PART TWO (EXPLANATORY SECTION)

1.0 INTRODUCTION

1.1 Purpose

This report provides the planning rationale for the Structure Plan (SP) prepared for Lot 53 Kerosene Lane, Baldivis (herein referred as the "SP area").

A SP is generally required to be prepared and approved prior to subdivision and development of the land in a 'Development' zone under TPS 2 and in accordance with the *Planning & Development (Local Planning Schemes) Regulations 2015*.

The SP has been prepared taking into consideration the relevant planning framework and previous structure planning for urban development to the west and south of the SP area. The proposed SP (refer to **Plan 1**) integrates with the established urban development to the west and south and provides for appropriate connections to Kerosene Lane to the north and provision of Nairn Drive (MRS 'Other Regional Road') along the eastern part of the SP area. This is consistent with the approved *Baldivis North District Structure Plan* (DSP).

To inform the SP design and requirements, preliminary discussions have been held with key stakeholders, which is set out in the 'Pre-Lodgement Consultation' (**Appendix 7**). In addition, various technical investigations have been completed which are attached with the SP and forms part of the explanatory report.

2.0 LAND DESCRIPTION

2.1 Landownership & Description

This Structure Plan relates solely to Lot 53 on Diagram 43666 Kerosene Lane, Baldivis (Certificate of Title Volume 1361 Folio 982) (herein referred to as "the SP area"). The SP area is in freehold ownership of W Radonich and comprises approximately 11.16 hectares in area.

2.2 Location

The subject site is located approximately 39kms south of Perth CBD and 6km east of Rockingham Regional Centre. The coastline of Warnbro Sound and Shoalwater Bay Marine Park is approximately 7km to the west. Kwinana Freeway is accessible within 2kms to the east.

The SP area is within the Perth Metropolitan South-West Corridor and is situated within the municipality of the City of Rockingham and the locality of Baldivis. **Figure 1** shows the location of the SP area in the context of the locality of Baldivis and proximity to Rockingham and the Kwinana Freeway. **Plan 2** shows the Lot 53 cadastral boundaries of the SP area and neighouring context.

2.3 Existing Land Use

The subject site has been historically cleared and used as a market garden for the last 30 years. The market garden operation ceased some years ago (circa 2006), with the land now vacant, except for a large outbuilding in the central area. The metal outbuilding was used in market garden operations and is proposed to be demolished and removed as part of urban development.

2.4 Surrounding Context

The SP area is within the locality of Baldivis. **Figure 2** provides an overview of the SP in relation to surrounding locality.

As mentioned above, Rockingham Regional Centre is approximately 6kms to the west of the subject site. Rockingham is a substantially developed urban coastal strip, providing a high level of service and amenities. This includes commercial (retail shops, other retail, offices etc), civic, medical, health and community facilities.

3.0 PLANNING FRAMEWORK

STATE & REGIONAL PLANNING

3.1 Perth and Peel@3.5million

The Perth and Peel @ 3.5 million provides strategic land use planning documents to facilitate accommodation of a forecast population growth of 3.5 million for Perth and Peel regions by 2050. Within the context of this document, the subject site is located within the *South Metropolitan Peel Sub-Regional Planning Framework*.

The ***South Metropolitan Peel Sub-Regional Planning Framework*** provides a framework for delivering the objectives of Directions 2031 and Beyond. The subject site (and a broader area of Baldivis) is identified in the Framework as '*Urban'* forming part of the future urban footprint in the Perth Metropolitan south west area. Land identified as 'Urban' in the Framework is generally given higher priority for short – medium term urban development than 'Urban Expansion' and 'Urban Investigation' areas identified in the Framework. The subject site is proposed for urban development in the short term by the landowner. It is noted that the Framework does not identify any specific district or regional planning infrastructure for the subject site, other than the regional road requirement for Nairn Drive alignment.

3.2 Directions 2031

Directions 2031 establishes the vision for the future growth of Perth and Peel regions. It provides a framework in which population growth is to be accommodated. Directions 2031 seeks a 50% increase in the current average residential density of 10 dwellings per gross urban zoned hectare; and has set a target of 15 dwellings per gross urban zoned hectare of land in new development areas. This proposed Structure Plan achieves the targets set by Directions 2031 and this will be discussed further in this report.

3.3 Metropolitan Region Scheme

The SP area is predominantly zoned 'Urban' under the Metropolitan Region Scheme (MRS), with an approximate 40m wide strip along the eastern boundary reserved under the MRS as 'Other Regional Roads'. The land directly neighbouring the SP area to the south, west and east is also zoned 'Urban' under the MRS. The semi-rural land use and extractive industry to the north on the opposite side of Kerosene Lane is zoned 'Rural', with a portion reserved as 'Other Regional Roads' for the future extension northwards of Nairn Drive to connect with a westward extension of Mundijong Road.

3.4 *Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy*

The Draft Outer Metropolitan Perth and Peel Sub-Regional Strategy identifies the SP area as part of the "BA1" precinct with an estimated potential for future 3900+ dwellings. The SP area will thus contribute to the overall 'BA1' expected dwelling yield in the metropolitan urban expansion strategy. The proposed Structure Plan meets the target density of 15 dwellings per hectare, providing for an estimated 133 dwellings.

3.5 *Liveable Neighbourhoods*

Liveable Neighbourhoods (LN) has been prepared to guide the sustainable development of communities. It addresses both strategic and operational aspects of structure planning and subdivision for both 'greenfield' and urban infill sites.

The SP has been designed in accordance with the principles of Liveable Neighbourhoods, in particular, the layout of roads and POS. Consistent with LN, the SP provides a high level of connectivity with good external linkages to cycle, pedestrian and proposed future public transport networks (i.e. Kerosene Lane and Nairn Drive as potential future bus routes). The road design in the SP is legible and reduces car travel distances by creating alternative routes in a modified grid pattern. These aspects are further addressed in the report when referring to the indicative Subdivision Concept Plan (**Plan 3**) for the SP area. LN elements that deal with lot design interface with regional roads, such as Nairn Drive, is addressed in further details under Section 5.5 of this report.

