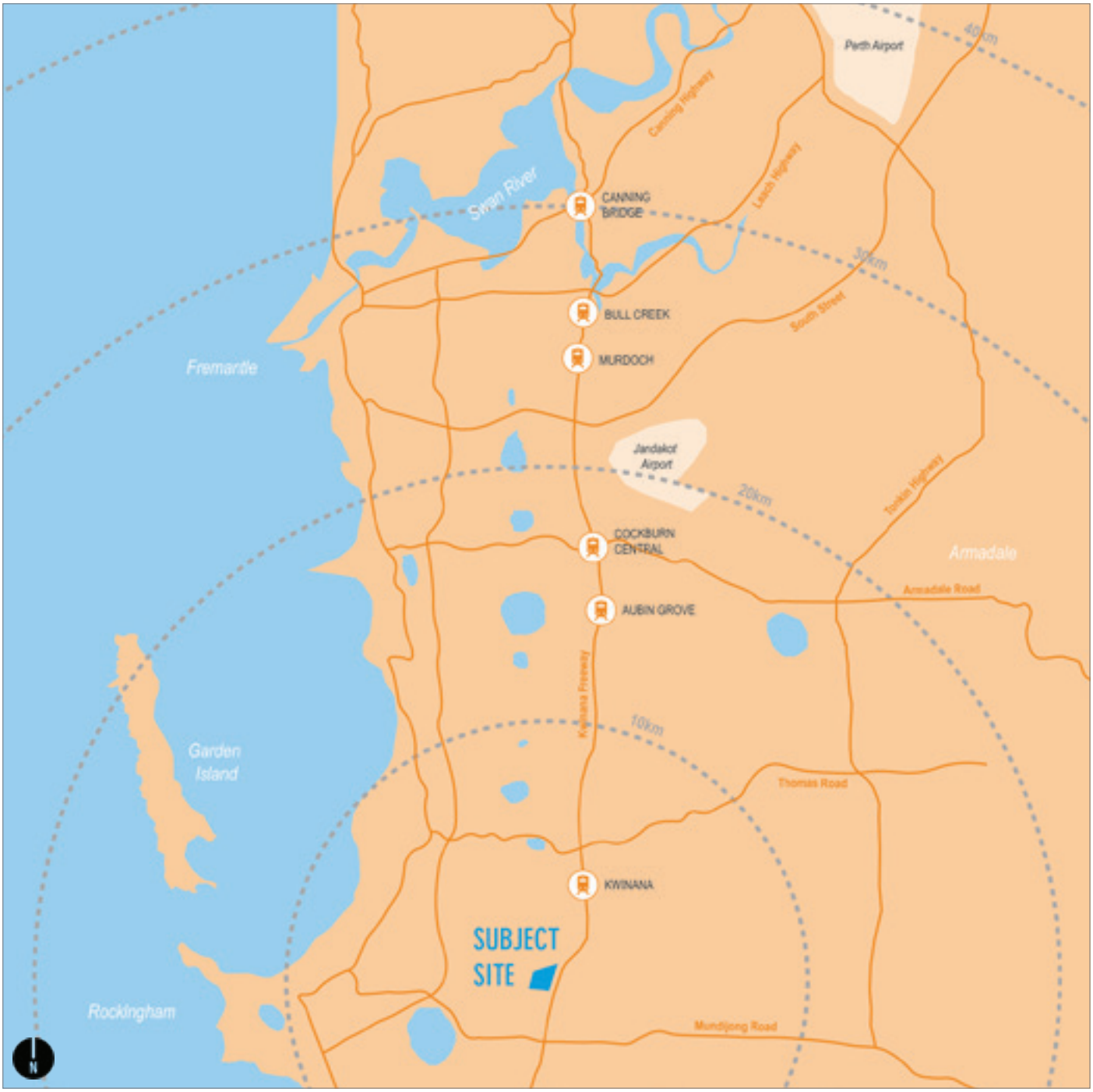

Figure 1 - Location Plan

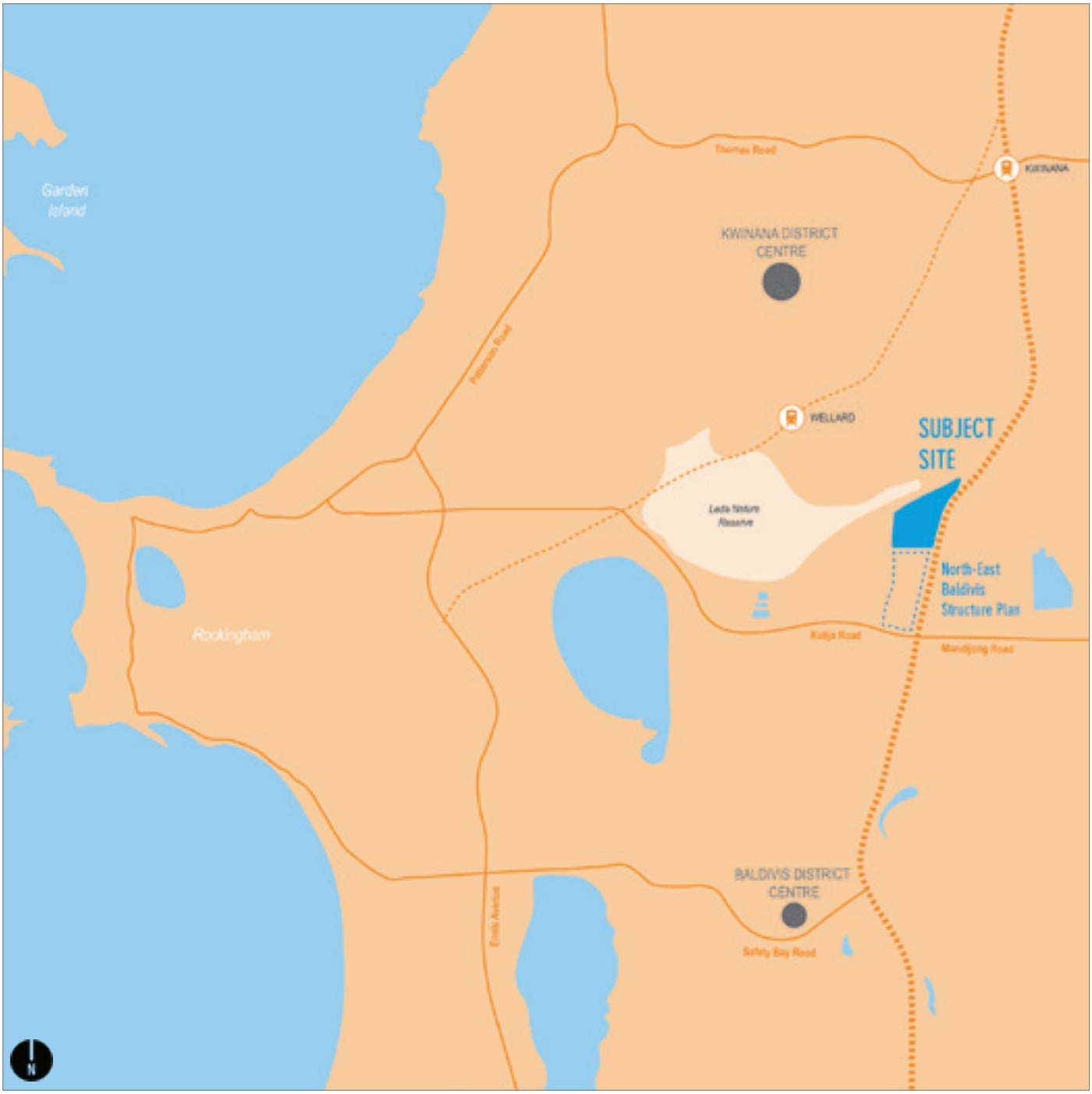

Figure 2 - Context Plan

1.2 Land Description

1.2.1 Location

The structure plan area is located in the City of Rockingham approximately 39km south of the Perth city centre and 4km north-west of the Baldivis District Centre. A location plan and context plan are included as Figures 1 and 2.

The structure plan area is generally bounded by Telephone Lane to the north, the Kwinana Freeway to the east, Pug Road to the south and Baldivis Road to the west. The existing Baldivis Tramway reserve (reserved for 'Parks and Recreation' under the Metropolitan Region Scheme) passes through the site on a north-south axis, dividing the structure plan into eastern and western portions.

The Kwinana Freeway is located to the east of the structure plan area and can be accessed via the Kulija Road / Mundijong Road interchange located approximately 1km to the south.

1.2.2 Area and Land Use

The structure plan area comprises Lots 447 and 459 St Albans Road, Baldivis and Lot 709 Baldivis Road, Baldivis. The structure plan also provides a framework for the rehabilitation of the Baldivis Tramway within the structure plan area.

As shown in Figure 3, the structure plan area is currently vacant and unimproved. The majority of native vegetation has long been cleared for pastoral activities, and the remaining vegetation is limited to scattered native and exotic trees.

1.2.3 Legal Description and Ownership

The structure plan area consists of four separate titles. Details are provided in Table 1 below.

Table 1: Legal Description of Land

Lot	Plan	CT (Vol/Fol)	Gross Area (ha)	Ownership
447	DP202741	1323 / 403	20.8885	Kayea Property Pty Ltd
459	DP202741	1323 / 404	19.6606	Kayea Property Pty Ltd
709	DP202741	1323 / 405	10.2282	Kayea Property Pty Ltd
Tramway	n/a	n/a	5.2080	Crown
Total			**55.99853**	