LN encourages walkable access to activity nodes and POS. Within the SP, there are no commercial activity nodes in or adjacent the SP. The SP does propose a relatively large POS neighbourhood park, whereby all lots are within 400 metres walking distance from the POS. This provides residents in the SP with opportunities for active lifestyle and recreational pursuits within 5 minutes walking distance from residences. The Spudshed Neighbourhood Centre is approximately 600 metres to the west and will be accessible via a direct east-west pathway in the southern verge along Kerosene Lane.

Consistent with LN, it is important for the SP design to respond to site characteristics and site context. The SP design has taken into consideration the natural topography, surrounding land uses, solar orientation and existing developments. Proposed lots can achieve an E-W or N-S orientation, which provides good opportunity for solar orientation for dwelling design and outdoor living areas. East – west orientated lots are shown in the Subdivision Concept Plan to have adequate lot frontages (i.e. 12.5m wide), which provides opportunity for dwellings to setback from northern boundary to allow opportunities for natural light and solar access.

Within the SP, lots that face parkland increase opportunity for passive surveillance and interaction with public spaces. Lot shape and proportion of width to depth is considered important and the lots in the SP have been designed to be rectangular in shape with a greater depth than width wherever possible. This ensures ability to develop the lots with high quality housing and builtform and conformity with the Residential Design Codes of Western Australia. Other aspects of LN principles, such as local water management and, diversity of lot sizes and target residential density are addressed further in the SP report.

3.6 State Planning Policy 3.7 Planning in Bushfire Prone Areas

The provisions of SPP 3.7, including the WAPC *Guidelines for Planning in Bushfire Prone Areas* apply to the proposed urban development within the SP area. As will be discussed in this report, the proposed SP can adequately address the requirements of SPP 3.7.

3.7 State Planning Policy 5.4 Road and Rail Transport Noise and Freight Consideration in Land Use Planning

Under the WAPC SPP 5.4, the appropriate acoustic criteria for urban development of the SP area will need to address acceptable 'Noise Limits' for sensitive land uses. Nairn Drive is a future MRS 'Other Regional Road' carrying significant traffic volumes which are above the threshold for which SPP 5.4 applies. As such, adequate noise measures will be required for any proposed sensitive land uses in accordance with SPP 5.4. This will be discussed in more detail in this report, whereby it can be demonstrated that the SP can adequately address the requirements of SPP 5.4.

3.8 City of Rockingham Town Planning Scheme No. 2

The SP area is zoned 'Development – DA22' with a density code R20/R40 under TPS2. As the subject land is englobo undeveloped urban zoned land, it is considered that proper and orderly planning requires the preparation and approval of a Structure Plan, prior to any subdivision and development.

The 'Deemed Provisions' of the *Planning and Development (Local Planning Schemes) Regulations 2015* set out the procedures for the preparation and approval of Structure Plans. This proposed SP has been prepared in accordance with the Regulations and WAPC *Structure Plan Framework* 2015.

It is envisaged that once the Structure Plan has been approved (setting out the proposed land use zones and reserves) and urban development established, the zoning of the SP area can be *normalised* under a TPS amendment (i.e. via TPS review).

3.9 City of Rockingham Urban Growth Programme

The City's Urban Growth Programme (UGP) was finalised in 2009 to provide an understanding of the likely pattern of urban growth within the City's municipality consistent with the State's planning direction. The UGP considers existing established areas, population and dwelling statistics, approved Structure Plans and future structure planning areas. The SP area forms part of the urban growth area anticipated by the City for 'Precinct 2' (Baldivis North) area being south of Kerosene Lane.

3.10 Baldivis North District Structure Plan

The Baldivis North District Structure Plan (DSP) was finalised in July 2000 and provides for a district level structure plan which provides the framework and sets out the principles for the residential and urban development of Baldivis north of Safety Bay Road. The DSP has been designed with regard to the principles of Liveable Neighbourhoods, including walkable catchments around activity centre nodes.

No community infrastructure (i.e. schools or centres) are proposed in the DSP for the SP area. However, the DSP identifies the need for a major north-south orientated MRS 'Other Regional Roads' reservation (Nairn Drive) along the eastern portion of the subject site. The proposed SP provides for the necessary reservation (i.e. 40m wide road reserve) for this MRS ORR, with any further road widening for intersection treatments (i.e. Kerosene Lane) to be determined at the detailed road design stage at subdivision.

3.11 City of Rockingham Planning Policy No. 3.3.22 (RMD Codes)

The SP area is a *greenfield* urban development site that requires structure planning. The City's Policy provides for new residential development, on lots within greenfield structure planning urban areas, to utilise the RMD Code provisions as per WAPC's Bulletin No. 112/2016 (April 2016). The SP area is to be included in 'Appendix 2' of the Policy as an area where the RMD Codes apply to new created lots.

4.0 SITE CONDITIONS & ENVIRONMENT

4.1 Topography

The subject site generally slopes (with an average grade of 4%) from east to west with elevations ranging 17.5m AHD in the north-west corner to 29m AHD in the north-east corner. The natural topography of the subject site has no significant topographical constraints to urban development and can be adequately managed through appropriate earthworks to create serviceable lots.

4.2 Geology and Soils

The *Perth Environmental Geology Mapping* as referenced in the Structure Plan Local Water Management Strategy (LWMS) (**Appendix 1**) identifies the subject site as predominantly consisting of:

'LS1' – limestone, pale yellowish brown of aeolian origin comprising *Tamala Limestone and Safety Bay Sand*.

This soil type characteristically has ability to attenuate pollutants due to lime and small clay content. The soil material characteristics also has good groundwater recharge capability, having high permeability. Meaning the generally coarse sandy soils will allow for high infiltration and soakage at source.

Overall, the predominant soil type as mentioned, found throughout the subject site, is considered suitable for urban development.

4.3 Hydrology

Groundwater

The Department of Water *Perth Groundwater Atlas* (2003) shows groundwater flow from east to west at a depth of approximately 6m AHD and around 11.0m – 13.5m below existing natural ground levels and proposed development levels. A more detailed analysis of groundwater in and around the subject site is provided for in the LWMS. In general there are no areas of the site that are subject to inundation or shallow groundwater. The groundwater maximum height levels as indicated in the LWMS indicate the level of groundwater will not have a significant impact on development levels and for purposes of stormwater drainage disposal and urban water management.

Surface Water & Wetlands

The subject site contains no natural permanent or perennial surface water bodies (i.e. creeks or wetlands etc). Sheet drainage occurs across the site, however as mentioned the well graded sands of high permeability lead to rapid infiltration and soakage at source. There are no surface water features in proximity to the subject site on neighbouring surrounding properties.

There are no Ramsar or EPP wetlands within the SP area identified in the DEC database *Geomorphic Wetlands of the Swan Coastal Plain*. Accordingly the SP area is unaffected by any localised surface water features.

4.4 Acid Sulfate Soils

A desktop assessment to determine the presence of Acid Sulfate Soils (ASS) indicates it is unlikely that there be any ASS affecting the SP area. WAPC ASS mapping indicates the subject site to have a 'Low to no risk of Acid Sulphate Soils'. Notwithstanding, any development within the SP will require a preliminary site investigation to be undertaken prior to any subdivision and or development.

Should any development be proposed within areas identified to contain ASS, a detailed geotechnical ASS investigation would be carried out to inform the preparation and approval of an ASS management plan, prior to works being undertaken. This would generally be undertaken as a condition of subdivision approval.

4.5 Flora & Vegetation

The SP area has been cleared in the past for horticultural pursuits and currently the subject site contains grasses and weeds. The predominant grasses and weeds are Kikuyu, clover, fleabane, lupins and cape weed. There are no trees on the site.

Vegetation condition assessed to the following criteria (Keighery, 1993):

Classification	Vegetation Condition
Pristine	Pristine or nearly so, no obvious signs of disturbance
Excellent	Vegetation structure intact, disturbance affecting individual species and weds are non-aggressive species
Very Good	Vegetation structure altered, obvious signs of disturbance
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as being 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs

Keighery, B (1994) *Bushland Plant Survey, Guide to Community Survey for Community, Wildflower Society WA*

In classifying the existing vegetation condition using Keighery (1993), the vegetation within the subject site is classified as being 'Completely Degraded'.

Based on the above, a Level 2 Flora & Vegetation Survey has not been deemed to be necessary due to the extreme unlikelihood that the SP area contains any significant environmental assets (including possible threatened flora or fauna).

An Environmental Statement (**Appendix 5**) indicates that there are no significant environmental assets (i.e. TECs, Priority Flora etc) that the SP needs to protect and manage.

4.6 Fauna

A Level 1 Fauna Survey has not been conducted as the SP area contains virtually no significant environmental assets that would provide natural habitat for fauna, such as Black Cockatoo. For instance there are no trees or pockets of remnant vegetation on the subject site that could provide natural habitat. Accordingly there are no significant fauna habitats that need to be managed in the proposed SP.

4.7 Bushfire Management

The SP area is located within the Department of Fire and Emergency Services Bushfire Prone Mapping. A Bushfire Management Plan (BMP) has been undertaken over the SP area (**Appendix 4**). The BMP Assessment demonstrates that the SP area is not significantly impacted by bushfire hazard risk and is capable of supporting urban development, whereby the threat of bushfire from internal and neighbouring bushfire hazards can be adequately addressed and managed in accordance with WAPC *Guidelines for Planning in Bushfire Prone Areas* (Version 1.3, December 2017).

The BMP demonstrates that potentially urban development for residential lots could achieve BAL ratings not exceeding BAL-29. There are no issues with provision of secondary emergency access (in a different direction) as future internal structure plan road connections can be provided to existing roads to the north, west and south.

Accordingly there are no significant bushfire hazards or risks that cannot be adequately managed as part of the Structure Plan to accommodate future urban development of the SP area.

4.8 Contamination

The subject site contains no listed 'Contaminated Sites' on the Department of Environment Regulation contaminated sites database. There are 'Remediation for restricted uses' sites to the south of the SP area situated between Fairchild Drive, Fifty Road, Firebrand Grove and Marron Chase. However there are no contamination issues impacting the SP area.

Notwithstanding, given the SP area has historically been used for horticultural pursuits, at subdivision stage a preliminary site investigation would be required to check the site for any potenital contamination of residual chemicals that may have been used for horticulture. If the PSI outcome finds any traces of contaminants, these will need to be remediated as part of subdivision.

4.9 Transport Noise

The proposed urban development within the SP area will be adjacent to Kerosene Lane and the future Nairn Drive MRS 'Other Regional Road'. Future traffic flows for Kerosene Lane (Neighbourhood Connector B) are significantly below the threshold for which SPP 5.4 applies. However, the expected traffic volumes for Nairn Drive will be above the noise threshold and as such, adequate noise mitigation will be required for sensitive land uses (i.e. residences) abutting Nairn Drive.

An Acoustic Assessment (**Appendix 2**) has been undertaken to determine the noise impact of Nairn Drive and appropriate noise mitigation measures to allow residences to be adjacent Nairn Drive road reserve.

The noise modelling indicates that without any noise amelioration, noise received at the residences located adjacent to the future Nairn Drive road reserve would exceed the 'Noise Limit' criteria under SPP 5.4. The Acoustic Assessment identifies that residences can be acceptably located abutting Nairn Drive road reserve, with the following noise mitigation strategies:

- Construction of a 2.2 metre high (noise wall) barrier at the boundary to Nairn Drive (similar to the developer uniform barrier constructed in the development to the south). The noise wall may need to extend along the boundary of lot/s abutting the POS, where the open style uniform fence creates openings which allow noise to penetrate; and

- Residences as identified in the Acoustic Assessment that are adjacent to Nairn Drive incorporating SPP 5.4 'Quiet House Design Package A' building design elements into the residences.