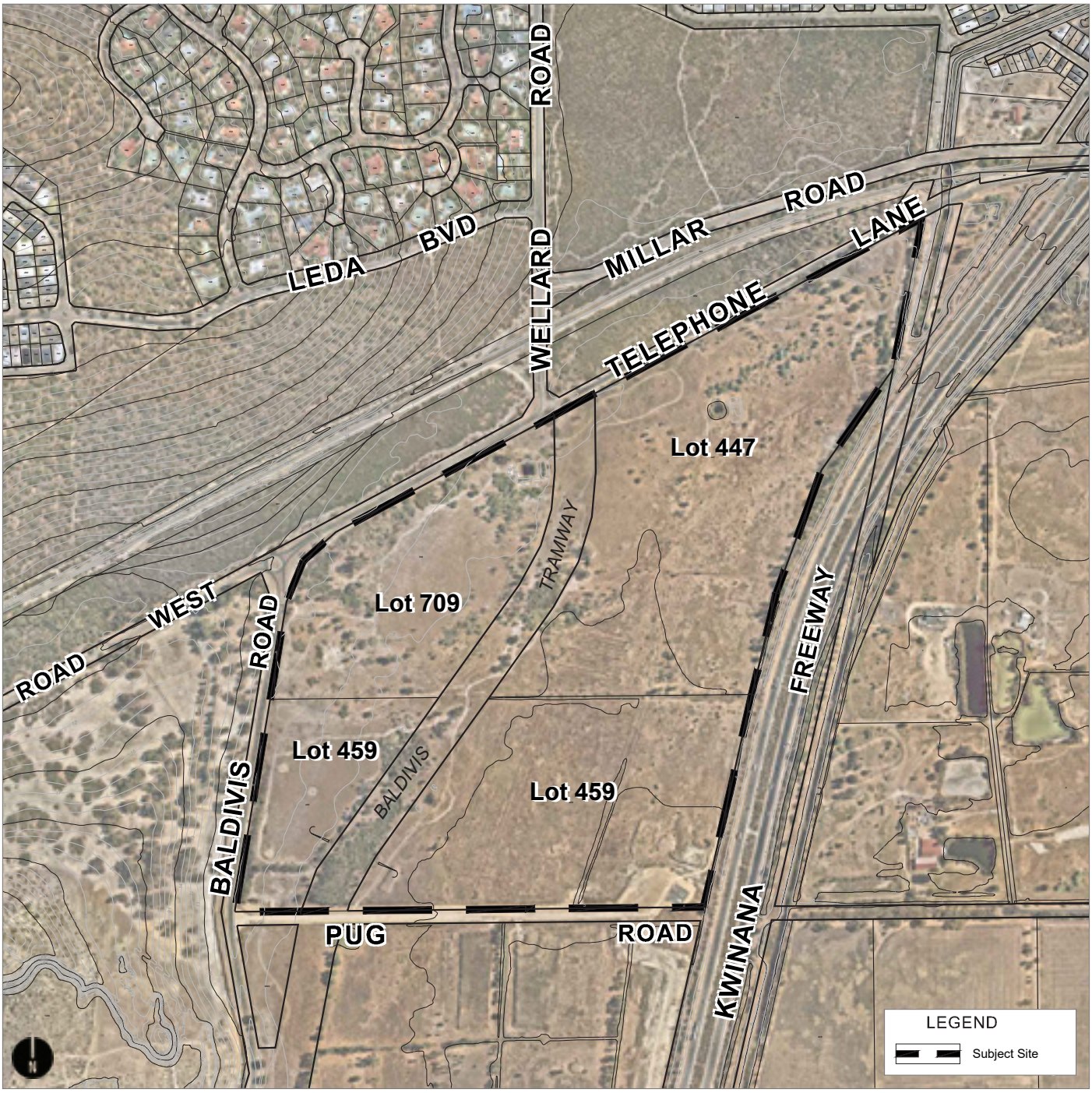

Figure 3 - Site Plan
Source: Nearmap

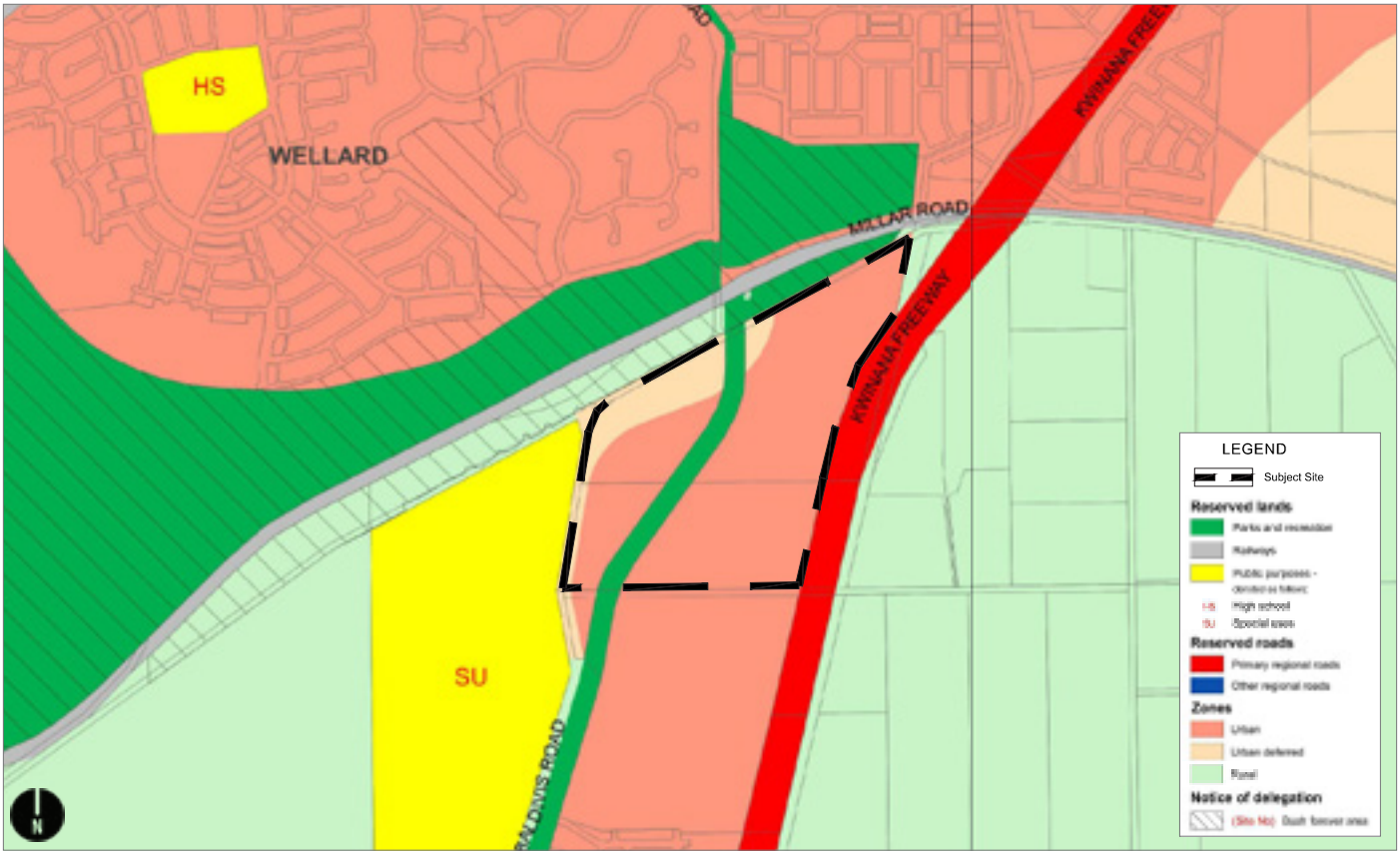

Figure 4 - MRS Plan
Source: WAPC

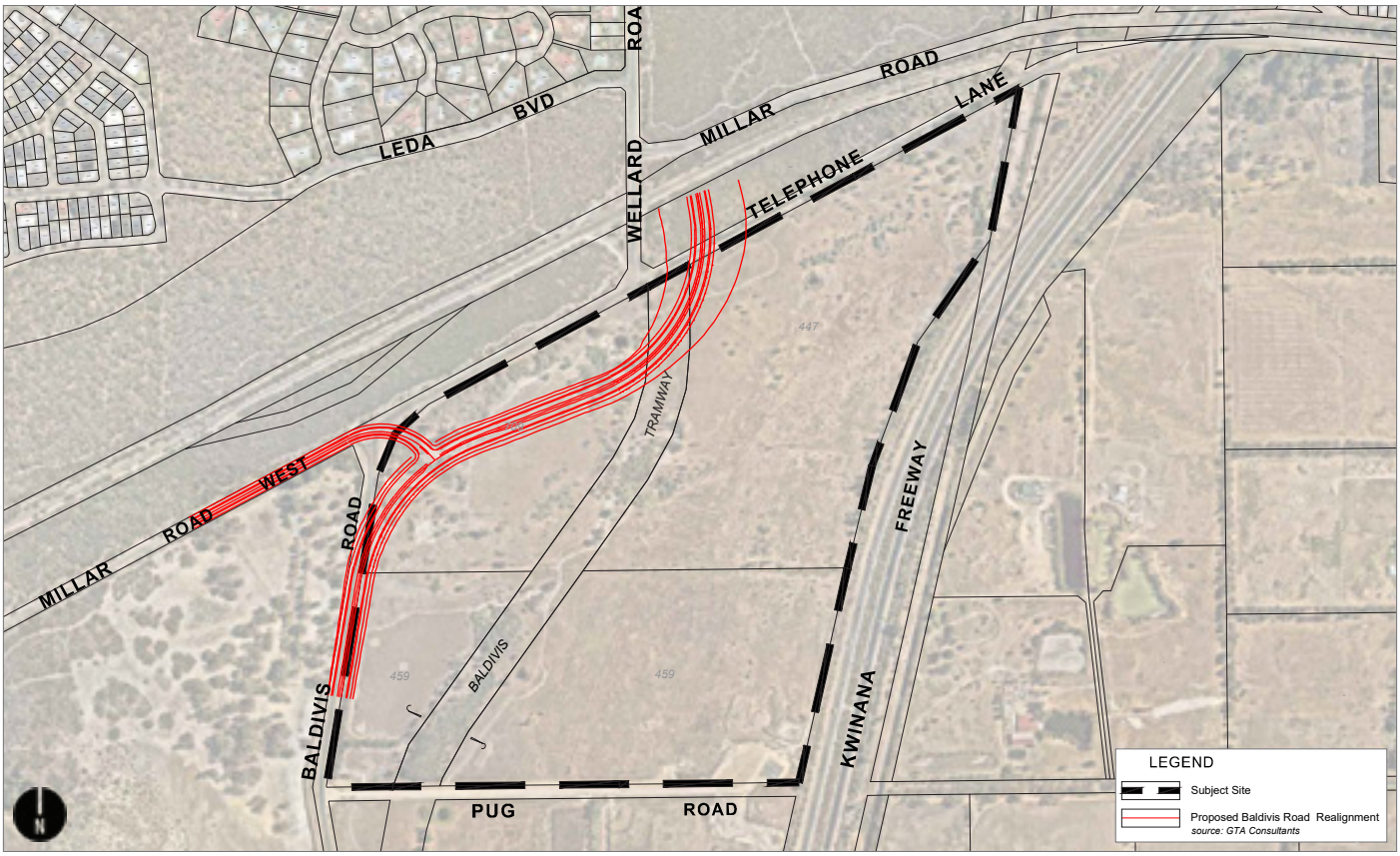

Figure 5 - Plan showing proposed Baldivis Road realignment
Source: GTA Consultants

1.3 Planning Framework

1.3.1 Metropolitan Region Scheme

The majority of the structure plan area is zoned 'Urban' under the MRS, with the exception of land in the north-western corner and the Baldivis Tramway, which is reserved for 'Parks and Recreation' (refer Figure 4: MRS Plan).

Land in the north-western corner has been held in the 'Urban Deferred' zone in order to accommodate a realignment of Baldivis Road (including a flyover) planned by Main Roads. Detailed design work and physical construction is yet to be scheduled, however, a preliminary plan has been prepared by the proponent (Main Roads). This appears as Figure 5. This shows a realignment of Baldivis Road from near Pug Road through the north-western part of the structure plan area to connect directly with Wellard Road via a bridge over the Kewdale to Kwinana railway. A four-way intersection of Baldivis Road / Wellard Road and Leda Boulevard / Millar Road is proposed to the north of the railway. It is understood that the land required for this purpose will be reserved under the MRS and acquired by the WAPC for Main Roads in due course.

In the vicinity of the structure plan area:

- Land to the north is reserved for 'Parks and Recreation' and comprises part of the Leda Nature Reserve. Also to the north is the 'Railways' reservation accommodating the Kewdale to Kwinana freight railway, and 'Urban'-zoned land developed for residential purposes;
- The Kwinana Freeway reserve to the east is reserved for 'Primary Regional Roads'. Beyond the Freeway is land developed as rural smallholdings and zoned 'Rural';
- Land to the south of the structure plan area is zoned 'Urban' and covered by the approved North-East Baldivis Structure Plan (refer Figure 6). The first three stages of subdivision for this area have been approved and are underway and being marketed as the 'Millars Landing' estate; and
- Land to the west of structure plan area, on the opposite side of Baldivis Road, is reserved for 'Public Purposes – Special Use' and forms part of the Rockingham Regional Memorial Park administered by the Metropolitan Cemeteries Board.

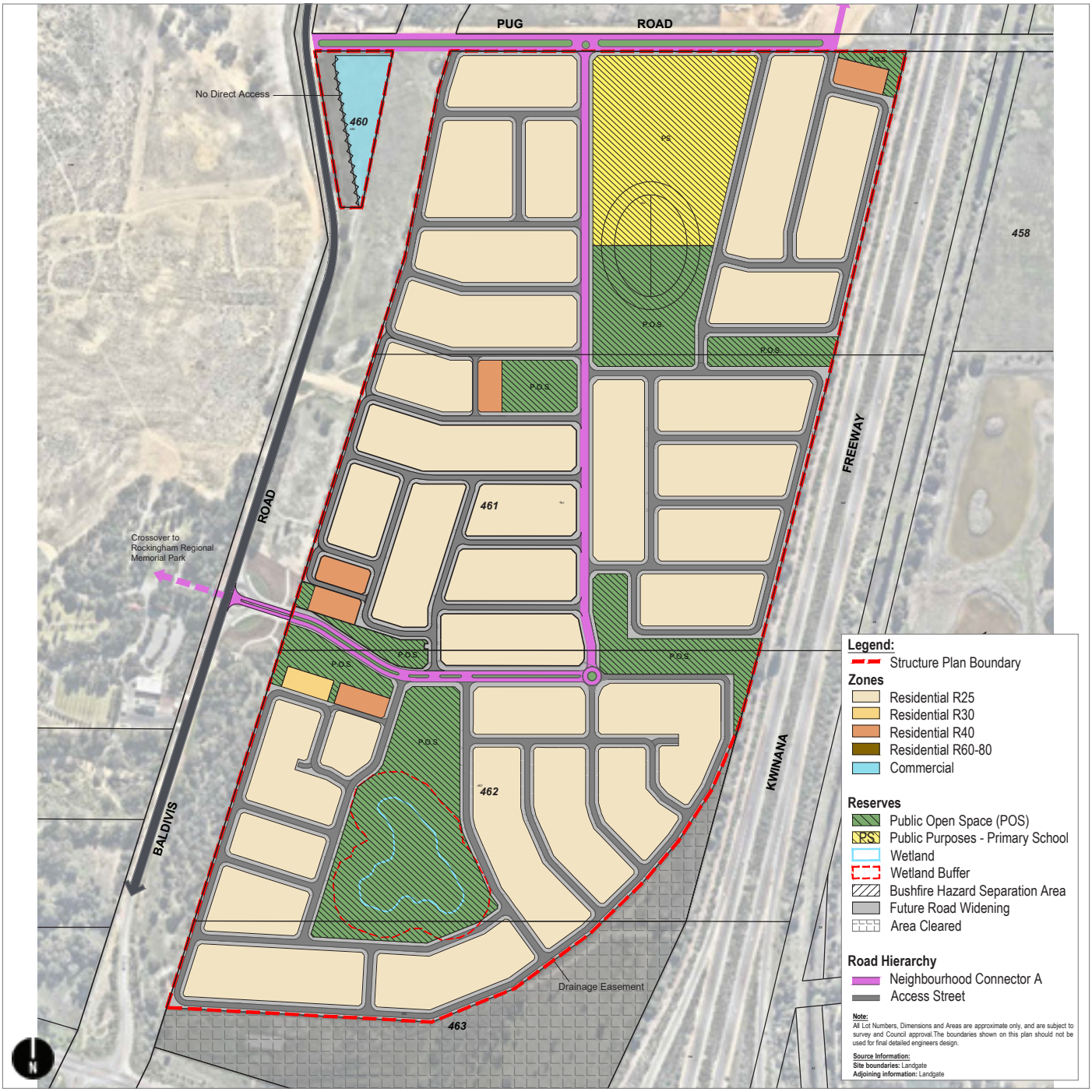

Figure 6 - North-East Baldivis Structure Plan
Source: City of Rockingham

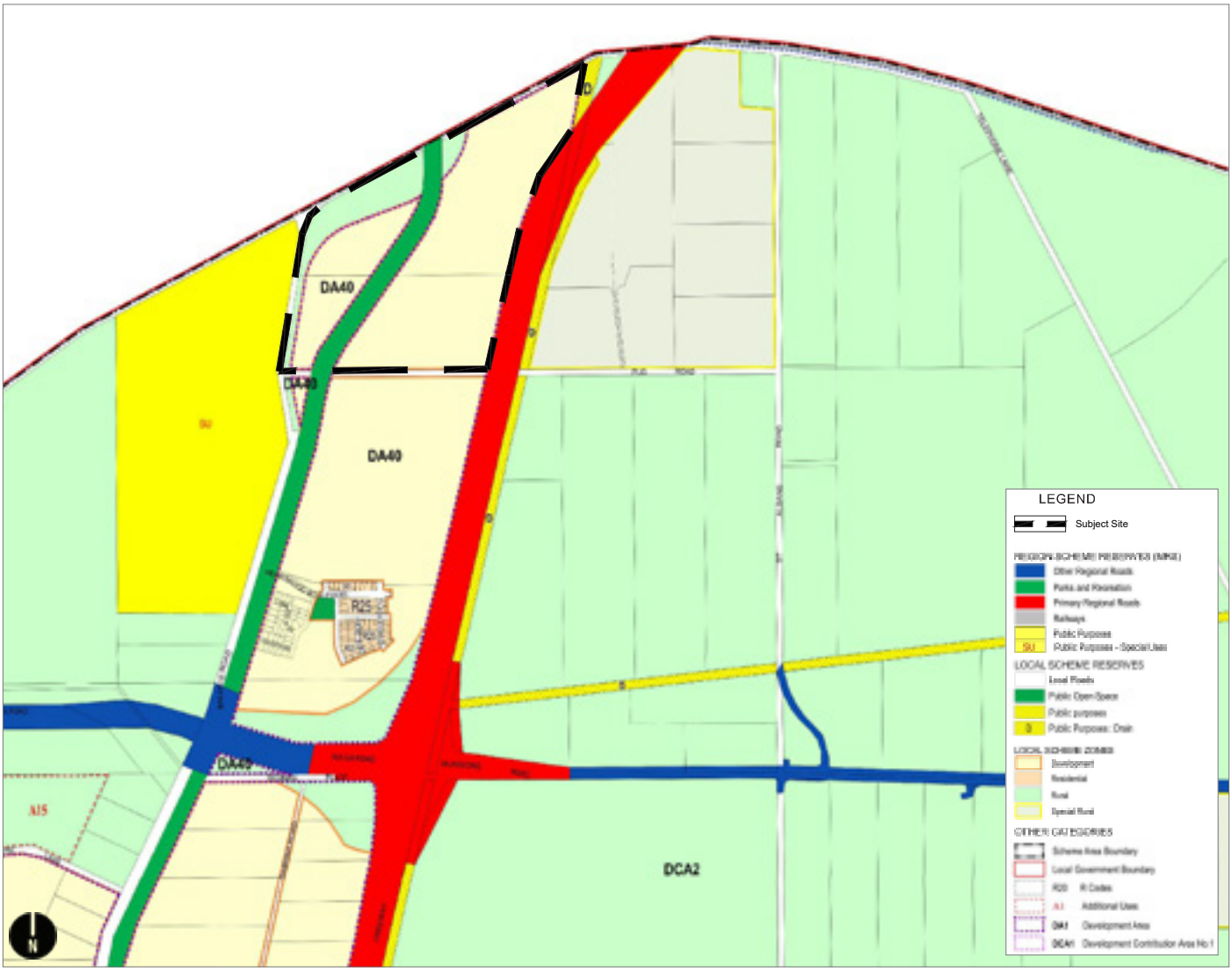

Figure 7 - TSP 2 Plan
Source: City of Rockingham

1.3.2 City of Rockingham Town Planning Scheme No. 2

The majority of the structure plan area (coinciding with the MRS 'Urban' zone) is zoned 'Development' under City of Rockingham Town Planning Scheme No.2 ('TPS 2') and is entirely within Development Area 40 ('DA 40'), as defined in Schedule 9 of TPS 2 (refer Figure 7). The purpose of the 'Development' zone is to facilitate the co-ordinated planning of sites for subdivision and development through structure plans.

Schedule 9 of TPS 2 sets out the requirements and special conditions for each Development Area. The provisions for DA40 include a requirement to prepare a *"Fire Management Plan where a Bushfire Hazard Assessment determines the land as having a moderate to extreme risk of bushfire"*. This and other necessary specialist technical studies have been provided as appendices to this structure plan, and are summarised in Section 3 of this report.

The portion of the site still zoned 'Urban Deferred' under the MRS is zoned 'Rural' under TPS 2. This zone will be extinguished at such time that the land is reserved for the purposes of a regional road under the MRS (refer Section 1.3.1 above).

1.3.3 Strategic Planning Context

1.3.3.1 Perth and Peel @ 3.5 million

The *Perth and Peel @ 3.5 million* suite of policies forms the spatial framework and strategic plan for Perth and Peel. Its purpose is to establish a blueprint for supporting a population of 3.5 million by 2050 through adoption of four sub-regional planning frameworks. The structure plan area is within the South Metropolitan – Peel area (refer Section 1.3.3.2 below).

1.3.3.2 South Metropolitan-Peel Sub-regional Planning Framework

The *South Metropolitan-Peel Sub-regional Planning Framework* ('the Framework) is part of the *Perth and Peel @ 3.5 million* suite of documents and provides guidance at a sub-regional level for land use and infrastructure. The structure plan area is within an area identified for 'Urban' purposes, reflecting its zoning in the MRS.

Also shown on the Framework plan is the Baldivis Tramway reservation (an 'Open Space' area), the Kwinana Freeway and Kewdale-Kwinana railway as existing infrastructure and a future Regional Road (likely to be an 'Other Regional Road' in the MRS on the alignment of Baldivis Road, facilitated in part by the proposed flyover connecting to Wellard Road (refer Section 1.3.1 above).

1.3.3.3 East Baldivis District Structure Plan

The structure plan area is within the East Baldivis District Structure Plan ('the DSP'). The DSP is a strategic structure plan prepared for the East Baldivis corridor as a whole to identify district-level infrastructure and servicing requirements and guide more detailed, precinct-level planning through local structure plans. The DSP was advertised for public comment by the City of Rockingham ('City') in late 2013 and adopted by the City in February 2014. The adopted DSP is reproduced at Figure 8.