4.10 Proximity to Extractive (Sand) Industry

There is an existing Extractive (Sand) Industry situated in proximity to the SP area on the northern side of Kerosene Lane. The quarry operations is expected to continue in the years ahead, subject to strict development controls to minimise impacts to existing urban development to the south.

The EPA Guidance Statement No. 3 – 'Separation Distances between Industrial and Sensitive Land Uses' suggests, in the instance of the quarry size and scale of operations to the north, a generic buffer distance of 300m from quarry operations to sensitive land uses such as residential be applied. However, urban development neighbouring and extending to the west of the SP area has been permitted to occur within the buffer. Urban development within the buffer has generally been accepted on the grounds that potential noise and dust impacts would be easily manageable as:

(i) the quarry excavation operates below the level of Kerosene Lane;
(ii) quarry operations are further minmised by existing 'earth bunds' and vegetation;
(iii) quarry operations do not result in any blasting activities; and
(iv) there is no direct quarry vehicle access/egress from Kerosene Lane.

Urban development that is within the 300m buffer is therefore considered acceptable, however notwithstanding, notifications on titles advising of possible infrequent noise/dust impact from the quarry operation is considered necessary at subdivision stage, as stated in the Part One Section 4.3.

5.0 STRUCTURE PLAN

5.1 SP Proposed Land Uses

The proposed Structure Plan land uses respond to the opportunities and constraints (**Plan 8**) characteristics of the site. The proposed land uses shown in the Structure Plan will generally guide future subdivision and development of the land. Once the SP is adopted 'Deemed Provisions' require the SP be given 'due regard' by decision makers with respect to future subdivision and/or development within the SP area.

5.2 Residential Densities and Yield

The SP potentially provides for approximately 133 dwellings (at ultimate development) with a base density coding of R25 and R30 density around the public open space. Proposed development as provided by the SP could accommodate up to approximately 372 people based on an average household of 2.8 persons.

The proposed range of R25 and R30 densities provides opportunity for a mix of single dwellings on medium density sized lots, typically ranging 330m^2 – 450m^2, with some larger lots above 500m^2. Table 1 outlines the estimated dwelling yield based on the Subdivision Concept Plan (SCP) shown in **Plan 3**.

Table 1. Estimate of the residential dwelling yield of the SP

RESIDENTIAL LOT TYPE	DENSITY	YIELD	HOUSING TYPES
Medium density residential Typical lots in the SCP 12.5m x 30m 15.0m x 30m	R25 - R30	133	Single Dwellings
SP Estimated Potential Dwelling Yield		**133**	

Table 2 provides a snapshot of development statistics based on the SCP and analyses the effectiveness of the based density code of R25 in terms of achieving set target densities under Directions 2031 and Liveable Neighbourhoods.

Although the SCP is indicative only at this SP level of planning (and not the subject of approval), the SP technical reports have been based on the SCP. The SCP provides a point of reference to demonstrate the capability of the proposed SP design over the SP area. The technical investigations undertaken for the SP proposal could therefore provide the basis for future subdivision of the SP area, based on the SCP.

Table 2 demonstrates that the SP design and base density code of R25 delivers approximately 27 dwellings per *site hectare*, which meets the Liveable Neighbourhoods density expectations for the site's locational context with regard to activity centres and major transport networks. Similarly, the SP delivers approximately 17 dwellings per gross urban hectare, which meets the target density of 15 dwellings per gross urban hectare under Directions 2031.

Table 2 Development Statistics (based on Subdivision Concept Plan)

	Site Outcomes	Target Density
Total SP Area	111,600m^2	-
Area set aside for roads (inc Nairn Drive), drainage & POS	55,419m^2	-
Balance area for residential development	56,181m^2	-
Estimate ultimate number of dwellings	133 dwellings	-
Estimated number dwellings per *site hectare*[1]	24 dwellings/ha	**Liveable Neighbourhoods** 12 – 20 dwellings per site hectare for standard lot layouts; or 20 – 30 dwellings per site hectare for areas within 400m of neighbourhood centres
SP target density per *gross urban hectare*[2]	15 dwellings/site ha (Excludes MRS reserved land 2.33ha Nairn Drive)	**Directions 2031** 15 dwellings per gross urban hectare

[1] Liveable Neighbourhoods definition of *site hectare* is the area available for residential development excluding roads, non-residential uses, public open space and drainage areas.

[2] Directions 2031 definition of *gross urban hectare* is the gross area available for urban development.

5.3 Housing Typologies

The SP provides opportunity for a range of predominantly 350m^2 and 450m^2 (front loaded) lot typology. This range of lot size is sufficient to accommodate a variety of housing built form, including 4 x 2 and 3 x 2 single dwellings, of which can accommodate a diversity of household types, including families, young couples or retirees.

The SP proposes terraced level sites that are generally ideal as a building site and which also reduces housing cost, creating more affordable housing. The use of retaining walls within development will allow for the general landform to be retained, whilst also providing quality homesites and lot sizes consistent with optimal and viable lot yield.

There is a relatively high diversity of existing and proposed housing stock within the Baldivis North area. For instance, to the west of the SP area around the proposed Spudshed Baldivis Neighbourhood Centre some high density (R60) housing and possible low scale apartments are provided for in the Paradiso Estate structure plan. Further west is the Tuart Lakes Lifestyle Village, which caters for aged and retirement accommodation.

The SP provides a reasonable mix of housing lot typologies for its context within Baldivis North, whereby there are no activity centres or community facilities within the SP that would support higher density housing. The SP housing density and mix is therefore responsive to its context within the Baldivis DSP.

5.4 Use of Local Development Plans

A Local Development Plan (LDP) is likely to be required for certain lots within the SP, particularly those lots directly adjacent to Nairn Drive. Lots adjacent to Nairn Drive will require 'Quiet House Design' building design to address transport noise in accordnace with SPP 5.4. In addition, lots affected by bushfire hazard risk as outlined in this SP will also require inclusion in an LDP to address the requirements of SPP 5.4.

An LDP for the SP can be prepared and approved at subdivision stage, to provide the mechanism for built form development controls to be put in place for a high quality development outcome, which maximises the site's potential, makes efficient use of urban zoned land and addresses necessary planning requirements.

5.5 Street Layout

The Structure Plan layout has been designed to satisfy LN principles and objectives. The SP proposes a site responsive street network that provides access from the existing road network to the north, south and west. The SP also provides for the extension of Nairn Drive from the south to connect with Kerosene Lane to the north. Appropriate intersections are allowed for at Kerosene Lane and Fairchild Drive with Nairn Drive, in addition to a proposed restricted 'left-in/left-out' intersection connection with Dunning Street (extension).

The proposed local access roads is consistent with the local road hierarchy and Baldivis North DSP. Once existing roads immediately to the west are linked with future roads within the SP, this will reinforce legibility. The SP design provides adequate connections for future urban development of the land to the east, via provision of Nairn Drive along the eastern boundary of the SP area.

Use of nib roads has been eliminated wherever possible, however it is noted in the adjoining western subdivision that the City's required minimum width for nib roads is 10m, which has been provided in the Subdivision Concept Plan.

LN encourages lots to be orientated towards arterial roads in order to provide for passive surveillance and reduce the appearance of 'blank walls' along arterial roads. The Structure Plan has provided wherever possible for lots to be orientated to Nairn Drive, through the use of minor road(s) abutting parallel to Nairn Drive. This is shown in the Subdivision Concept Plan (Plan 3). Lots have been shown in the SP to back onto Nairn Drive as there is limited ability and difficulty in providing 'slip road' interface along the entire length and interface with Nairn Drive, due to topographical constraints and the balance width of the subject site after the regional road land area requirements for creation of Nairn Drive have been provided.

The level of Nairn Drive will be higher than the proposed subdivision lots. As such an abutting (slip road) would not provide a suitable interface with Nairn Drive as residential lots abutting Nairn Drive would be lower by approximately 3m north of Dunning Street and approximately 0.5m lower immediately to the south of Dunning Street. The area of the Structure Plan where a slip road has been provided abutting Nairn Drive to provide for lot orientation towards Nairn Drive is the most suitable area in the Structure Plan where residential lots can be orientated towards Nairn Drive fronting a slip road. In this area the lots and Nairn Drive will be at similar finished levels. It is noted that for the Structure Plan on the eastern side of Nairn Drive, the natural topography allows for residential lots to be 1.0m – 3.0m higher than the finished level of Nairn Drive. Therefore the LN elements for lot design fronting an arterial road can be much more readily accommodated on the land on the eastern side of Nairn Drive.

In addition to the topographical constraints of the subject site in orientating lots towards Nairn Drive, the relatively narrow width of the subject site after ceding land for the creation for Nairn Drive presents another constraint to orientation of lots (i.e. via a slip road) to Nairn Drive. After removal of the 40m wide regional road reservation, the balance subject site is much narrower and the natural topography of the site is more preferable for north-south orientated roads and lots. Provision of slip roads would result in squeezing the developable area even more thus reducing development efficiency. The street block dimensions shown in Plan 3 and the Structure Plan lend towards a more efficient design with better built form outcomes for residential lots in creating a higher amenity residential environment for residents, in accordance with LN principles. Plan 3 responds well to the subject site's natural topography in the context of the planned finished road level of Nairn Drive.

LN also suggests that lots should orientate along arterial roads, to enable possible future business or home-based business. However, Nairn Drive is not suitable for this purpose as no on-street parking will be provided within Nairn Drive, having a primary purpose of moving large volumes of traffic at speed. Nairn Drive will not be a high amenity pedestrian "main street". Accordingly the Structure Plan proposes limited activation to Nairn Drive, with preference to orientating lots internally to proposed local access roads to reinforce a higher amenity residential streetscape environment.

Street blocks which are orientated east-west, which could lead to creation of service roads adjacent to Nairn Drive, is not preferred. Such layout would result in a substantial increase in area of unnecessary road reserve and road pavement to construct. This would result in an unacceptable increase in development cost impacting on housing affordability.

Furthermore, providing service roads adjacent to Narin Drive would result in undesirable inefficiencies (i.e. development on one side of road) which should be avoided.

Similar with other projects abutting a future regional road, a uniform (developer constructed) Noise Wall, similar to existing noise wall to the south, is envisaged abutting Nairn Drive to satisfy noise mitigation. Any service roads adjacent to the noise wall would result in residential lots fronting the service road and facing straight into a noise wall, which has low amenity and appeal. For this reason lots will face the internal subdivision road as shown in Plan 2 and no service road is provided.

A slip road has been provided adjacent to Kerosene Lane, similar to Mozart Lane further to the west, to increase passive surveillance of Kerosene Lane by orientating some of the lots towards the road. This assists in breaking up any solid boundary fencing along Kerosene Lane and increases permeability for pedestrians and cyclists.

Orientation of roads either to create north-south or east-west neighbourhood blocks has been provided to assist with efficient urban water management, as the topography and SP area generally slopes from east to west. The SP proposed roads

will ultimately function as a multi-purpose public space, designed to accommodate and balance traffic management with other functions such as community space, safe pedestrian environment, vehicle parking and as an entrance into the residential environment. The width of the proposed roads (to be determined at subdivision stage) will allow for the construction of footpaths consistent with LN.

The location of the Public Open Space (POS) has largely been determined by urban water management. The site for the POS is considered to be optimal for multiple use function to accommodate urban stormwater infrastructure and for active and passive recreation. The POS will also provide an effective 'break' in the uniform noise wall adjacent to Nairn Drive.

5.6 Population & Employment

Based on an average household size of 2.8 persons per dwelling, the SP would result in a residential population of approximately 372 people for the proposed 133 dwellings that could be developed, as shown in the SCP.

The SP area forms part of the northern-most edge of a new *greenfield* growth area in Baldivis north area. There is an expectation for new urban growth areas to provide for opportunities for local employment, promoting concepts of self-sufficiency as those stated in Liveable Neighbourhoods.

No commercial, community, public use or mixed use land is proposed in the SP, as these land use types have not been identified to be provided in the SP area under the Baldivis North District Structure Plan (DSP).