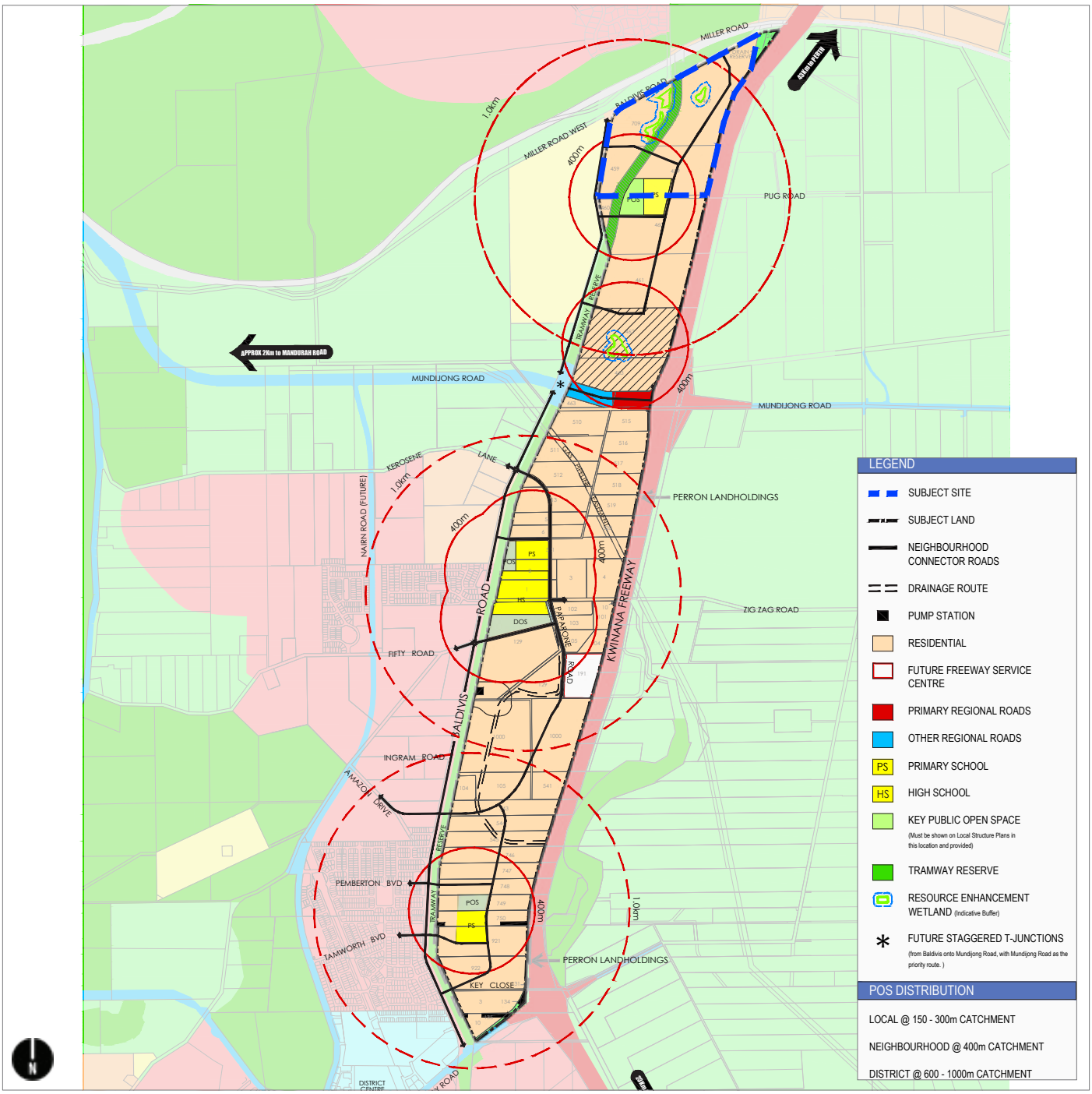

Figure 8 - East Baldivis District Structure Plan
Source: City of Rockingham

The DSP proposes residential development for most of the structure plan area, with some land near the southern boundary identified for a primary school and co-located public open space. The DSP also identifies two Resource Enhancement Wetlands in the northern part of the structure plan area and states that further investigation will be required at structure plan stage, which has now been undertaken.

The DSP is supported by the following technical reports, which assist to define the key land use principles and inform subsequent stages of planning:

- Environmental Assessment and Management Strategy;
- Servicing Report;
- Traffic and Transport Report;
- Hydrological Report;
- Acoustic Report;
- Commercial and Community Facilities Report;
- Bushfire Hazard Assessment Report; and
- Description of Alternative School Precinct & District Open Space Site Options.

The structure plan is consistent with the principles of the DSP. The structure plan refines and expands upon these principles to create a more specific plan for this particular area.

1.3.3.4 City of Rockingham Urban Growth Programme (2009)

The City of Rockingham Urban Growth Programme ('the Programme') was prepared to assist Council in understanding the likely patterns of urban growth within the City of Rockingham. It considered existing population and dwelling statistics, existing structure plans and forecast urban growth patterns. The Programme provides the City with a summary of expected urban development areas to help guide Council in its decision-making processes.

The structure plan area falls within Precinct 3 of Baldivis North under the Programme. It identifies this area as being 'Future Development' but with no structure plan in place. The Programme suggests that development of the entire Precinct 3 area is expected to accommodate approximately 5,000 dwellings over the next fifteen years. Progression of this structure plan will facilitate continued progress toward this objective, as did the DSP.

1.3.4 State-level Planning Policies

The following section summarises the State-level policies and strategies relevant to the structure plan area as urbanisation proceeds.

1.3.4.1 Liveable Neighbourhoods

Liveable Neighbourhoods ('LN') is the WAPC's operational policy guiding urban design for greenfield development. LN sets out the key considerations for master planning new communities including subdivision layout and movement networks, as well as the location of open space, community facilities, schools and activity centres.

This structure plan has been prepared in accordance with the principles and objectives of Liveable Neighbourhoods. Discussion about this structure plan in the context of the relevant Elements in LN appears in Section 3 of this report.

1.3.4.2 SPP 2.1: Peel-Harvey Coastal Plain Catchment

The structure plan area falls within the Peel Harvey Coastal Plain, and as such, the provisions of SPP 2.1 apply. The objectives of SPP 2.1 are (relevantly) to:

- Improve the social, economic, ecological, aesthetic, and recreational potential of the Peel-Harvey Coastal Plain Catchment;
- Ensure that changes to land use within the catchment to the Peel-Harvey estuarine system are controlled so as to avoid and minimise environmental damage;
- Increase high water-using vegetation cover within the Peel-Harvey coastal plain catchment; and
- Prevent land uses likely to result in excessive nutrient export into the drainage system.

These objectives have all been addressed previously as part of the rezoning of the East Baldivis cell and the subsequent preparation of the DSP. This structure plan is in accordance with the DSP and therefore SPP 2.1.

There are no direct development implications for the site from this policy. The structure plan incorporates Water Sensitive Urban Design principles and Best Management Practice to prevent excessive nutrient export into the drainage system, thereby minimising the risk of environmental damage.

1.3.4.3 SPP 3.7: Planning in Bushfire-Prone Areas

The structure plan area is identified in the mapping maintained by the Department of Fire and Emergency Services as being bushfire-prone. As such, SPP 3.7 is applicable. The purpose of this policy is to:

- Avoid any increase in the threat of bushfire to people, property and infrastructure;
- Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process;
- Ensure that strategic planning documents (which include structure plans) include specified bushfire protection measures; and
- Achieve an appropriate balance between bushfire risk management measures and biodiversity conservation values, environmental protection and biodiversity management, and landscape amenity, with consideration of the potential impacts of climate change.

To ensure that residential development in the structure plan area achieves the objectives of SPP 3.7, a Bushfire Management Plan (Strategen-JBS&G, August 2020) has been prepared in accordance with the SPP 3.7 Guidelines.

1.3.4.4 SPP 5.4: Road and Rail Transport Noise

The structure plan area abuts the Kwinana Freeway (an existing major road reserved as a 'Primary Regional Road' under the MRS) and is in close proximity to the Kewdale to Kwinana freight railway. As such, SPP 5.4 is applicable. The purpose of this policy is to *"minimise the adverse impact of transport noise, without placing unreasonable restrictions on noise-sensitive residential development, or adding unduly to the cost of transport infrastructure."*

To ensure that residential development in the structure plan area achieves the objectives of SPP 5.4, a Transportation Noise Assessment (Lloyd George Acoustics, September 2020) has been prepared. The recommendations of this report are summarised in Section 3.11, and the report itself constitutes Appendix 6.

1.3.4.5 SPP 7.3: Residential Design Codes

The Residential Design Codes (R-Codes) form the basis for assessment of all single, grouped and multiple-dwelling developments in Western Australia. They are applicable to the structure plan area by virtue of the proposed Residential and Commercial zones, within both of which dwellings are permissible.

The R-Codes can be varied through use of (relevantly) Local Planning Policies and Local Development Plans. Standard variations to the R-Codes will be available to the structure plan area through the reference to the City's Local Planning Policy 3.3.22 in Part 1 of the structure plan (see also Section 1.3.5.2 of this report), and other variations may become active in future through Local Development Plans.

1.3.5 Local Planning Policies

The following section summarises the local-level policies and strategies relevant to the structure plan area as urbanisation proceeds.

1.3.5.1 Local Planning Policy 3.1.2: Local Commercial Strategy

The primary purpose of LPP 3.1.2 is to establish the objectives, principles and key strategies for retailing and commercial development in the City of Rockingham. As a growth area with an emerging hierarchy of commercial centres, Baldivis receives particular attention. LPP 3.1.2 indicates that the City will apply the following objectives and principles, taken from State Planning Policy No. 4.2: Activity Centres for Perth and Peel, for this area (relevantly):

- *"Provide sufficient development opportunities to enable a diverse supply of commercial and residential floorspace to meet projected community needs;*
- *Cater for a full range of needs from shopping, commercial and community services from local convenience to higher-order comparison retail/goods and services;*
- *Mitigate the potential for an over-concentration of shopping floorspace in large activity centres at the expense of a more equitable level of service to communities; and*
- *Promote the walkable neighbourhoods principle of access to employment, retail and community facilities by distributing activity centres to improve access by foot or bicycle, rather than having to depend on access by car in urban areas."*

The provision of a Local Centre anchored by a small supermarket within the Millars Landing estate, and partly within this structure plan area, is critical to the achievement of these objectives. The location of the Local Centre is consistent with the 'Baldivis East' Local Centre shown on the Activity Centre Hierarchy plan contained in LPP 3.1.2.

In light of the above, a Retail Needs Assessment has been prepared not to justify the location of the Local Centre but to justify the inclusion of a small supermarket, which is not entertained in LPP 3.1.2 and thus triggers the following requirement of Section 4.2.2 therein:

> *A Retail Sustainability Assessment (RSA), prepared in accordance with SPP4.2, will be required under any of the following circumstances…Any proposal that would result in an alteration to the role and function of that centre in the hierarchy of centres* ***(e.g. by the development of a supermarket in a Local Centre…)*** *[emphasis added].*

The Retail Needs Assessment is discussed further at Section 3.8 of this report and appears in full at Appendix 7.

1.3.5.2 Local Planning Policy 3.3.22: Medium-density Single House Development Standards-Development Zones

In April 2016, the WAPC released Planning Bulletin 112, which contains a set of standard variations (known as the R-MD Codes) to the deemed-to-comply provisions of the R-Codes for single houses in 'Development' zones where a coding of R25 to R60 applies.

To enable these to be implemented on an estate-wide basis through reference in a structure plan, the City of Rockingham has adopted a Local Planning Policy, LPP 3.3.22. This is referenced in Part 1 of this structure plan, making the R-MD Codes applicable within the structure plan area. These apply unless a Local Development Plan containing additional variations has been approved in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015*.

1.3.5.3 Local Planning Policy 3.4.1: Public Open Space

The purpose of LPP 3.4.1 is to guide the City's assessment of structure plans and subdivision applications in respect of public open space. It elaborates on the key principles of Element 4: Public Open Space in Liveable Neighbourhoods and provides specific requirements with respect to the location, layout and function of areas of open space. The following two objectives are specified:

a. *"To ensure that all residential development is complemented by well-located areas of POS that provide for the recreational and social needs of the community.*

b. *To ensure that POS is designed, developed and maintained to an acceptable standard to enhance local amenity."*

LPP 3.4.1 states that it *"does not cover regional open space…"*, which includes the Baldivis Tramway reserve. However, in the interest of orderly and proper planning, this structure plan does address the Tramway reserve. The relevant principles espoused in LPP 3.4.1 have been incorporated into the Landscape Master Plan accordingly.

The structure plan recognises and is consistent with the key elements of LPP 3.4.1. In particular, the following documents are required under LPP 3.4.1 (Section 4.1.1) and have been included:

a. A Landscape Master Plan – refer to Section 3.4 and Appendix 3.

b. A POS Schedule – refer to Section 3.4 and Table 4; and

c. A Local Water Management Strategy – refer to Section 3.6 and Appendix 4.

Comment on the compliance of this structure plan with the relevant specific aspects of LPP 3.4.1 (including under Sections 4.3, 4.4 and 4.7) is provided in Section 3.4.3.

1.3.5.4 Local Planning Policy 3.4.3: Urban Water Management

The Local Water Management Strategy ('LWMS') forming part of this structure plan has been prepared in accordance with the WAPC's *Better Urban Water Management* guideline and LPP 3.4.3, which has the following objectives:

a. *"Ensure the application of Better Urban Water Management (WAPC, 2008), and any future versions of BUWM, as part of the planning approvals process;*

b. *Provide guidance on the City's urban water management requirements to ensure that planning and development proposals are dealt with in a consistent manner;*

c. *Ensure that appropriate measures are taken to manage catchments in order to maintain or improve surface and groundwater resources;*

d. *Promote alternative water conservation and sustainability practices that reduce reliance on traditional supplies."*

Of specific relevance to this structure plan are the Assessment Criteria listed at Section 4.5 of LPP 3.4.3, which include targets for:

- Stormwater quantity;
- Stormwater quality;
- Groundwater levels;
- Groundwater quality;
- Wastewater management; and
- Water conservation and sustainability.

The structure plan's response in this regard is detailed in full in the LWMS appearing at Appendix 4.

1.3.5.5 City of Rockingham Baldivis Tramway Master Plan

The City has a Master Plan for the full extent of the Baldivis Tramway reserve, including the portion that passes through the structure plan area. The Landscape Master Plan that forms part of this structure plan (refer Appendix 3) has been prepared in accordance with the Master Plan and more recent feedback provided by the City.

The Master Plan contains the following Vision and expression of Purpose:

Vision

"To protect and improve the natural environment and habitat corridor of the Baldivis Tramway Reserve whilst providing sustainable nature based recreation opportunities which encourage greater community participation in the use and management of the reserve."

Purpose of the Master Plan

"The purpose of the Baldivis Tramway Reserve Master Plan is to establish key directions; including use, development and management of the reserve over the next ten years" [to 2024].

The Vision and Purpose of the Master Plan are supported by the following overarching objectives, which the project team has used as the basis for the Landscape Master Plan provided with this structure plan:

1. *"Conserve and enhance the natural and cultural environment;*
2. *Encourage community use of and engagement in the reserve;*
3. *Coordinate management practices and responsibilities within the reserve;*
4. *Improve sense of place through landscaping, infrastructure and interpretive opportunities; and*
5. *Ensure equity and safety of reserve users."*

The Master Plan breaks the Tramway up into precincts, with the structure plan area being in Precinct 1. This precinct extends well south of Kulija Road, but its description is neatly applicable to the section of the Tramway within the structure plan area:

"The vegetation in Precinct One is highly degraded, with only small patches of remnant vegetation. The area is prone to seasonal inundation and contains a multiple use category wetland, with few ecological attributes and functions remaining. A number of planned resource enhancement wetlands are located adjacent to the Tramway that, despite being modified, still support substantial ecological attributes and functions. Small localised water bodies are also present within the reserve."

Ten Management Actions are specified for Precinct 1. Comment on the performance of this structure plan, including the Landscape Master Plan, against these is provided in Section 3.4.3 of this report.

2.0 SITE CONDITIONS AND CONSTRAINTS

The following sections provide detail on the environmental aspects of this structure plan, which have been comprehensively investigated through the Environmental Assessment and Management Strategy ('EAMS') prepared by RPS and appearing at Appendix 1. The EAMS is the most recent in a series of environmental reports prepared for the structure plan area during the 2010s, and it concludes that much of the site is environmentally degraded. This presents an opportunity for rehabilitation.

Discussions held between the project team and the City of Rockingham between 2015 and 2020 established the following key principles for the design of the structure plan:

- Integration of the Baldivis Tramway reserve and minimisation of road crossings;
- Retention and rehabilitation of three priority Resource Enhancement Wetlands;
- Integration of stormwater drainage with retained wetlands and the Tramway;
- Use of sub-soil drainage infrastructure to control groundwater;
- Compliance with the maximum allowable water flow rate into the Peel Main Drain; and
- Provision of a consolidated POS area supporting organised active recreation.

The structure plan design and the supporting technical reports have been guided by, and demonstrate compliance with, these principles.

2.1 Biodiversity

The structure plan covers former agricultural land that has been grazed since at least 1950 and was heavily affected by a bushfire in 2015. As such, the majority of the structure plan area is devoid of remnant vegetation and in 'Completely Degraded' or 'Degraded' condition.

2.1.1 Flora and vegetation

The structure plan area does not contain any Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), Declared Rare or Priority flora or Bush Forever sites. Flora surveys confirming this were undertaken before and after the above-mentioned bushfire (by Emerge Associates in 2011, RPS in 2016 and Tranen in 2019). All three surveys recorded the following:

- High weed load (with 48 weed species recorded, compared to 49 native species);
- Loss of understorey species;
- Severe historical grazing; and
- Death of numerous trees.

A tree survey (ArborLogic, 2019) prepared in accordance with the City's *Preparation of Environmental Assessment Reports to Inform Structure Plan Applications* guidelines identified 93 trees with potential retention value. Most of these are within the Tramway reserve or within proposed public open space and can therefore be considered for retention. None of the trees were recorded as having hollows suitable to support black cockatoo breeding.

Several 'declared pest' flora species (arum lily, bridal creeper and narrow-leaf cotton bush) have been recorded and will be removed as part of the future development process.

2.1.2 Fauna

The degraded condition of the native vegetation within the structure plan area and the lack of understorey make it largely unsuitable as habitat for native fauna, especially non-avian species.

Approximately 0.09ha of marri woodland in 'Degraded' or 'Completely Degraded' condition adjacent to the north-western boundary of the structure plan area was noted in 2011 as exhibiting signs (chewed banksia and pine cones) of foraging by black cockatoos. The EAMS concludes that the proposed removal of this small and degraded patch of vegetation is unlikely to significantly affect any of the three local black cockatoo species.

2.2 Landform and Soils

2.2.1 Topography

The structure plan area is relatively flat, rising from 4.5 metres AHD near the eastern boundary to a high point of 7.5 metres AHD at the north-western corner. This topography and the soil profile (refer below) are not constraints to development. In particular, substantial earthworks are unlikely to be necessary in order to drain and service the structure plan area.

2.2.2 Soils

2.2.2.1 Soil types

Soil types within the structure plan area include Bassendean Sand in northern and western parts and Guildford Silt over Guildford Clay in eastern parts. These soil types are typical of the East Baldivis area and although Guildford soils in their unmodified state impede infiltration to groundwater, there are no insurmountable issues arising from the soil types. Further information on soil types and drainage is provided in Section 3.6 and the Local Water Management Strategy at Appendix 4.

2.2.2.2 Soil contamination

The structure plan area is not identified on the register of contaminated sites maintained by the Department of Water and Environmental Regulation, although illegal dumping of waste may have contributed to localised contamination. This can be investigated at the subdivision stage as relevant.

2.2.2.3 Acid sulphate soils (ASS)

Regional ASS mapping indicates that the structure plan area has 'moderate to low risk' of acid sulphate soil (ASS) disturbance within 3 metres of the soil surface. However, a site-specific geotechnical and preliminary ASS investigation completed in 2008 by Douglas Partners found that there is some risk of ASS disturbance through excavation and dewatering and that further, detailed investigations culminating in an Acid Sulphate Soil and Dewatering Management Plan at the subdivision stage should be undertaken. The LWMS forming part of this structure plan endorses this recommendation.

2.3 Groundwater and Surface Water

2.3.1 Groundwater

The LWMS notes that the Department of Water and Environmental Regulation's Perth Groundwater Atlas does not have historical maximum contours for the structure plan area, however, groundwater conditions are well understood. Monitoring undertaken during the 2000s (including for the District Water Management Strategy ('DWMS') forming part of the DSP) and over two winter peaks between 2012 and 2014 has established that the Average Annual Maximum Groundwater Level ('AAMGL') is approximately 3.9m AHD at the eastern boundary of the structure plan area to 4.8m AHD along the western boundary, with groundwater migrating in an easterly direction.

The primary implication of the calculated AAMGL and Maximum Groundwater Level ('MGL') is that parts of the site are subject to inundation, which occurs when AAMGL and/or MGL exceed the natural ground level. The LWMS notes that the calculated MGL is higher than that calculated in the DWMS prepared to accompany the DSP.

The groundwater conditions described above are impediments to development and will be managed through the addition of fill and the installation of sub-surface drainage infrastructure. This will feed into the Peel Main Drain to the east through existing culverts under the Kwinana Freeway. Full detail in this regard is provided in Section 3.6 and the Local Water Management Strategy at Appendix 4.

2.3.2 Surface water

The LWMS notes that the structure plan area is within the Peel-Harvey Estuary Catchment and the Serpentine Sub-catchment. The Peel Main Drain ('PMD') is located immediately east of the structure plan area, east of the Kwinana Freeway except in the north-eastern corner. This was originally built to support agriculture in the district, and within the structure plan area, there are three agricultural channels leading to the PMD via culverts under the Freeway. The channels will be removed as part of the development process, whilst the culverts will be retained and are an integral part of the proposed stormwater management system.

The *North-East Baldivis Flood Modelling and Drainage Studies* (Department of Water, 2015) conclude that the eastern half of the site is part of the Serpentine River / PMD floodway and subject to 1:100 year flood levels of up to 5.0m AHD. Depth of inundation ranges from 0.06m to 0.25m, with localised depths of up to 0.5m near Pug Road. The Department of Water and Environmental Regulation ('DWER', the successor agency to the Department of Water) has recommended that any urban development in the structure plan area should be designed with the objective of delivering a minimum habitable floor level of at least 5.5m AHD. This provides 0.5m of freeboard in a 1:100 ARI flood event, consistent with standard DWER advice. This can be achieved through the importation of fill to the eastern half of the structure plan area. The western half is outside the floodway.

Aside from mapped wetlands (refer to the following section), the only other surface water features are the PMD and four artificial soaks that will be filled.

2.3.3 Wetlands

The eastern part of the site (within the above-mentioned floodway) is classified as a Multiple Use wetland. Within this are five Resource Enhancement Wetlands ('REWs'), all of which are in Degraded or Completely Degraded condition. This observation was originally made by Emerge Associates through a Flora and Fauna Assessment conducted in 2011 and was confirmed by further studies by RPS in 2016 and Tranen in 2019. The poor condition of the REWs is the consequence of decades of livestock grazing.

Extensive discussions have been held with the City over recent years in respect of the REWs. These have established the following parameters for the structure plan:

- Retention and rehabilitation of REWs within the Baldivis Tramway reserve (namely, UFI 15873 and portions of UFIs 15874 and 14648);
- Retention and rehabilitation of a portion of UFI 15874 adjacent to the Baldivis Tramway reserve; and
- Removal of portions of UFI 15872 and UFI 15874, and all of UFI 14406.

Retention and rehabilitation of a portion of UFI 15874 outside the Tramway will be facilitated through its inclusion in public open space. All three REWs proposed for retention have been incorporated into the LWMS and the Landscape Master Plan. Implementation of this structure plan provides the opportunity for the priority REWs to be rehabilitated into a near-natural state.

2.4 Bushfire Hazard

As noted in Section 1.3.4.4 of this report, the structure plan area is identified as being bushfire-prone in the map database administered by the Department of Fire and Emergency Services. In accordance with the requirements of SPP 3.7, a Bushfire Management Plan (Strategen-JBS&G, August 2020, 'the BMP') incorporating a Bushfire Attack Level (BAL) contour map forms part of this structure plan. This is described at Section 3.10 of this report and confirms that all bushfire hazards affecting the structure plan area can be managed through subdivision design and built form controls, and is therefore not a constraint to subdivision and development.

2.5 Heritage

2.5.1 Aboriginal Heritage

The structure plan area contains no sites listed on the Aboriginal heritage register maintained by the Department of Aboriginal Affairs under the *Aboriginal Heritage Act 1972*.

2.5.2 European Heritage

The structure plan area contains no sites listed on the State Heritage Register maintained by the Western Australian Heritage Council under the *Heritage of Western Australia Act 1990*.

Figure 9 - Concept Master Plan

3.0 STRUCTURE PLAN

3.1 Plan Overview

The structure plan proposes a robust and site-responsive urban form that optimises the irregular shape of the structure plan area and capitalises on the significant amenity value of the Baldivis Tramway. The basic urban structure espoused in the DSP has been respected and integration with the structure-planned area to the south of Pug Road has been achieved.

Consistent with the Structure Plan Framework, the structure plan map contained in Part 1 provides the spatial, statutory framework for the implementation of a more detailed development concept. The current development concept, which will be refined at the subdivision stage, appears as Figure 9.

The key principles of the structure plan are to:

- Enable the creation of a diverse range of high-quality housing that is consistent with planning policies and responsive to market conditions;
- Provide a robust urban form that responds to the site's location within the wider Baldivis locality and integrates with development planned to the south;
- Celebrate the natural amenity of the site, particularly in respect of the Baldivis Tramway, through rehabilitation of natural areas and urban design that facilitates access and management;
- Provide accessible, attractive and multi-functional open space that provides a range of opportunities for active and passive recreation, accommodates drainage and ensures management of bushfire hazards;
- Extend necessary service infrastructure in a timely and co-ordinated manner to support the future development; and
- Facilitate the development of a local activity centre providing convenience retail floorspace for the future community.

Based on these key principles, the structure plan provides the framework for:

- Approximately 650 lots, with residential densities of R25, R30 and R40. The R30 and R40 densities will be focused around areas of high local amenity, including areas of public open space, the primary school south of Pug Road and the Local Centre;
- A higher-density 'Urban Village', comprising development at densities of R60 or R80. This is proposed in the vicinity of the commercial centre and Baldivis Tramway, providing a distinctive focal point for the community and opportunities for ageing-in-place;
- Well-distributed public open spaces that facilitate the retention and rehabilitation of the priority 'Resource Enhancement' wetlands and integrate seamlessly with the Baldivis Tramway;

- A legible network of local access roads that are responsive to the existing road networks surrounding the structure plan area and encourage accessibility by cyclists, pedestrians and future public transport services;
- A landscaping strategy that guides the development of the public open space and provides detail on how integrated drainage will be developed; and
- An appropriate interface to noise and bushfire hazards to the north and east, ensuring that the health, safety and amenity of future residents is protected in accordance with relevant policies.

These features underpin the development concept at Figure 9. This is not intended to be a rigid concept; it outlines one development scenario and will be refined at the subdivision stage in response to contemporary planning requirements and market preferences. The intent of the development concept is to guide the structure plan's response to the opportunities and constraints of the site and underpin the structure plan map in Part 1.

3.2 Residential

The structure plan provides a framework to support delivery of a very diverse range of housing. The density and style of housing across the structure plan area is responsive to the characteristics of different parts of the site and will be delivered with the objective of creating high quality built form and streetscapes. On completion, the structure plan will facilitate an estate with a unique mix of housing for Baldivis.

3.2.1 Dwelling yields and density targets

The WAPC's draft *Perth and Peel @3.5 million* planning framework sets an overall residential density target of 15 dwellings per gross hectare of urban-zoned land. This target was carried over from the previous planning framework, *Directions 2031 and Beyond* and its purpose is to ensure efficient use of urban-zoned land in the metropolitan region. Site-specific constraints and geographic characteristics influence the distribution of density; some areas are suitable for higher densities, whilst in other areas it will only be feasible to provide lower densities.

The structure plan delivers potential for a dwelling yield of approximately 14.5 dwellings per gross urban hectare through a combination of residential densities from R25 to R80. This is generally consistent with the above-mentioned target. The minor shortfall is attributable to the over-provision of POS, which is necessary in order to provide suitable-sized areas for drainage and recreation outside the conservation-focused Tramway.

As noted above, densities of R25 to R40 are proposed for the eastern and northern parts of the structure plan area, whilst an 'Urban Village' comprising land coded R60-R80 is proposed for land within the walkable catchment of the planned Local Centre.

3.2.2 Lots in the medium-density precinct

The structure plan proposes a base residential density of R25, which permits lot sizes at an average of 350 square metres. At strategic locations guided by locational criteria, pockets of housing at the R30 and R40 density are proposed (average of 300 and 220 square metres respectively). In the vicinity of the Local Centre, an Urban Village comprising housing at densities of R60 or R80 is envisaged, including, potentially, aged and dependent persons' dwellings (see next section).

The range of residential densities permissible under this structure plan enables the development of a diverse mix of lot and housing product, including traditional home sites, smaller contemporary front-loaded lots, and rear-loaded cottage lots. The characteristics of each are summarised in Table 2 below.

Table 2: Typical lot products for the structure plan area, outside the Urban Village

	Traditional home sites	Contemporary front-loaded	Rear-loaded cottage
R-Code	R25	R30	R40
Typical location	Base code for the structure plan area	In close proximity to POS or a Neighbourhood Connector road	As per R30, where access is obtained from a rear laneway
Typical width (m)	12.5+	10 to 15	6 to 10.5
Typical depth (m)	25+	25 to 30	25 to 30
Approx. area (sqm)	300+	260+	180+
Built form control	R-Codes; LDPs	R-Codes; LDPs	R-Codes; LDPs
Built form	Single dwellings, usually single-storey only; sold as either land-only or house-and-land packages	Single dwellings; single or double-storey; sold as either land-only or house-and-land packages	Single and grouped dwellings Lots less than 10m wide typically built out and sold as a house-and-land package Opportunities for terrace housing

Further detail on the type of lot product envisaged for the Urban Village is provided in Section 3.2.3 below.

3.2.3 Urban Village

The focal point of the structure plan area is the Local Centre at the intersection of Pug Road and Baldivis Road. This centre is in a high-amenity location adjacent to the Baldivis Tramway reserve, and has the potential to be a vibrant and attractive community hub.

Within the 400 metre walkable catchment (approximately a 5 minute walk) of the Local Centre, a medium to high-density precinct referred to as the Urban Village is proposed. This will comprise residential densities of R60 to R80. This area benefits from its proximity to the Local Centre, the Tramway and the primary school on Pug Road. In particular, the Tramway and the local reserves attached to it will, once rehabilitated, be an attractive centrepiece for the structure plan area. The Tramway will be developed in accordance with the City of Rockingham's Baldivis Tramway Master Plan and subsequent landscaping plans, and serve a recreation and conservation function. It will also contain a dual-use path along its entire length, providing pedestrian and cycle access to the north and south.

The Urban Village will be unique for this part of the metropolitan region, providing a choice of housing not widely available in Baldivis. The type of lot product envisaged for this area is as per Table 3 below, as well as, potentially, aged and dependent persons' accommodation. A concept for the Urban Village is provided at Figure 10.

Table 3: Typical lot products for the Urban Village

	Terrace	Small front-load	Apartments and maisonettes
R-Code	R60 to R80	R80	R80
Typical width (m)	4.5 to 6 7.5	7.5	7.5
Typical depth (m)	25 to 30	15	30
Approx. area (sqm)	112.5 to 180	112.5	225
Built form control	R-Codes; LDPs	R-Codes; LDPs	R-Codes; LDPs
Built form	Two-storey attached dwellings built out by developer's partner builders and sold complete	Two-storey attached dwellings either built out by developer's partner builders and sold complete or sold as house-and-land packages	Multiple dwellings in terrace form by the developer's partner builders and sold complete

Figure 10 - Concept Master Plan for the Urban Village

3.2.4 Local Development Plans

Local Development Plans (LDPs) will be prepared for select lots at the subdivision stage to mandate appropriate noise and bushfire mitigation measures, ensure quality built form and facilitate variations to the deemed-to-comply criteria of the Residential Design Codes, as applicable. LDPs may be prepared for the following types of residential lots requiring more detailed planning:

- Are rear-loaded (are accessed from a laneway);
- Abut public open space;
- Are within the 'Urban Village' shown on Plan A;
- Are within the 'Commercial' zone; and
- Are affected by road or rail transport noise and require implementation of noise mitigation measures at the development stage.

3.2.5 R-Codes Variations

The Regulations do not include provision for structure plans to vary the deemed-to-comply provisions of the R-Codes. Local Development Plans and Local Planning Policies are the relevant means by which such variations can be made.

The City of Rockingham has a Local Planning Policy, namely, LPP 3.3.22: *Medium-Density Single House Development Standards – Development Zones* that introduces the R-Codes variations specified in the WAPC's Planning Bulletin 112: *Medium-Density Single House Development Standards – Development Zones* (usually referred to as 'the R-MD Codes') for some of the 'Development' zones within the City. This structure plan area is not currently included, but an amendment to LPP 3.3.22 can be progressed separately to include it.

3.3 Movement Network

A Traffic Impact Assessment (Cardno, November 2021, refer Appendix 5; 'the TIA') has been prepared in accordance with the WAPC's *Transport Impact Assessment Guidelines* to assess the existing and proposed movement network around and within the structure plan area. It uses as its basis the various studies that precede this structure plan, including the Transport Impact Assessment forming part of the DSP.

3.3.1 Regional road network

The structure plan area is highly accessible from existing and planned regional roads, which include:

- **Kwinana Freeway**, which is classified as a Primary Distributor in Main Roads WA's Metropolitan Functional Road Hierarchy ('the Hierarchy') and reserved as a Primary Regional Road in the MRS. It is currently constructed as a dual carriageway (two southbound lanes; two northbound lanes) where it passes the structure plan area and has a posted speed limit of 100km/h. It is accessible from the structure plan area via the Mortimer Road and Mundijong Road / Kulija Road interchanges, which are approximately 2km north and 1.3km south respectively.
- **Baldivis Road** and **Millar Road**, which are classified as Regional Distributors in the Hierarchy and connect the structure plan area to the Baldivis town centre to the south and Kulija Road at two points south and west of the structure plan area, respectively. To the east, Kulija Road connects with Mundijong Road at an interchange on the Kwinana Freeway and provides direct access to the Rockingham city centre to the west.
- **Wellard Road**, which is classified as a Local Distributor in the Hierarchy. It connects to Baldivis Road at the northern end of the structure plan area and provides a link northward to the Wellard railway station (on the Perth-Mandurah passenger railway) and (via Johnson Road) the Mortimer Road interchange on the Kwinana Freeway.
- **Telephone Lane**, which is classified as an Access Road in the Hierarchy. It commences near the Baldivis Road / Wellard Road intersection and proceeds eastward, providing access to the South Western Highway via Mundijong Road.

As mentioned in Section 1.3.1 above, the existing intersection of Baldivis Road, Millar Road, Wellard Road and Telephone Lane will be modified in future through the construction of a flyover over the Kewdale-Kwinana freight railway and the associated closure of access to the western end of Telephone Lane.

The structure plan responds to the planned regional road network and ensures that its operation will not be compromised through the introduction of excessive traffic volumes or vehicle access points.

3.3.2 Proposed structure plan roads

The structure plan proposes a legible and site-responsive network of local roads built around the two main thoroughfares shown in the East Baldivis DSP. The East Baldivis DSP proposes:

- A north-south Neighbourhood Connector running parallel to Kwinana Freeway toward the eastern boundary of the structure plan area; and
- An east-west Neighbourhood Connector crossing the Baldivis Tramway and intersecting with Baldivis Road south of Millar Road.