In terms of local employment opportunities (i.e. within 400m – 800m walking distance) there are areas provided in the DSP, such as the local activity centre to the south and future public primary school within the neighbouring Paradiso Estate to the west. In addition, the Spudshed Baldivis Neighbourhood Centre is currently under construction within approximately 500m – 800m to the west of the SP area.

Within 11km to the north-west is the Rockingham Regional Centre, which is a strategic employment centre outside of Perth CBD. Opportunities for home-based employment within the SP would exist under the provisions of TPS2 in a 'Residential' zone.

5.7 Transport Noise

Noise mitigation measures will be required for lots adjacent to Nairn Drive to address transport noise (as recommended in the Acoustic Assessment – Appendix 2). This includes provision of a 2.2m high noise wall along Nairn Drive. The location of the POS will assist in 'breaking up' the noise wall.

In addition, lots identified in the Acoustic Assessment will require 'Quiet House Design'. This will be subject to further investigation at the subdivision stage as set out in Part One Section 4.7. Affected lots would be required to have notification on titles advising of potential noise generated from Nairn Drive traffic as provided for in Part One Section 4.3.

6.0 MOVEMENT NETWORK

6.1 Existing Movement Network

Regional & District Road Network

The SP area is approximately 1.5km east of Mandurah Road to the west, which is reserved as 'Other Regional Roads' under the Metropolitan Region Scheme and approximately 1.4 kilometres west of Baldivis Road. Mandurah Road and Baldivis Road are both classified under the Main Roads WA (MRWA) regional hierarchy as 'Regional Distributor' roads.

The Mundijong Road interchange with Kwinana Freeway ('Primary Distributor') is approximately 3 kilometres east of the SP area. There is good accessibility to the subject site via these regional and district level roads. There is also a planned westward extension of Mundijong Road as reserved under the MRS.

Local Road Network

The SP has its main frontage to Kerosene Lane and Fairchild Road, with potential connections to the local access streets of Kingcote Road, Chilvers Road and Dunning Street.

Kerosene Lane is classified as an 'Access Road' under the MRWA regional hierarchy and has a posted speed limit of 60km/hr (recently reduced from 80km/hr due to urbanisation along Kerosene Lane). Kerosene Lane is a single undivided carriageway with an 8 metre wide seal and 3 metre wide unsealed shoulders. The road has central line marking, however there is no kerbing or formal drainage infrastructure provided within the Kerosene Lane section abutting the SP area.

Fairchild Drive is a local access road connecting with Nairn Drive and extending into established urban areas to the west.

6.2 Proposed Movement Network - Roads

A Transport Assessment (TA) (**Appendix 6**) has been prepared for the proposed Structure Plan. The TA has been based on the Subdivision Concept Plan contained in this report, which proposes approximately 133 dwellings. The TA indicates that the proposed intersections with the SP local access road network with Fairchild Drive and future Nairn Drive are acceptable and will require no specific treatment of intersections (including turning pockets).

There are no safety or unacceptable risks to road users, or operational issues identified as a result of traffic modeling and transport assessment, that cannot be managed through appropriate design protocols.

Road Widening and Road Upgrades

Kerosene Lane is proposed to function as a single carriageway (urban standard) 'Neighbourhood Connector A' road connecting the SP development with the regional, district and local road network. The section of Kerosene Lane adjacent the SP area is intended to be upgraded, consistent with the upgrading of Kerosene Lane to the west by other developers as part of urbanisation. Road widening is proposed to be taken along the Kerosene Lane frontage of the SP area, to accommodate the future upgrading of Kerosene Lane. This is consistent with development to the west and upgrades to Kerosene Lane. In addition, road widening is proposed for Fairchild Drive to provide for its intended function as a neighbourhood connector road. The Structure Plan therefore provides for the road widening requirements. As the exact dimensions and area for road widening will be finalised at subdivision stage as part of detailed engineering design to the satisfaction of the local authority.

Nairn Drive is reserved as 'Other Regional Roads' under the MRS and is currently constructed as a single carriageway road between Fairchild Drive and Fifty Road. Nairn Drive is proposed to be extended through the SP area to connect with Kerosene Lane. Ultimately it will become a dual carriageway, extending north to Munjijong Road and south to Paganoni Road.

It is envisaged that the developer will construct Nairn Drive to the normal standard of full earthworks, one sealed carriageway with required kerbing and piped drainage and street lighting. The ultimate upgrade to a dual carriageway will be undertaken in the future by City of Rockingham.

The TA notes that the adjacent residential street network to the west currently provides good permeability and connectivity to Kerosene Lane and Fairchild Drive (and ultimately to Nairn Drive). As such, it is forecast that the amount of traffic traveling through the SP area from adjacent residential areas will be low.

The TA estimates that the local access roads within the SP will carry less than 1,000 vehicles per day, which would classify the internal subdivision roads as 'Local Access Road D'.

The Subdivision Concept Plan (Plan 3) shows proposed road types in accordance with Liveable Neighbourhoods. Predominantly the structure plan identifies 'Access Street C' roads and 'Access Street D' roads for minor roads. The Access Street C roads are consistent with the proposed extensions of Kingcote Road, Chivers Street and Dunning Street from the established urban area to the west.

No designated actual road widths are shown in the Structure Plan, as this is a matter dealt with at subdivision stage. The SCP is conceptual only and the final road reserve widths will be determined at subdivision stage to accommodate all necessary servicing and urban infrastructure to the satisfaction of the City.

Intersection Treatments

For the SP local access roads, no intersection treatments are proposed in relation to connections with existing and intersections with proposed roads. The existing and proposed local access roads are not expected to carry significant volumes of traffic and will have a sign posted speed limit of 50km/hr. Subsequently this does not necessitate any special intersection treatment.

Notwithstanding, the SP area is adjacent to the future intersection of Kerosene Lane and Nairn Drive. Design for this intersection will be undertaken in consultation with Main Roads WA and City of Rockingham, to accommodate the future intersection treatment within an adequate road reserve.