The structure plan adopts these two Neighbourhood Connector roads and uses them as a framework for the local road network. It should be noted that the road network in the East Baldivis DSP was modified in the approved North-East Baldivis Structure Plan, with the primary school site moved southward and abutting Neighbourhood Connector roads realigned accordingly.

The local road network proposed in the structure plan has been designed on the basis of the following principles:

- Provision of access points onto Baldivis Road in accordance with the DSP, ensuring no change to the anticipated impact of the structure plan area on the external network;
- A permeable and legible modified grid of access streets with reserve widths of 15-18 metres, generally consistent with *Liveable Neighbourhoods*. This includes lower-order access streets servicing the smaller groupings of residential lots. The precise location and alignment of local access streets will be determined at subdivision stage; and
- Provision of lower-order, pedestrian-friendly streets near the Baldivis Tramway reserve, facilitating an accessible and intimate interface and minimising crossings. This enhances the Tramway as a high-amenity recreational and conservation corridor.

All streets are proposed to be at Access Street D standard (with a minimum width of 15m, consistent with established practice for greenfield sites) except:

- The two Neighbourhood Connector roads shown in the DSP (and Pug Road, which is already approved as a Neighbourhood Connector via the North-East Baldivis Structure Plan); and
- The north-south street connecting the Activity Park with the primary school shown in the North-East Baldivis Structure Plan, which is anticipated to be a focal point for pedestrian movement in particular and will be constructed to Access Street C standard.

Laneways are proposed in a small number of locations to support rear-loaded lot product adjacent to POS. Figure 11 contains an extract from the TIA showing the proposed internal road hierarchy.

3.3.3 Intersection analysis

Baldivis Road intersections

The primary points of access to the structure plan area are proposed to be from Baldivis Road. One will be a full-movement intersection at Pug Road controlled using a roundabout, whist the other, described as the ‘Northern Access’ in the TIA, will be left-in, left-out only.

Capacity analysis of each intersection has been undertaken by Cardno using the SIDRA software package. This confirms that both will perform satisfactorily at ultimate development. Pug Road will be the busier of the two, reflecting its function servicing two structure plan areas.

Figure 11 - Internal Road Hierarchy
Source: Cardno

In addition to the above-mentioned intersections, the part of the proposed Local Centre that is within the structure plan area will be serviced by a left-in, left-out access point. This will reduce traffic demand on the Pug Road intersection and act as a traffic-calming measure for Baldivis Road. A left-out access point to Baldivis Road will be provided south of Pug Road (within the North-East Baldivis Structure Plan) for similar reasons.

Internal intersections

The traffic volumes anticipated in the TIA are such that all internal intersections (almost all of which are three-way or 'T' intersections) may be created as priority-controlled intersections, with no roundabouts or traffic signals. However, the relatively long Neighbourhood Connector road along the eastern boundary of the LSP area may benefit in terms of function, safety and aesthetic from the inclusion of intersection treatments such as a roundabout/s at key locations. Agreement in this regard will be reached in consultation with the City at the subdivision stage.

3.3.4 Public transport

The TIA confirms the Public Transport Authority's intention to introduce a bus route (number 569) linking Wellard railway station (to the north) with Warnbro railway station (to the south) via Baldivis Road. Timing will be dependent on the growth of the local residential area and fleet capacity. In the interim, private transport will be the primary mode of transport for residents of the structure plan area.

The PTA does not intend to divert Route 569 through the structure plan area. This is considered appropriate, as the majority of the structure plan area is within 400 metres (the desirable walkable catchment for bus stops expressed in *Liveable Neighbourhoods*) of Baldivis Road. Nevertheless, there is design potential for bus services along Pug Road and southward past the proposed primary school should that be deemed necessary in future.

In the longer term, another bus route (number 546) is understood to be proposed along Millar Road, which would further improve bus services in the local area.

3.3.5 Cycling and pedestrian movement

The structure plan delivers a permeable road network which, combined with the Baldivis Tramway reserve and the Activity Park, creates excellent opportunities for the provision of good pedestrian and cyclist routes.

The precise location and alignment of footpaths and shared paths will be determined in consultation with the City of Rockingham as part of detailed design following subdivision approval. Generally, these will be provided in accordance with the following principles:

- Paths to a width of 2.0 metres on at least one side of all streets;
- Shared paths on both sides of the Neighbourhood Connector roads (refer to Figure 4-2 of the TIA);
- Connectivity to the Principal Shared Path along the western side of the Kwinana Freeway; and
- A dual-use path in the Baldivis Tramway reserve (as advocated by the City of Rockingham's Baldivis Tramway Master Plan) linking the structure plan area with the North Baldivis (Millar's Landing) structure plan area to the south and facilitating internal connectivity.

Further detail on the cycling and pedestrian network is shown in the Landscape Master Plan.

3.4 Public Open Space and Drainage

3.4.1 Public Open Space Provision

The structure plan makes provision for approximately 5.69 hectares of creditable public open space, which equates to 12.9% of the gross subdivisible area. This exceeds the Liveable Neighbourhoods requirement of 10%, or for this site, 4.34 hectares. The POS Schedule is presented as Table 4 below, and each POS parcel is identified on Figure 12.

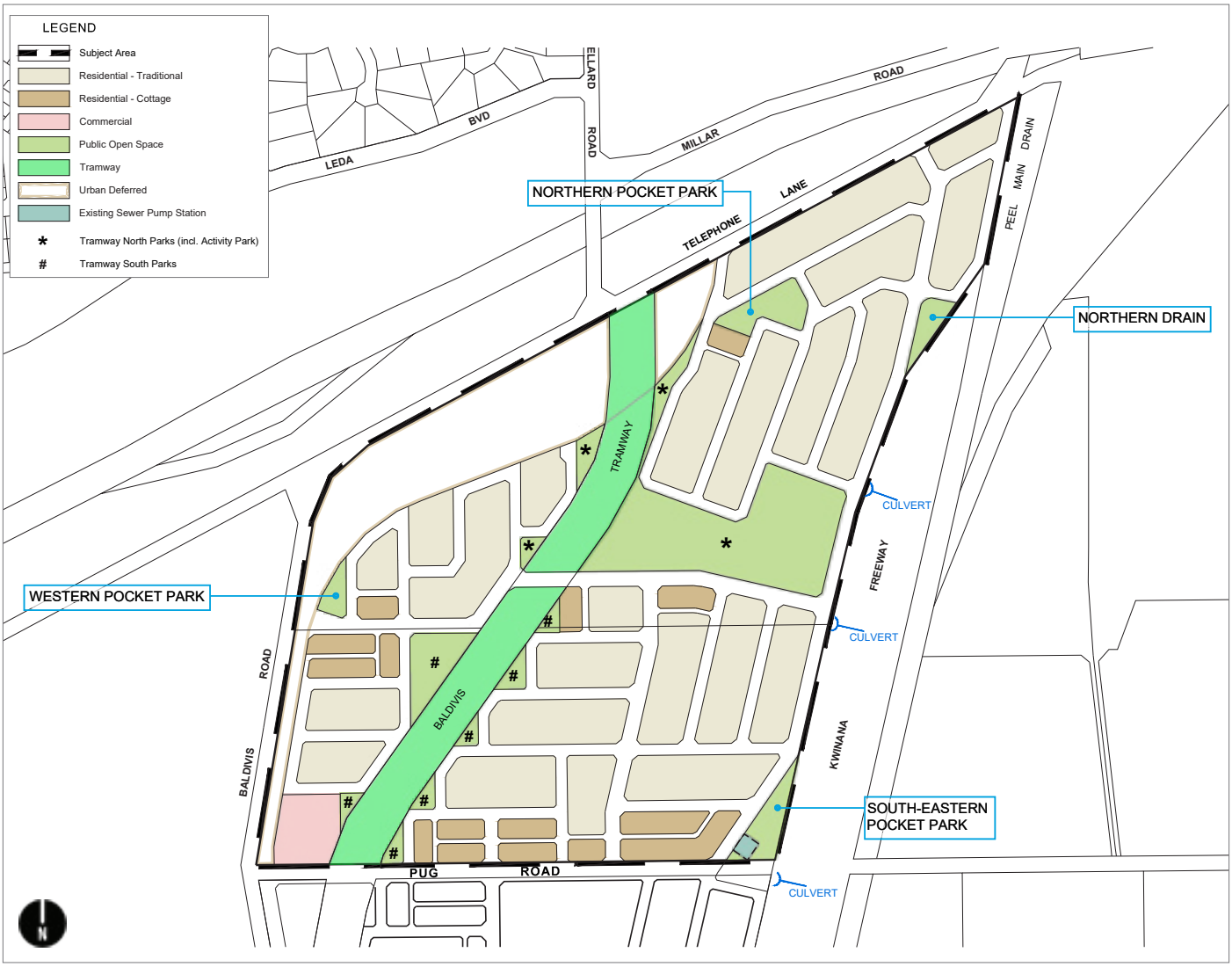

Figure 12 - POS Reference Plan

Table 4: POS Schedule

Public Open Space Schedule (all areas are in hectares)		
	Area	**Total**
Strucuture Plan Area		**55.99**
Deductions		
Land zoned Urban Deferred	6.53	
Tramway Reserve	5.21	
Pump Station Site	0.10	
1:1 Year Drainage within POS	1.18	
Total Deductions	**13.02**	
Gross Subdivisible Area		**42.97**
POS @ 10%		4.30
Public Open Space Requirement		
May Comprise:		
Min 8% unrestricted POS	3.44	
Max 2% restricted POS	0.86	
TOTAL POS REQUIRED		**4.30**
Public Open Space Provided	**Unrestricted**	**Restricted**
1 Northern Pocket	0.39	0.00
2 Northern Drain	0.00	0.25
3 Western Pocket	0.18	0.00
4 Tramway Interface North	3.11	0.29
5 Tramway Interface South	1.03	0.00
6 South-eastern Pocket	0.00	0.30
TOTAL POS PROVIDED (ha)	**4.70**	**0.84**
Additional Deductions		
Restricted Use POS Surplus (>2% of total)		-0.02
Credited POS contribution		
Min 8% unrestricted POS	4.70	10.9%
Max 2% restricted POS	0.84	2.0%
Total Creditable POS	**5.54**	**12.9%**

Notes:

1. *In accordance with Liveable Neighbourhoods: the area subject to inundation more frequently than a one year average recurrence interval rainfall event is not included as restricted or unrestricted open space and is a deduction from the net site area (LN R33); areas for the detention of stormwater for a greater than one year average recurrance interval up to the five year recurrance interval is restricted open space up to 20%, the area greater than 20% is a deduction (not applicable in this case) (LN R26 & Table 11); areas for the detention of stormwater for a greater than five year average recurrance interval is within unrestricted open space (LN R25).*
2. *Drainage inputs are from RPS plan refs. 2319-LWMS NTH-03 (J) and 2319-LWMS NTH-04 (C) and 2319-LWMS NTH-04A (C).*

The POS areas have been designed and distributed in accordance with the following principles:

- Seamless and comprehensive integration with the Baldivis Tramway reserve;
- Retention of priority wetlands within and adjacent to the Tramway reserve;
- Provision of an active open space, in response to pre-lodgement feedback from the City;
- Adequate drainage space to ensure management of stormwater flow into the Tramway reserve and the Peel Main Drain;
- Pedestrian connectivity throughout the structure plan area and to the primary school planned south of Pug Road; and
- Spaces for passive recreation that incorporate high-quality landscaping and foster a sense of place.

To describe the function of each open space and guide its creation, a Landscape Master Plan (Plan E, August 2020) has been prepared, and is summarised in Section 3.4.2 below.

3.4.2 Description of Open Space Areas

This section provides an overview and description of the proposed location, function and design of each open space area proposed in the structure plan (refer Figure 13). Detail in this regard is provided by the Landscape Master Plan prepared by Plan E (refer Appendix 3).

3.4.2.1 Baldivis Tramway

As noted in Section 1.3.1 above, the Baldivis Tramway is reserved under the MRS. This precludes the statutory imposition of a structure plan, however, the Tramway is, in practical terms, an intrinsic part of the structure plan area. It has been incorporated into the structure plan in accordance with the principle of orderly and proper planning.

The alignment of the Tramway through the structure plan is unusual; for most of its length, the Tramway abuts the Baldivis Road reserve and therefore provides only one interface to residential development. Within the structure plan area, it provides two interfaces. This demands a thoughtful design response that balances objectives for conservation, recreation, drainage and bushfire hazard management and is a welcome opportunity.

The Tramway is envisaged as a high-amenity, high-quality linear open space that forms a focal point for the structure plan and the future community. The Landscape Master Plan seeks to respond to the objectives of the City of Rockingham's Baldivis Tramway Master Plan (refer to Section 1.3.5.5 above) and more recent feedback from the City. Refer to Figure 13 for an extract from the Landscape Master Plan covering the Tramway reserve.

There is very little remnant vegetation in the Tramway reserve within the structure plan area. Renewal of the Tramway will therefore focus on, as sought by the Master Plan, retention of any mature native trees in good health, habitat restoration, management of weed species and provision of paths and boardwalks to guide access (including a path running the length of the reserve). The following comments are made on the specific Management Actions listed in the Master Plan for Precinct 1, within which the structure plan are is located:

Figure 13 - Extracts from the Landscape Master Plan
Source: Plan E

1. Construct 2.5 m wide concrete DUP [dual-use path].

Pre-lodgement discussions with the City of Rockingham have established that a trafficable path elevated above the 1:5 year ARI flood level within the Tramway reserve is required. The Landscape Master Plan makes provision for this through the Tramway reserve and across to the Activity Park. In some locations, sections of the trafficable path will be a boardwalk to ensure that drainage flows are not impeded.

2. Install directional, regulatory and interpretive signage.

Detail in this regard will be finalised in consultation with the City at the subdivision stage, with relevant themes likely to include wetlands and nature-based education.

3. Liaise with future developers adjoining the Tramway regarding interface treatments.

The structure plan area enjoys two frontages to the Tramway. Soft but clearly-delineated interfaces are proposed along both sides, with a series of local parks provided at the end of street blocks to facilitate a transition from the conservation-focused Tramway through managed POS to urban land. Elsewhere, plantings within road verges will facilitate this transition, whilst a considerable (approx. 100m) section of the Tramway's eastern interface will open onto the major POS space (described further below).

4. Maintain and protect all existing vegetation.

Existing vegetation within the Tramway is limited in extent, degraded and fragmented. This is a consequence of historical clearance and grazing activity and bushfires. The southern part of the Tramway, within a Resource Enhancement Wetland, has recovered to some extent from these events, and there is also several stands of trees present further north. Whilst undergrowth is generally degraded, an arborist's report (ArborLogic, 2019) has concluded there are numerous healthy native trees worthy of retention (see detail in Landscape Master Plan). These are one of the parameters for the proposals in the Landscape Master Plan, which recommends their retention as far as practical and the reintroduction of undergrowth species. The only minor intrusion into areas potentially containing native vegetation will be where space is required to create a narrow base channel for drainage (refer to Section 3.6 of this report).

5. Manage priority weed species.

As mentioned in Section 2.1.1 of this report, three 'declared pest' flora species (arum lily, bridal creeper and narrow-leaf cotton bush) have been recorded within the structure plan area. There are also numerous other weed species. To address these issues, the EAMS contains a comprehensive Revegetation and Weed Management Strategy (Appendix A to that document) prepared by Tranen (2020). This identifies six revegetation management zones based on current conditions and objectives for revegetation and weed control in the context of the Landscape Master Plan and Bushfire Management Plan.

6. Focus revegetation of native species in key concept area nodes and primary access points.

The Resource Enhancement Wetland mentioned under point 4 above is one of the 'concept nodes' mentioned in this Action. As illustrated in the Landscape Master Plan, this area contains numerous trees for retention and will be revegetated to its original 'Woodland' standard. Access to this area will be relatively limited in the context of the balance of the Tramway, enabling natural processes to re-establish. Further comment on this concept node is made under point 11 below.

7. Utilise designated offset areas for future revegetation of native species to improve landscape connectivity.

Implementation of this structure plan will not necessitate any clearance of native vegetation; as such, the revegetation proposed for the Tramway reserve is not required as an offset.

8. Ensure adequate fire safety measures, such as breaks and slashing.

The project team for this structure plan includes landscape architects Plan E, bushfire consultants Strategen-JBS&G and hydrologist RPS. These consultants have worked side-by-side throughout the process of preparing the structure plan to ensure that the revegetation proposals contained in the Landscape Master Plan do not result in elevated bushfire hazards that cannot be managed through interface treatments and/or construction standards. As noted under point 3 above, all Tramway interfaces comprise:

- Pocket POS, which will be managed in a low-threat state in accordance with normal practice for urban areas;
- Streets providing separation to dwellings; or
- The Activity Park.

The Bushfire Management Plan (refer Appendix 2) confirms that all bushfire hazards arising from the Landscape Master Plan (and elsewhere) can be managed, with further assessment to be undertaken progressively as the subdivision and development stages unfold.

9. Establish an integrated DUP network with the Kwinana Fwy Principal Shared Pathway (PSP) and future Gas Pipeline POS.

The structure plan area, but not the Tramway reserve itself, abuts the Kwinana Freeway. Connections to the PSP within the Freeway reserve will be made in consultation with the City at the subdivision stage in the context of the path network shown in the Landscape Master Plan.

10. Provide a safe pedestrian detour around the Kulija Road intersection.

Not applicable to this structure plan.

11. Create an Ephemeral Wetland Concept Area for nature appreciation and interpretation.

The Ephemeral Wetland Concept Area for Precinct 1 coincides with the Resource Enhancement Wetland mentioned at points 4 and 6 above. This is for good reason; the vegetation in this area is some of the best in the structure plan area, having survived the area's period of use for grazing and partially recovered from bushfires. The greatest concentration of mature trees targeted for retention is in this area and considerable effort has gone into ensuring the earthworks contouring in this area preserves their root zones as well as achieving drainage functionality. Crossing points are limited and extensive woodland and wetland-type planting is proposed, giving this area a strong chance of recovering its original habitat and species mix whilst preserving its natural hydrological function. As described in Section 3.6 of this report, larger storm events will inundate the natural surface in this area and enhance its ecological integrity.

There is every opportunity to provide interpretational signage and trails in and around this area, and there is clear potential for the primary school planned south of Pug Road to use the area for educational purposes and excursions.

Overall, the proposed rehabilitation of the Baldivis Tramway reserve is an outstanding outcome for the City and the local community, providing a recreation and conservation-oriented asset in accordance with the objectives of the Baldivis Tramway Master Plan.

3.4.2.2 Interface POS

The pocket POS along the Tramway reserve that facilitates drainage and interface management is collectively referred to as 'Tramway Interface North' (north of the central, east-west POS) and 'Tramway Interface South'. The bioretention basins proposed in these POSs cannot be accommodated in the Tramway itself because doing so would trigger the need for vegetation to be cleared, which is not desirable.

Outside the bioretention basins, the interface POSs are proposed to be landscaped in the following manner:

- 'Woodland and Wetland' planting where desirable to enhance revegetation in the Tramway and where bushfire hazard management considerations permit;
- Groundcovers, ornamental planting, turf and basin planting where necessary to manage bushfire hazards, provide recreational space and/or manage stormwater;
- Retention of healthy, mature native trees, with finished earthworks levels to accommodate root zones and retaining measures;
- Adjacent to the Urban Village, play spaces facilitating passive and informal active recreation by children and adults, set against the backdrop of the woodland in the Tramway; and
- Pedestrian connectivity (paths and boardwalks) through each POS and into the Tramway, residential areas and the Local Centre.

It should be noted that these POS spaces are not intended to be separate or discrete from the Tramway. As shown in the Landscape Master Plan, they are designed to be a seamless extension of the Tramway (refer also to Figure 14).

Figure 14 - Extracts from the Landscape Master Plan
Source: Plan E

3.4.2.3 Activity Park, within Tramway Interface North

The Tramway reserve is the centrepiece of the conservation component of this structure plan. Stretching from the Tramway across to the Neighbourhood Connector road on the eastern boundary, the Activity Park is the focal point for active recreation. The Activity Park will be within 250 metres of most of the lots east of the Tramway and, together with the primary school oval proposed south of Pug Road in a separate structure plan, will ensure that the new community has a very high standard of availability of active recreational space. Refer to Figure 14 for an extract from the Landscape Master Plan covering the Activity Park.

The Activity Park has been made possible by the relocation of the north-south Neighbourhood Connector road shown in the DSP to the eastern boundary of the structure plan area. As noted above, this has the effect of drawing traffic away from the heart of the residential area and the Tramway reserve. It also enables the creation of a consolidated east-west park, rather than two parks separated by that road. A park across the structure plan area in this location is a necessity for drainage reasons, and its useability in general is improved with relocation of the Neighbourhood Connector eastward. It also enables the provision, as requested by the City of Rockingham during the pre-lodgement period, of a formal active open space. The need for this space is not currently identified in the City's suite of policies or strategy, but anecdotal evidence from sporting groups in Baldivis suggests that an additional space would be welcome.

The active recreational space is rectangular and large enough to accommodate a full-sized soccer or rugby pitch and/or a junior Australian football or cricket oval. It will also accommodate 1:100 year stormwater events, detaining water temporarily until it can be discharged into the Peel Main Drain within outflow rates prescribed by the Water Corporation. Local-level picnic and passive recreation facilities are proposed around th1e playing field, which, being an 'extra' or overflow-type field for Baldivis, is not proposed to be floodlit or provided with a pavilion.

At the southern end of the playing field, and extending westward to the Tramway reserve, is a bio-retention basin and drainage channel facilitating the movement of stormwater away from the Tramway and the adjacent residential land across to the PMD. The playing field itself will be underlain with clean sand fill, overcoming the limited permeability of the local Guildford soil formation, and sub-surface drains to manage groundwater. This will maximise useability in all but the rarest storm events. Full detail in this regard is provided in the Local Water Management Strategy provided at Appendix 4.

North-south pedestrian movement across the drainage channel is proposed to be facilitated by way of a boardwalk and footpath (over a culvert). These provide a high standard of access to the facilities proposed in the western part of the Activity Park, which will incorporate a large play space and facilities such as climbing towers, a basketball court, multicourt and/or kick wall. Barbecue facilities and informal turfed areas for passive recreation are also envisaged, and numerous mature trees will be retained. The managed portion of this park will transition seamlessly into the more conservation-focused Tramway reserve through appropriate landscaping and plantings. Connections into the path meandering along the centre of the Tramway will also be provided.

The Activity Park is the major component of the line item labelled 'Tramway Interface North' in the POS Schedule, being all POS with an interface to the Tramway reserve, north of the road crossing.

3.4.2.4 Tramway Interface South

Similar to 'Tramway Interface North' in the POS Schedule, 'Tramway Interface South' is the POS with an interface to the Tramway reserve, south of the road crossing. Refer to Figure 15 for an extract from the Landscape Master Plan covering these areas. There are two primary nodes:

- Near the east-west road, a large play space, climbing towers, shade structures, barbecue facilities and informal play areas are envisaged. Bio-basins accommodating 1:1 year drainage are proposed, fringed by ornamental vegetation; and
- Opposite the above park, a medium-sized play space, shade structures barbecue facilities and informal play areas are proposed, with no need for drainage space. A small dog park is an idea for the space immediately north, which (like others to the south) performs a drainage function and enables the adjacent street blocks to be squared off relative to the angled Tramway.

In all instances, an appropriate transition between managed POS and the conservation-focused Tramway, which will mainly comprise woodland-type vegetation, is sought.

3.4.2.5 Northern Pocket Park

The northernmost park in the structure plan area provides passive recreational space for residents in the north-eastern precinct. A turfed kick-about area, half-court and shade structure are envisaged for this area, with final details to be confirmed at the subdivision stage.

This park will also perform a drainage function for all rainfall events, with the most frequent (the 1:1 year event) being detained within a bio-retention basin on the north-eastern boundary. Outflow from this park will be into the Peel Main Drain via the Tramway. The retention basin provided for more infrequent events will be turfed and planted with typical basin species, with groundcovers to be provided along the interface with the residential cell to the south-east.

Figure 15 - Extracts from the Landscape Master Plan
Source: Plan E

3.4.2.6 Northern Drain

This park is situated on the eastern boundary of the structure plan area in a location dictated by proximity to one of the four culverts leading to the Peel Main Drain. It comprises a bio-retention basin for 1:1 year events and a retention basin for more infrequent events. The basin will be relatively deep, making this park generally unsuitable for recreation, but it will be landscaped to the same high standard as the balance of the structure plan area and provide a high degree of visual amenity.

3.4.2.7 Western Pocket Park

The Western Pocket Park is located at one of the entry points to the proposed estate, and the major entry point for the Urban Village component. It will be more than an entry statement, however, with a kick-about area and half-court proposed to be provided. Local residents will also be close to the large play space on the western side of the Tramway, and the densities and small lot sizes envisaged for the Urban Village justify a very high standard of recreational space in the vicinity.

The Western Pocket Park is not proposed to accommodate drainage, optimising its useability.

3.4.2.8 South-eastern Pocket Park

The South-eastern Pocket Park is akin to the Northern Drain park in that its location is guided by the location of one of the four culverts to the Peel Main Drain. Its primary function is to detain stormwater temporarily until it can be discharged into the Peel Main Drain within permissible outflow rates and accommodate a wastewater pump station. This has been constructed already and is operational, being required as part of the sewer network for Millars Landing south of Pug Road as well as the structure plan area. The majority of this park will comprise drainage spaces and the pump station, but it will be landscaped attractively and, south of Pug Road, can accommodate a small play space.

3.4.3 Compliance with LPP 3.4.1

The City's Local Planning Policy No. 3.4.1 was listed in Section 1.3.5.3 above as being of relevance to this structure plan. In particular, the following specific provisions apply:

Table 5: Compliance with LPP 3.4.1

Provision no.	Provision text	Structure plan response
4.3	**Location of Public Open Space**	
4.3.1	Liveable Neighbourhoods (2007) requires that POS should provide for Local Parks up to 3,000sqm located within 150 to 300m of safe walking distance to all dwellings. Local Parks can include small parks, special purpose parks, children's playgrounds and squares.	The Northern Drain park and South-eastern Pocket Park (see Sections 3.4.2.5 and 3.4.2.7 above) fit into this size category but do not, and do not need to, perform a recreation function. Local residents are within, at most, 300m of the Northern Pocket Park, the Activity Park and/or the Tramway reserve.
4.3.2	Liveable Neighbourhoods (2007) requires that POS should provide for Neighbourhood Parks of around 3,000sqm to 5,000sqm or larger, each serving about 600-800 dwellings and to be located a maximum of 400m walk from most dwellings.	The Northern Pocket Park (see Section 3.4.2.5) is approximately 4900sqm in area and is within approximately 300m of all dwellings in the north-western precinct.
4.3.3	Liveable Neighbourhoods (2007) requires that POS should provide for District Parks of around 2.5-7.0 hectares, notionally serving three neighbourhoods, located within 600m-1km walk from most dwellings. District Parks must be of adequate size and shape to accommodate both grassed areas for informal games and for organised sport.	Collectively, the Baldivis Tramway reserve (which is a deduction for the purposes of calculating POS provision), the Activity Park and Tramway Interface North / Tramway Interface South parks provide district-level amenities. This contiguous group of parks is within 500m of all lots in this structure plan.
4.3.4	Any areas of POS shall be not less than 2,000sqm in area unless it can be demonstrated that the proposed POS will satisfy the intent of the Council's design criteria.	The Western Pocket Park (see Section 3.4.2.6) is approximately 1800sqm in area and will be landscaped and provided with facilities in a manner satisfying the Design Criteria. It is adjacent to the Urban Village and therefore presents an opportunity for a more intimate space that reflects the denser nature of that precinct.

4.4	Design Critera	
4.4.1	The location, layout and design of subdivision and development surrounding POS should promote visual surveillance of the POS to minimise personal safety and security problems.	All POS has been designed so that passive surveillance from surrounding lots is facilitated, with dwellings to face the park wherever possible.
4.4.2	In the interests of promoting visual surveillance, the POS should be bounded by streets on all frontages such that adjacent lots overlook the street and POS.	Almost all POS interfaces consist of a street, enabling dwellings to face the park.
4.4.3	Notwithstanding provision 4.4.2, consideration will be given to lots with direct frontage to POS where it can be demonstrated that the accessibility and usability of the POS is not compromised and that visual surveillance of the POS from adjoining development and the need for visitor parking has been addressed.	Two limited instances of lots with direct frontage to POS are provided, over a total interface of approximately 120m. This will enhance opportunities for visual surveillance of the POS and have no effect on its useability or accessibility.
4.4.4	A Detailed Area Plan will be required for lots with direct frontage to POS and the adjoining residential development will be required to be elevated a minimum of 500mm above the POS, with open-style front fencing and it will be necessary to provide a 1.5m wide footpath between the lot and the POS. Where appropriate, visitor parking will also have to be provided.	Local Development Plans (formerly known as Detailed Area Plans) will be prepared at the subdivision stage in accordance with this provision for the lots with direct frontage to POS.
4.4.5	The maximum acceptable grade for POS is as follows:- Active 1:250 Perimeter 1:20 Playground area 1:20 Other Banks 1:6	Pre-lodgement discussions with the City have focused particularly on the perimeter of the playing field, which is adjacent to a drainage basin. Batters around the playing field will vary from 1:14 to 1:20, and ramp and stair access will be available on 3 sides. Further detail in this regard will be provided to the City at the subdivision stage.
4.4.6	Where POS is designated to be used for active recreational purposes (Neighbourhood and District Parks), the provision of on-street carparking will be required at the time that the subdivision is being developed.	Compliance with this objective will be confirmed at the subdivision stage in consultation with the City. Indicative parking locations are shown on the Landscape Master Plan.

4.4.7	Where POS is designated to be used for passive recreational purposes, the provision of a minimum of one (1) on-street disabled carparking bay will be required at the time that the subdivision is being developed in accordance with the Disability Discrimination Act 1992.	Compliance with this objective will be confirmed at the subdivision stage in consultation with the City.
4.5	**Development of Public Open Space**	Detail in this regard is relevant to the subdivision stage and will be provided to the City's satisfaction at that time.
4.6	**Maintenance of Public Open Space**	Detail in this regard is relevant to the subdivision stage and will be provided to the City's satisfaction at that time.
4.7	**Urban Water Management**	
4.7.1	Liveable Neighbourhoods (2007) states that POS should incorporate drainage, wherever practicable, using contemporary urban water management measures.	The approach taken in this structure plan is consistent with this objective.
4.7.2	The Council will only support constructed water bodies (permanent or temporary) whereby it is a sustainable response to an environmental issue.	Not relevant to this structure plan.

4.7.3	A maximum of 25% site area of any parcel of POS may be covered by any body of water at a frequency of inundation of 1 in 10 years. The area of a water body shall be defined by the maximum water surface area measured from the outer most contour of the batter.	The following POS parcels comply with this policy: POS 1: 20% coverage; POS 2: 24% coverage; POS 3: 0% coverage; POS 5: 9.6% coverage. POS 6 (containing the pump station) will be covered to a proportion of approximately 60%, however, this park is Restricted POS. POS 4 will be covered to a proportion of approximately 50% by reason of the detention basin required on the playing field. The depth of water at a 1:10 year event would be minimal, at 10mm. The figure achieved for POS 4 are a product of the complex balance between stormwater management, tree retention, landscaping and bushfire hazard management adjacent to the Tramway and restrictions on outflow to the Peel Main Drain. It should be noted that 1:5 and 1:10 ARI drainage areas are inundated infrequently and only for short periods. Most of the time, it is fully available for recreation.
4.7.4	In order to control seagull numbers in the City, permanent water bodies (ornamental lakes) are not generally encouraged to be developed within residential areas in close proximity to the coast.	Not relevant to this structure plan.

4.7.5	Where it is proposed to incorporate urban water management measures (such as stormwater detention basins) into POS, the Local Water Management Plan shall address the following additional requirements: Details of the location, type and size of each proposed urban water management measure; Demonstrate that the floor of any detention basin is a minimum of 500mm above the post-development maximum groundwater level as determined by the Local Water Management Plan; In the case of subdivision within the Peel-Harvey Catchment Area or any other site the City considers is susceptible to rising groundwater post-development, demonstrate that the floor of any detention basin is a minimum of 1200mm above the post-development maximum groundwater level as determined by the Local Water Management Plan; Demonstrate that the side slope of any detention basin does not exceed a maximum grade of 1:6; and Demonstrate that the usability of the POS for recreation purposes will not be compromised by any urban water management measures.	The LWMS forming part of this structure plan has been prepared within the parameters specified in (a) to (d) of Section 4.7.5 of LPP 3.4.1. Compliance with (e) is demonstrated under section 4.7.3 above. Full detail in this regard is provided at Section 3.6 of this report and at Appendix 4.

3.5 Water management

3.5.1 Existing water and drainage strategies

Serpentine River Floodplain Management Strategy (SKM, 2010)

Sinclair Knight Merz was commissioned by the (then) Department of Water to develop a Floodplain Management Strategy for the Serpentine River in the areas of Serpentine, Baldivis, Karnup and Keralup. The LWMS is consistent with the relevant principles of the Floodplain Management Strategy.

East Baldivis District Water Management Strategy (Parsons Brinkerhoff, 2007)

The East Baldivis DWMS was prepared in support of the East Baldivis District Structure Plan, and has been endorsed by the Department of Water.

The LWMS has been prepared in accordance with the key objectives and principles of the DWMS, and refines these principles to a local scale consistent with the WAPC's Better Urban Water Management Guidelines.

3.5.2 Local Water Management Strategy

The LWMS prepared by RPS (2020, refer Appendix 4) provides a framework for best-practice urban water management in the context of ten Design Objectives, which are:

- Utilise fit-for-purpose water sources throughout the development;
- Achieve a consumption target for water of 100 kilolitres per person per year;
- Provide clearance between habitable floor levels and groundwater of at least 1.2m;
- Provide clearance between bio-retention areas and groundwater of at least 0.5m;
- Ensure that all water leaving the site is equal or better in quality than that entering the site;
- Manage small rainfall events (up to the first 15mm) within retention, treatment and detention areas to enable stormwater quality treatment;
- Ensure that local roads remain passable in minor (1:20 ARI) rainfall events;
- Facilitate discharge of stormwater into the Peel Main Drain at a rate of no more than 4.5 litres per second per hectare, consistent with Water Corporation requirements;
- Provide 0.5m clearance from the habitable floor level to the 1:100 ARI level of the Peel Main Drain and 0.3m to the 1:100 ARI level of the stormwater drainage system; and
- Implement structural and non-structural measures to reduce nutrient loads.