Similarly with the intersection treatments connecting Fairchild Drive and Dunning Street with Nairn Drive, the future subdivision requirements for road planning will need to consider providing an acceptable truncation to accommodate an intersection treatment. It is proposed that the Dunning Street and Nairn Drive intersection will only be required as a 'left-in/left-out' intersection.

6.3 Proposed Movement Network – Pedestrian/Cyclists

Vehicle speeds on local access streets will be limited through detailed road design measures including reduced pavement width appropriate to traffic volume. Pathways are proposed within the proposed local access roads. **Plan 5** shows the conceptual location for proposed paths linking with the proposed surrounding pathway network for structure planning on neighbouring properties. The exact location of pathways will be determined in liaison with the City of Rockingham at the subdivision stage. In general, pathways are proposed to be provided on all streets in accordance with the requirements of Liveable Neighbourhoods.

6.4 *Proposed Movement Network – Public Transport*

No public transport facilities are presently located adjacent to the SP area. The nearest bus stop is located in Fifty Road, which services Transperth Route 568 which runs between Warnbro Transit Station and Baldivis. The Baldivis North District Structure Plan proposes extension of public transport as the suburb of Baldivis becomes increasingly urbanised and matures. It is likely that Kerosene Lane and Nairn Drive will form part of the future bus route.

6.5 *Street Parking*

At this Structure Planning level, no specific provision of on-street parking embayments have been shown within the SP, however, the standard pavement width of local access roads could allow for localised on-street parking, whereby vehicles must pass around parked vehicles. This has been found to assist in traffic calming of streets and is generally acceptable in most residential neighbourhoods where speed limits are between 40 – 50km/hr.

Appropriate consideration for the provision of street parking (where considered suitable) will be given at detailed subdivision design stage and in consultation with the City of Rockingham. In particular, opportunities for formalised on-street parking will be considered around areas of high amenity, such as opposite or adjacent to public open space. Indicative areas for on-street parallel parking bays within roads abutting the public open space is shown in **Plan 3** and would be given further consideration at subdivision stage.

7.0 PUBLIC OPEN SPACE

7.1 Public Open Space Provision

The SP provides for 1.06 hectares of public open space (POS) contained solely within a large park in the northern portion of the SP area. The POS area shall be utilised as multiple use drainage and recreation function by accommodating a bio-retention basin within the POS (refer to Plan 4). The location of the POS is ideal as the POS land is situated within a low point of the SP area. Locating the POS further to the north or south would require substantial earthworks and development costs to provide servicable lots. This would have an adverse impact on housing affordability and resource efficiency.

7.2 Public Open Space Typologies

The POS area is proposed to be developed in a single stage with the final landscaping design to be determined in liaison with the City as part of subdivision works. Given its size (i.e. over 1ha) the POS is considered to be a 'Neighbourhood Park'.

The park can ultimately be developed with both active and passive recreational use facilities. The park will also serve a multi-purpose function of POS and drainage. The conceptual landscaping plan (Plan 4) which shows the bio-retention basin area designated for 1:1yr ARI and 1:5yr ARI events, with the remaining POS predominantly turfed with a playground and pathways.

The bio-retention drainage basin will be stepped down (approximately 0.5m RL) and planted with reeds, sedges and native trees. This will create an attractive artificial wetland, which over time once plantings have become established, will take on appearance of a more natural looking wetland. Around the drainage basin will be groupings of locally endemic shade trees and mulched native gardens, giving the park a lush green appearance. A boardwalk is planned to extend over the basin to provide both convenient access to the POS and as a park feature. The park will have high quality landscaping, connecting pathways to the local street pathways, seating areas, play area and a generous area of turf (over 9,000m^2).

The large park will be a centre piece of the development and will also provide a 'green break' adjacent to Nairn Drive. All residential lots within the SP area will be within 400m of parkland, which can be used for both passive and active recreation.

7.3 Public Open Space Schedule

Table 4. Lot 53 Kerosene Lane POS Schedule

Calculation of Required POS Provision		
Lot 53 **Total Site Area (ha)**	11.162	11.162
Deductions		
Bio-retention drainage basin (1:1yr) – 63.2% AEP Event with retaining wall – DD1	0.122	
Surplus POS not credited[2]	0.107	
MRS ('Other Regional Roads' – Nairn Drive)	2.330	
Kerosene Lane (2.2m road widening)	0.030	
Total Deductions		2.589
Gross Subdivisible area (total area minus deductions)		8.573
Required POS (10%)		**0.857**
Breakdown of POS Provided May comprise: - minimum 80 per cent unrestricted POS - Maximum 20 per cent restricted use POS	 0.686 0.171	
Restricted Public Open Space Bio-retention drainage basin (balance between 63.2% AEP and 1% AEP) – including boardwalk	0.278	
Total Restricted POS Credited to a maximum of 20%		**0.171**
Unrestricted Public Open Space : by function		
Neighbourhood Park (including boardwalk over bio-retention basin)	0.700	
Total Unrestricted POS		**0.700**
Total Public open space provision provided		**0.871[1]**
POS Provision as Percentage of Gross Subdivisible Area		**(10.17%)**

Notes

1) Final POS calculations will be subject to detailed survey and approved Urban Water Management Plan. **Surplus POS** is shown in Table 4 above and at subdivision stage a minimum of 10% POS land contribution is to be provided to the satisfaction of the local authority and WAPC.

2) POS areas that have an agreed drainage function as restricted POS in consultation with DPLH as part of structure plan approval.

8.0 LOCAL WATER MANAGEMENT

8.1 Local Stormwater Drainage

A Local Water Management Strategy (LWMS) (**Appendix 1**) has been prepared for the proposed SP based on the SCP. The SP development site has highly permeable sandy soils and adequate separation to ground water. In this instance, the development site is suitable for urban development and on-site infiltration to maximise groundwater recharge.

The proposed development will have the potential to increase the proportion of impervious areas across the site. This in turn will lead to an increase in the volume of stormwater runoff during rainfall events, thereby altering the natural hydrological behaviour of the site.