Strategies for achieving these objectives are specified in the context of stormwater management and groundwater management.

All outlets to the Peel Main Drain are designed to be above the baseflow level in the Peel Main Drain, consistent with the requirements of DWER's Water resource considerations when controlling groundwater levels in urban development guidelines. This outcome will ensure that inundation within subsoil drains does not occur at any time of the year without necessitating excessive volumes of fill for the structure plan area.

Stormwater

The stormwater management strategy has been developed in the context of the criteria outlined in Table 6 below.

Table 6: Stormwater management design criteria

Strategy element	Criteria
Storm water	
Flood protection (1% AEP)	• Provide 1% AEP floodways for safe passage of regional flood flows of the PMD adjacent to the development area. • Drainage modelling has been undertaken to determine the 1% AEP event flood storage areas within the site for attenuation of local stormwater to a maximum depth of 1.2 m and discharge to the PMD at an allowable rate of 4.5 L/s/ha, consistent with Water Corporation (2000) requirements. • Earthworks will ensure establish minimum habitable floor levels at 5.5 m or above, allowing a minimum 0.5 m freeboard to the mapped 1% AEP flood level on the site. • Provide flood paths for overland flows with the development area which exceed the capacity of piped drainage.
Serviceability (20% AEP)	• Provision of storage areas for local stormwater attenuation from the 20% AEP events (equivalent to 1 in 5yr ARI). • Road drainage (piped) system to be designed so that roads will be passable in the 20% AEP event.
Ecological protection (first 15 mm)	• Managing runoff from the first 15 mm rainfall event as close to source as practical via retention, treatment and detention areas. Soakwells will be installed on lots greater than 300 m2, whilst run-off that enters a piped drainage system will be retained and treated in bio-filtration areas and detained in vegetated flood storage areas. • Bioretention areas will be established at 2% of connected impervious areas. • The bioretention basins will be constructed according to Vegetation Guidelines for Stormwater Biofilters in the South-West of Western Australia (Monash University 2016) and Adoption Guidelines for Stormwater Biofiltration Systems (Payne et al. 2015). • Implement non-structural controls to maintain and if possible, improve water quality.

Ground water	
Clearance to groundwater	• Subsoil drains will be installed in the road reserve to provide a controlled groundwater level. This along with imported clean fill will ensure that finished lot levels have a minimum 0.8 m clearance from the post-development controlled groundwater level.
Groundwater quality	• The proposed stormwater treatment methods in the bio-filtration basins will ensure that nutrients will be retained in the soil profile as stormwater infiltrates. • Fertiliser and pesticide use in the POS and streetscapes will be minimised. • Groundwater quality will be monitored post-development.
Acid sulfate soils and contamination	• Management of Acid Sulphate Soils where required to be handled as a separate process to the LWMS consistent with DoE(2004) requirements.

The stormwater management strategy has been designed to maximise opportunities for infiltration as close to source as practical, minimising the export of nutrients and pollutants in runoff during small (up to 15 mm) rainfall events. Stormwater from these will enter the street drainage system and discharge into the bioretention basins for infiltration into an amended soil medium, before either being taken up by plants or entering the subsurface network. Rainfall events that exceed the capacity of the bioretention basins will discharge to lower-lying vegetated detention areas within the POS and Tramway, with discharge off-site to the Peel Main Drain controlled to the Water Corporation's maximum flow rate.

At a lot level, stormwater from small events will be infiltrated on-site using soakwells (for lots larger than 300sqm) or a combination of small soakwells and piped connections to the road reserve drainage network (for lots smaller than 300sqm). The road reserve network will comprise a pit and pipe system capable of conveying stormwater for events up to and including a 1:5 ARI. Larger rainfall events (up to 1:100 ARI) will be conveyed via overland flow paths along the road reserves to one of the flood storage areas (detention basins or wetlands).

Wetlands

The retained REWs within the Tramway and Activity Park are the lowest parts of the structure plan area and perform a natural hydrological function. They are utilised as part of the stormwater drainage system to provide flood storage and treatment during large events (between a 1:20 and 1:100 ARI).

The major event drainage design for these areas accommodates flood storage to meet the PMD discharge criterion and will maintain the pre-development hydrological function of the wetlands, whilst achieving the City's desired landscape outcomes.

The southern portion of the Tramway, which incorporates two REWs, will convey stormwater (excess from bioretention basins and subsoil drainage) in a north-easterly direction along the Tramway and into the Activity Park, where another REW is located. From there, stormwater is conveyed into a detention basin before being discharged to the Peel Main Drain. The depth of inundation of the REWs is designed to be no more than 0.7m during a 1:100 ARI event. Noting the City's preference for natural surface levels within the REWs and Tramway to be maintained, a shallow, rock-lined baseflow swale will be provided in the lowest-lying ground, meandering around existing trees, to assist with drainage flows during large events.

Groundwater

As discussed in Section 2.3 above, separation to groundwater for the structure plan area requires close consideration. A groundwater flow model has been prepared to assess the impact of subsoil drains on groundwater levels. These are required to control groundwater and provide practical post-development site elevations. They will be provided beneath turfed POS and road verges, and not where they may interfere with natural hydrological processes, such as beneath REWs.

The majority of the subsoil drainage network (approx. 85%) will drain into a vegetated flood storage area before leaving the structure plan area, with the balance discharging directly into the Peel Main Drain. Assessment using the Urban Nutrient Decision Outcomes (UNDO) tool has established that the Department of Water and Environmental Regulation water quality targets will be met for groundwater discharging into the Peel Main Drain. It should be noted that many of the measures designed to manage stormwater quality will be of direct benefit for groundwater outflows, including the following:

- Increasing biological uptake through the establishment of vegetation;
- Minimising and controlling the levels of fertilisers and pesticides applied to the site through appropriate plant selection, and operation and maintenance procedures after development;
- Soil amendment within bioretention areas to encourage nutrient retention; and
- Monitoring groundwater quality leaving the site to verify that pre-development values are being maintained or improved.

Pre-development groundwater monitoring at the site has been completed to determine the baseline conditions and to allow for a direct comparison during and after development. A post-development monitoring program of three years is proposed to enable this comparison to be made.

Urban Water Management Plans

The LWMS notes that the Urban Water Management Plans (UWMPs) prepared pursuant to conditions of subdivision approval, and in accordance with the LWMS, will include the following design measures in more detail:

- Measures to achieve water conservation and efficiencies of water use;
- Landscaping and POS detail, including irrigation scheduling;
- Management of groundwater levels, including proposed finished lot levels, fill levels and final subsoil design (including subsoil spacing and invert levels);
- In-depth stormwater drainage design including the location and sizing of drainage infrastructure and required storage as well as drainage control points, integrated major and minor flood storage volumes;
- Management of subdivisional works including development of a strategy for sediment control during construction as well as ASS and dewatering management;
- Final subdivision layout, including final cut and fill levels, minor and major drainage layouts and overland flow paths;
- Specific post-development monitoring and reporting to be undertaken consistent with the monitoring program defined in the LWMS;
- Finalised monitoring performance values and list of likely contingency measures; and
- Finalised implementation plan including roles and responsibilities.

In relation to subsoil design, it has been agreed between the City of Rockingham and the project team that subsoil drainage within POS will have a minimum cover of 0.45m, with any subsoil drainage lines at this exact level to be spaced more closely to enable quicker emptying times.

3.6 Schools

The structure plan area abuts and falls within the catchment of a primary school proposed on the south side of Pug Road, within the North Baldivis (Millars Landing) structure plan area. This primary school is one of three primary school sites within the East Baldivis DSP serving (broadly) the northern, central and southern parts of the East Baldivis urban precinct.

Together, the three primary schools fall within the catchment of a centrally-located secondary school on Paparone Road, which is co-located with the central primary school. Together, Baldivis Road, the main north-south Neighbourhood Connector, and the Baldivis Tramway reserve will provide outstanding pedestrian and vehicular access from the structure plan area to the secondary school.

The primary school site on Pug Road will be a focal point for the community, despite not being within the structure plan area. It will be highly accessible to pedestrian and vehicular traffic via local access streets and a Neighbourhood Connector road. Importantly, the school will be visible down the north-south access street leading into the northern part of the structure plan area, which fosters legibility and walkability.

3.7 Activity Centres and Employment

3.7.1 Proposed Local Centre

The City's Local Commercial Strategy (LPP 3.1.2), described at Section 1.3.5.1 of this report, recommends provision of a 'Local Activity Centre' (referred to as a 'Local Centre' in SPP 4.2) near the intersection of Baldivis Road and Pug Road. This structure plan delivers on that objective.

Although convenient by road to the Baldivis District Centre, the Wellard Neighbourhood Centre and the Kerosene Lane Neighbourhood Centre, LPP 3.1.2 recognises that residents in the Millars Landing precinct may not, without policy direction, be provided with walkable access to a commercial centre. This would be contrary to the objectives of LPP 3.1.2, which include:

- *"Mitigate the potential for an over-concentration of shopping floorspace in large activity centre at the expense of a more equitable level of service to communities" and*
- *"Promote the 'walkable neighbourhoods' principle of access to employment, retail and community facilities by distributing activity centres to improve access by foot or bicycle".*

It is in this context that the above-mentioned Local Centre is proposed.

The approved North-East Baldivis Structure Plan, which covers the part of the Millars Landing estate situated south of Pug Road, contains a parcel of land zoned 'Commercial' for the purpose of the Local Centre. The balance of the necessary land is shown on this structure plan, enabling completion of the Local Centre and provision of a main street-style precinct along Pug Road.

LPP 3.1.2 envisages the Local Centres recommended for Baldivis (including the Local Centre in this structure plan) being characterised by:

- Catchments of up to 5,000 residents, with walkability encouraged;
- Floorspace of up to 1500 square metres;
- Tenants such as convenience shops, limited specialty stores, personal services, with supermarkets *"generally not appropriate"*; and
- Potential for a mixed residential / commercial function incorporating 'shop-top' housing.

LPP 3.1.2 states that *"Further LC [Local Centre] development within Baldivis will not impact on the achievement of an appropriate hierarchy and is encouraged, as an overall net benefit will result if additional LCs are established."* Inclusion of land for a Local Centre in this structure plan and the neighbouring North-East Baldivis Structure Plan is therefore consistent with LPP 3.1.2.

Whilst a network of small Local Centres across Baldivis is desirable from the perspective of walkability, LPP 3.1.2 acknowledges that *"the development feasibility of LCs is very difficult to achieve".* The Retail Needs Assessment ('RNA') prepared to accompany this structure plan (refer Appendix 7) reflects the intention of this structure plan to accommodate a small supermarket with the Local Centre to support its chances of delivery. Section 2.4.4 of LPP 3.1.2 states that a Retail Sustainability (Needs) Assessment will be needed if, relevantly, a proposal for a supermarket in a Local Centre is made.

The North-East Baldivis Structure Plan states that demand will exist for *"…a Local Centre of 1500sqm, which will attract support businesses such as accountancy, barristers and solicitors, training specialists, people services/business coaching, personal training and/or health and wellness coaches…property development consultants and the like".* This may be the case, but the RNA suggests that in reality, *"it is highly improbable that these business types could be attracted to a small Local Centre…that is not anchored by a major customer attractor such as a supermarket".* The RNA notes that *"very few – if any – non-supermarket-anchored Local Centres"* have commenced operation in Perth and Peel over the past decade, which mirrors the difficulties experienced by many centres of that nature in established suburbs in recent decades.

The outcome of this is that in practice, Local Centres are usually either:

- Small, consisting of nothing more than a café or restaurant occupying perhaps 250sqm; or
- Larger than the 1500sqm of floorspace often prescribed for them, enabling inclusion of a small supermarket (ca. 1500sqm; as opposed to the full-line supermarket (ca. 3500sqm) that characterises Neighbourhood Centres).

The RNA concludes that a small supermarket within proposed Local Centre would be appropriate. It will anchor the centre and assist the establishment of small shops, and is sustainable in the context of the activity centre network in Baldivis for several reasons:

- Millars Landing does not fall within the dedicated catchment of any of the existing or planned Neighbourhood Centres in LPP 3.1.2 or any other planned centre;
- There is no appreciable overlap between the catchment of the Pug Road Local Centre and that of the other Neighbourhood Centres in LPP 3.1.2 or any other planned centre;
- The ultimate resident population at Millars Landing (approximately 4100) is sufficient, in itself, to support a small supermarket in the context of surrounding centres. The Local Centre would not impact the delivery and sustainability of the other Neighbourhood Centres in LPP 3.1.2; and
- Failure of the Local Centre to eventuate (which is likely if a supermarket is not accommodated) would result in an inequitable provision of retail floorspace across the catchment.

Provision of a small supermarket within the Local Centre shown in LPP 3.1.2 and reflected in this Structure Plan (and the approved North-East Baldivis Structure Plan) will ensure an appropriate and sustainable level of service for local residents in terms of commercial floorspace and the employment opportunities that brings.

Development is likely to proceed in stages, with the first stage likely to consist of a café adjacent to the Baldivis Tramway reserve and a supermarket to emerge later in response to local demand and to catalyse other tenancies.

3.7.2 Existing centres and employment opportunities

The structure plan area was identified and zoned 'Urban' in the MRS in recognition of its locational attributes relative to activity centres and employment opportunities.

The structure plan area is part of an urban precinct that has enjoys close proximity to activity centres and employment opportunities. The structure plan area is located approximately 6 kilometres north of the Baldivis District Centre, accessible via Baldivis Road, and approximately 3 kilometres south-east (by road) of the Wellard neighbourhood centre, which is also the location of the nearest railway station. Together, these centres will provide for the day-to-day retail and community needs of future residents, as well as some employment opportunities.

The Kwinana Secondary Centre and the Rockingham Strategic Metropolitan Centre are also readily accessible to the structure plan area and provide for a wider range of commercial, community and employment opportunities. In addition to these centres, the Kwinana industrial area and Jandakot Airport precinct are within a short commute. There are also expansive areas of planned industrial at the Latitude 32 estate and at Mundijong and North-East Baldivis, both on Mundijong Road.

3.8 Infrastructure Co-ordination, Servicing and Staging

Engineering consultants Tabec have prepared a detailed Engineering Servicing Report (June 2016; see Appendix 8) demonstrating that although upgrades and extensions to service infrastructure in the local area will be required, there are no site-specific constraints to the structure plan area being connected. Further, more detailed infrastructure planning and design will be undertaken as the development of the structure plan area proceeds.

The Engineering Servicing Report is summarised in the following sub-sections.

3.8.1 Earthworks

The objective of the earthworks design process is to provide flat, Class A building sites. This needs to be achieved in the context of the need to provide clearance to drainage and groundwater in an area subject to inundation. The vast majority of the structure plan area will need to be filled, with localised cutting required for drainage basins. The resultant flat development site will need to be retained only along interfaces with abutting land, such as along the Kwinana Freeway interface.

3.8.2 Wastewater

A Type 40 wastewater pump station (WWPS) has been constructed in the south-eastern corner of the structure plan area. This has been handed over to the Water Corporation and is gravity-fed from a catchment covering Millars Landing South (development of which is underway) and Millars Landing North (the subject of this structure plan). The WWPS discharges through a pressure main in the Pug Road reserve into another pressure main in Baldivis Road. Ultimately, wastewater from the structure plan area is destined for the Kwinana Wastewater Treatment Plant.

A standard 30m odour buffer applies around the wet well of the WWPS.

3.8.3 Water Supply

A DN250mm water main was laid within the Baldivis Road reserve to service Millars Landing South. Planning and design for this infrastructure included preparation of water reticulation concept plans for Millars Landing South and North from this main. Millars Landing North will be serviced from a main proposed to be laid in the north-south Neighbourhood Connector shown in the North-East Baldivis (Millars Landing South) Structure Plan. In the event that development of Millars Landing North pre-dates completion of Millars Landing (South), a forward works package will be required to enable the structure plan area to be supplied with water.

3.8.4 Electricity Supply

Full implementation of the structure plan will generate a need for approximately 3.2 mega Volt amperes (MVA), which can be supplied through connection to existing infrastructure in Baldivis Road (the Brownell Gres feeder) or in the railway reserve (the Medina Sub-station feeder). Both are supplied by the Medina Sub-station on Thomas Road. Supply from the Waikiki Sub-station on Safety Bay Road may be required to augment the Medina supply. This will be resolved in due course depending on the staging of the structure plan area relative to others.

Distribution of electricity supply to individual dwellings will be enabled through provision of switchgear and transformers in the usual manner at the subdivision stage.

3.8.5 Telecommunications

Optic fibre will be laid throughout the structure plan area through an extension to infrastructure being provided in Millars Landing South. The developer will be responsible for providing pit and pipe infrastructure within which NBN Corporation will install cables.

3.8.6 Gas

The water main laid within the Baldivis Road reserve to service Millars Landing South (refer to Section 3.9.3 above) was accompanied by the provision of a gas main in parallel. In a similar manner, gas mains extensions will follow water infrastructure throughout the estate. Supply is likely to come through Millars Landing South, but there is a gas main in Millar Road that could be accessed depending on timing.

3.8.7 Staging

The structure plan will be implemented on a staged basis in response to commercial factors. It is currently anticipated that development will commence in the south-western corner or from near the primary school site in Millars Landing South. Commencement in the south-western corner would enable the construction of an entry road off Baldivis Road and the development of a sales office, display village and initial POS. Development would then likely proceed in a north-easterly direction.

3.9 Bushfire hazard management

A Bushfire Management Plan (Strategen-JBS&G, August 2020, refer Appendix 2; 'the BMP') has been prepared in accordance with SPP 3.7 as part of this structure plan. The BMP confirms that the structure plan responds appropriately to all bushfire hazards relevant to the structure plan area.

The BMP indicates that the primary bushfire hazard affecting the structure plan area is unmanaged 'Woodland', 'Scrub' and 'Grassland' within 150m of the boundary. These vegetation types occur within Bush Forever Area 349 (Leda Nature Reserve), road reserves (including the Kwinana Freeway) and private property. Internally, the Baldivis Tramway reserve, which crosses the site in a north-south direction, also presents a hazard. Consistent with advice provided by the City during pre-lodgement discussions, the Tramway has been mapped as 'Woodland'. It currently comprises mainly 'Grassland', however, revegetation to a natural 'Woodland' state is proposed as the ultimate scenario.

Other assumptions made by the BMP include that:

- An active recreation space (turfed) will be provided at the eastern end of the central POS;
- The Baldivis Road verge will be maintained in a low-threat state as far north as where the Tramway reserve deviates eastward;
- The land south of Pug Road develops in accordance with the North-East Baldivis (Millars Landing South) Structure Plan, significantly reducing the bushfire hazard from the south;
- The trees and associated understorey along Telephone Lane will be modified and maintained in a low-threat state (except those in the vicinity of the Tramway where it meets Telephone Lane); and
- No other management or maintenance of nearby vegetation occurs, including over the land zoned 'Urban Deferred'.

In the absence of final, subdivision-stage Landscape Strategies, which will be factored into the subdivision-stage BAL Contour Plan, most POS has been mapped as 'Woodland'. This represents a conservative approach that results in a worst-case scenario being mapped. Even with this approach, the post-development Bushfire Hazard Level assessment contained in the BMP (refer to Figure 16) concludes that all future development will be located on land with either a Low or Moderate bushfire hazard level or will be rated no higher than BAL-29 at the subdivision stage through provision of Asset Protection Zones and landscape management. This is all acceptable in the context of the requirements of SPP 3.7 for structure planning, and given the conservative approach described above, it is likely that the final bushfire hazard outcome for the structure plan area will be considerably less significant.

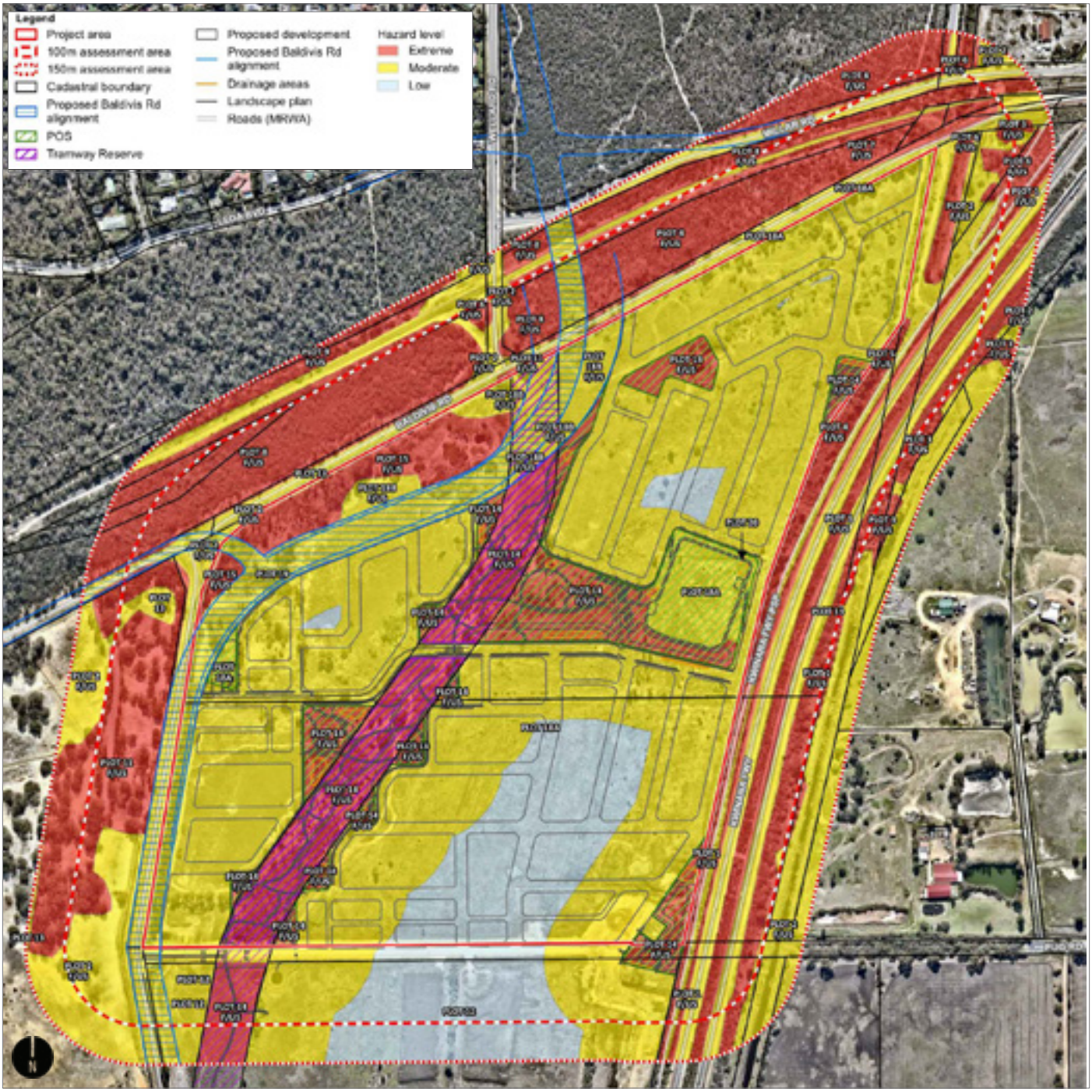

Figure 16 - Post-development Bushfire Hazard Level Assessment
Source: Strategen - JBS+G

Bushfire hazard management has been a key factor for this structure plan, and especially urban design and landscape design, from the outset. Perimeter roads (externally and along the Tramway) have been incorporated wherever possible and POS will be landscaped and managed to provide separation to remnant or rehabilitated vegetation. In this context, the BMP notes that the following specific bushfire considerations are relevant to the structure plan layout – the need for:

- Asset Protection Zones (APZs) for lots in close proximity to remnant and/or rehabilitated vegetation within the Baldivis Tramway reserve, through interfacing roads and managed POS;
- Separation from unmanaged vegetation within the Kwinana Freeway reserve and the 'Urban Deferred' land, through perimeter roads and managed APZs;
- Low-threat staging buffers to ensure management of vegetation during staged development;
- Maintenance of firebreaks for any balance lot/s during staged development;
- Provision of two access routes both at completion and on a stage-by-stage basis;
- Provision of a compliant turnaround area for any cul-de-sacs; and
- Provision of an adequate water supply and hydrant network to support fire-fighting activity.

The most significant on-site hazards ('Woodland' within the Tramway, and unmanaged vegetation within the Kwinana Freeway reserve and the 'Urban Deferred' land) can be managed through the maintenance of APZs, preliminary calculations for which are contained in the BMP.

The BMP concludes that with the above-listed measures taken, bushfire hazard management is readily achievable for the structure plan area. Further detail will be provided at the subdivision stage, in accordance with the requirements of SPP 3.7. At that point, a lot layout, staging program and final landscaping designs, among other details, will be available, and a BAL Contour Plan/s will be prepared.

3.10 Transport noise

As noted above, the structure plan area abuts the Kwinana Freeway and Baldivis Road, and is close to the Kewdale-Kwinana freight railway. These trigger consideration of the WAPC's State Planning Policy 5.4: Road and Rail Transport Noise ('SPP 5.4'). To address the requirements of SPP 5.4, a Transportation Noise Assessment ('the Noise Assessment') has been prepared. A copy of the Noise Assessment is available at Appendix 6.

The Noise Assessment was prepared in accordance with the SPP 5.4 Guidelines and uses noise monitoring and modelling to estimate the level of noise likely to be experienced by the structure plan area once developed. The Noise Assessment concluded that transport noise is not an impediment to residential development but that noise levels will exceed the relevant noise Targets without noise mitigation measures being implemented (refer to Figures 17 and 18). These mitigation measures comprise the following:

- A noise wall along the boundary between the structure plan area and the Kwinana Freeway reserve (wall height 3m) and a portion of the Telephone Lane reserve (wall height 2.5m); and
- Quiet House construction standards for dwellings along the eastern and northern boundaries of the structure plan area and a portion of the western boundary.

The recommendations of the Noise Assessment will be implemented at the subdivision and development stages as appropriate.

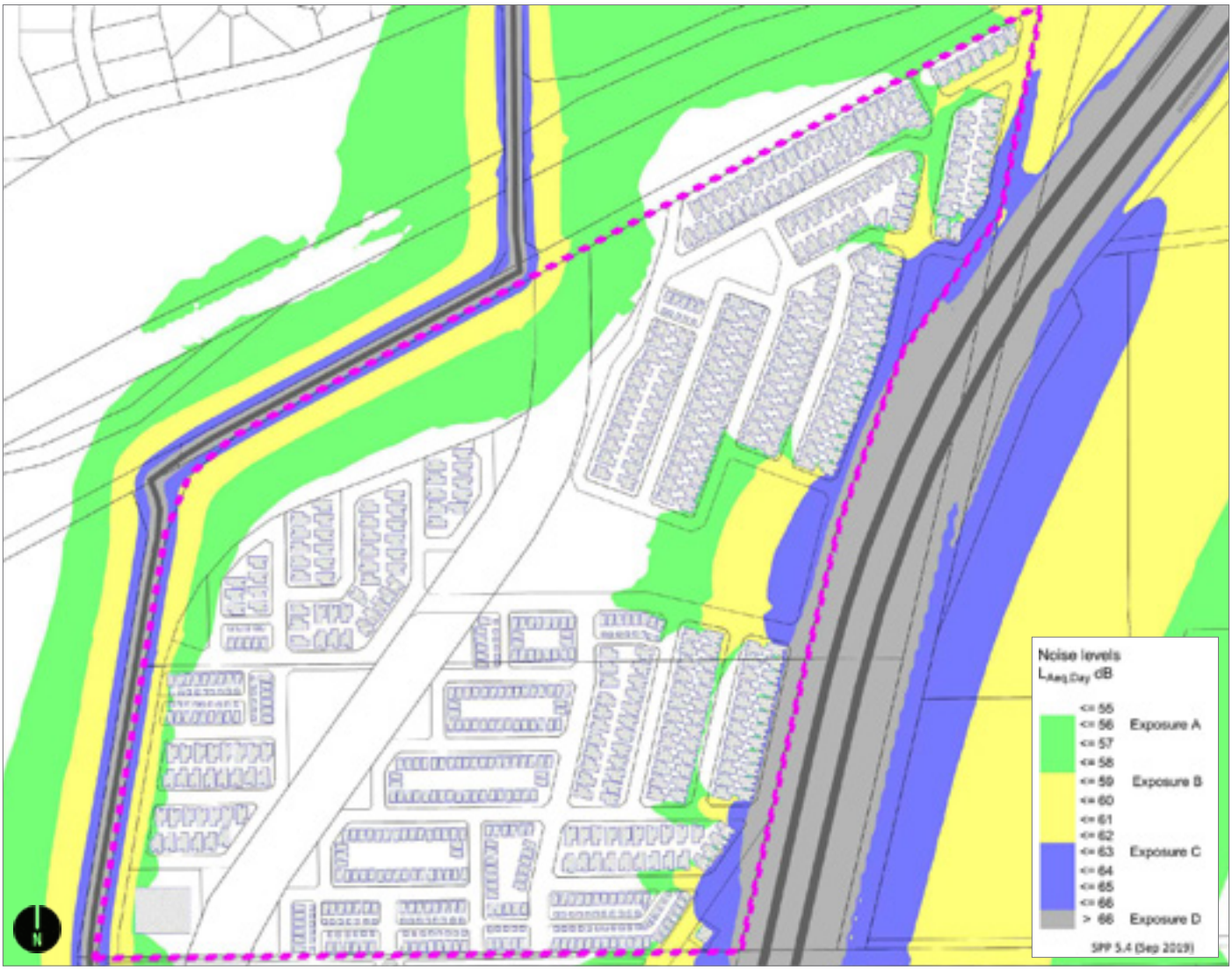

Figure 17 - Post-development Transport Noise Contours
Source: Lloyd George Acoustics

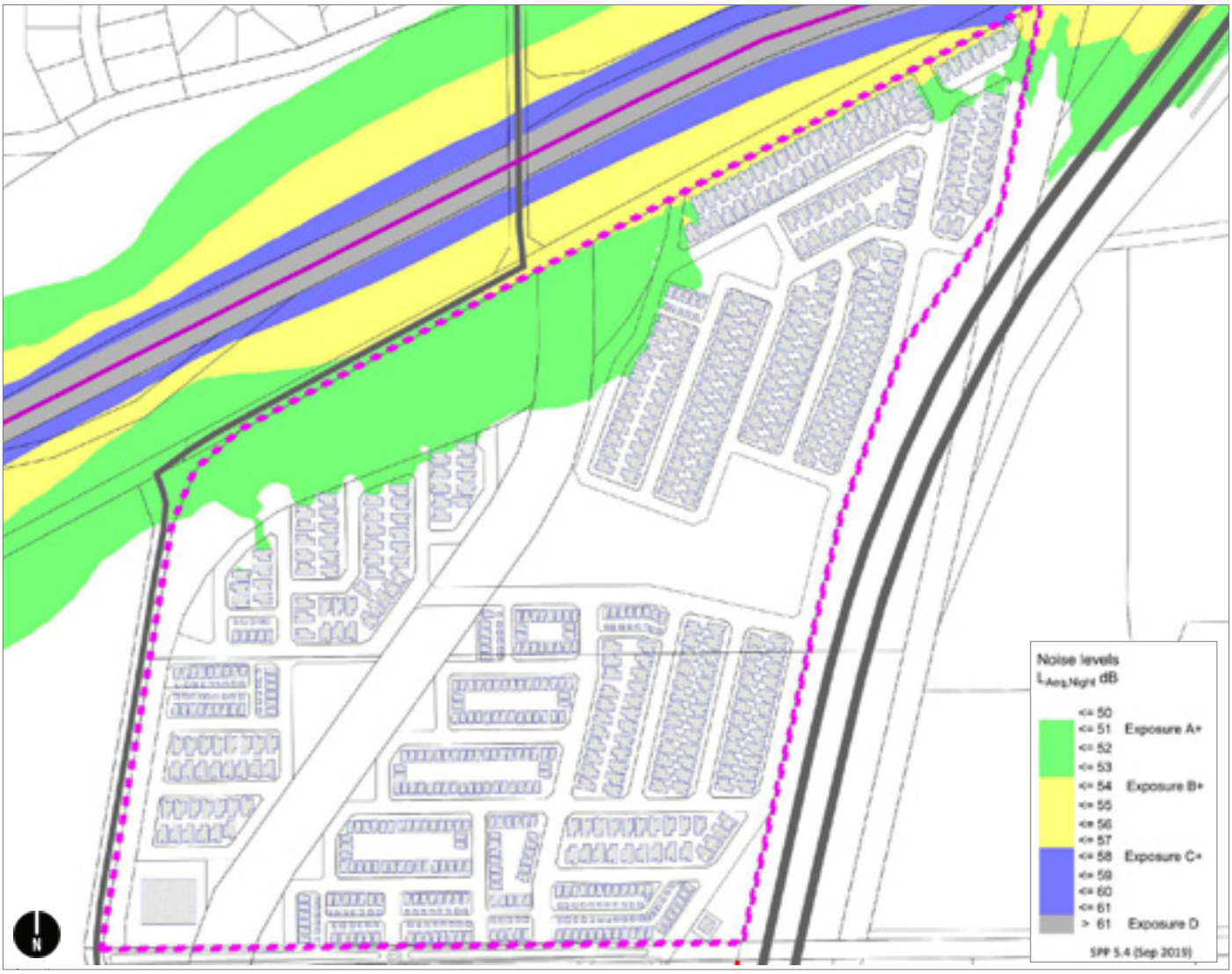

Figure 18 - Post-development Transport Noise Contours
Source: Lloyd George Acoustics

3.11 Developer contributions

The structure plan area is in single ownership. The developer will be taking responsibility for pre-funding and construction of necessary infrastructure upgrades as the structure plan is implemented. Contribution arrangements with other landowners/developers will be made privately as required and will not require input from or action by the planning system.

The structure plan area is within Developer Contribution Area 2 under the City of Rockingham Local Planning Scheme No. 2 (Schedule 12). DCA 2 applies to the majority of land developed for residential purposes in the municipality and the associated Development Contribution Plan (DCP) apportions costs for community infrastructure. Contributions will be made for the structure plan area in accordance with the DCP pursuant to a condition of subdivision approval at such time that lots are created.

Figure 19 - Tree Retention Plan
Source: Plan E