The proposed roads in the SP have been designed to assist in providing for effective urban water management by facilitating overflow paths towards stormwater infrastructure within the large POS area. The location of the POS is considered optimal for the purpose of efficient and resource effective urban stormwater management.

All future residential development will be required to contain stormwater on-site. This can be undertaken using standard soak wells and other stormwater disposal techniques, such as directing water run-off to garden beds or use of rainwater tanks.

The LWMS will be used to guide the design and construction of the proposed drainage infrastructure at subdivision stage, under an approved Urban Water Management Plan.

8.2 1 year, 5 year and 100 year ARI events

The SP provides for the development to be self-contained, accommodating the detention and dipsosal of stormwater on-site.

All stormwater generated within the SP area is proposed to be diverted, detained and treated within drainage bio-retention basin and 1:100yr contoured swale in the POS. The SP local water management principles for the 1 year, 5 year and 100 year Average Recurrence Interval (ARI) events are set out in more detail in the Local Water Management Strategy (Appendix 1).

9.0 LANDSCAPING

The underlining concepts guiding future landscape design within the proposed SP roads and POS areas of the SP are:

- Provision of public facilities which cater primarily for recreational activities to suit the predicted demographic for the locality, including but not limited to active uses and passive uses such as seating, picnics, passive contemplation, walking exercise etc;

- The bio-retention basin will collect stormwater runoff and contain plantings which fringe the basin and provide for a nutrient stripping function;

- Integrated path systems to link and create areas suitable for walking, dog walking, cycling and similar;

- Planting in POS and street verges will consist of a mixture of turf, native and dry tolerant species, with an emphasis wherever possible on using indigenous plantings; and

- Where verge areas provide opportunity for plantings, diversity of street tree plantings to form strong avenue and high amenity streetscapes.

A detailed landscaping design and management plan for public open space areas is to be provided as part of subdivision works. Landscape design will minimise water use, with shrub planting to be native or similar.

Water harvesting from direct urban stormwater runoff or other sources (i.e. swales, weirs and drainage channels) can potentially be used where possible for passive irrigation purposes. Also where considered appropriate, the use of organic mulches and 'amended earth' techniques will assist in water conservation and reduced irrigation dependency.

A preliminary landscaping plan (Plan 4) has been prepared for the POS area and it is expected that the detailed design of the POS levels and landscaping will be undertaken as part of subdivision.

10.0 INFRASTRUCTURE & SERVICING

An Engineering Services Report has been prepared following preliminary investigation and planning for infrastructure and servicing of the SP. The following is a general summary of the report. For the full report refer to **Appendix 3**.

10.1 Wastewater

The SP area is currently not connected to reticulated sewer. All residential lots within the SP area will be connected to reticulated sewer.

The SP area can be served from the Water Corporation's Baldivis North Pump Station 'McDonald Road' located south of the SP area. Connection to the pump station would be via extension of the gravity sewer mains in the abutting existing subdivisions.

Water Corporation policy requires developers to extend sewer services to the boundary when extension is planned. The neighbouring land to the east will also be connected to the Water Corporation's Baldivis North Pump Station 'McDonald Road' and an adequate sewer connection across Nairn Drive will be provided for as required by Water Corporation.

10.2 Water Supply

At present there is no Water Corporation reticulated water main serving the site. Water supply to the site has come from a groundwater bore and rainwater harvesting for horticultural purposes.

All residential lots within the SP area will be connected to reticulated water supply. Water Corporation reticulated water infrastructure can potentially be provided via extension of services along Kerosene Lane. This will be done in further consultation with the Water Corporation at subdivision stage.

10.3 Power

The site is currently serviced by the high and low voltage overhead power lines located on the southern verge of Kerosene Lane. Preliminary investigations indicate that there is sufficient power supply capacity in the area to service the proposed SP development. All residential lots within the SP area will be connected to sufficient power supply.

There is also potential for dwellings to install solar power panels connected to battery storage.

It is likely that as a requirement of subdivision the existing aerial power lines in the southern verge of Kerosene Lane will need to be relocated and sunk underground along the frontage of the SP site. Underground power reticulation will be extended from the adjacent subdivision and from Kerosene Lane. Any requirements for upgrading and provision of transformer and switch station sites would be determined as part of subdivision works.

10.4 Telecommunications

The SP area can be serviced by the existing telecommunications infrastructure within Kerosene Lane. This infrastructure will need to be extended to service the proposed development, with some upgrading likely to be required. The developer is also required to install National Broadband Network (NBN) 'pipe and pit' to allow for future installation of cables for the NBN. This can be accommodated within common telecommunications trenching.

10.5 Gas

The SP area can potentially be serviced with reticulated gas via extensions to gas infrastructure in the adjacent subdivision to the west. Reticulated gas infrastructure would be extended to the SP area by ATCO under standard developer arrangements. Arrangements for the provision of reticulated gas supply to the SP area will be further investigated at detailed design stage in consultation with ATCO, as part of subdivision works.

10.6 Earthworks

Earthworking of the site will be required to create level, free draining lots for dwelling construction and provision of roads and services. A preliminary earthworks design is provided in **Plan 7**. Extensive retaining walls ranging 0.5m – 1.5m (perhaps higher in some instances) will be required due to the undulating site.

Level sites that are terraced reflect the ideal building site to reduce housing cost and create more affordable housing. Retaining walls will be used to provide terraced lots and absorb level differences. Wherever possible, the height of retaining walls will be kept to a minimum and may vary due to natural ground level differences. All retaining walls will be constructed to the City's satisfaction.

Earthworks will involve removal of topsoil, localised cut and fill, followed by stabalisation of finished design levels. Where limestone is encountered under the natural surface, where necessary the limestone will be removed and replaced with suitable fill. Importation of a moderate amount of fill (approximately 10,000m^3) is anticipated to create the desired levels.

10.7 Roads & Pathways

In accordance with City's engineering standards, the roadways will generally be constructed in the conventional manner, with asphalt wearing coarse on a granular base coarse and cast-in-situ concrete kerbing with piped drainage and provision of footpaths.

As stated previously, Kerosene Lane will be upgraded to a similar standard immediately west of the SP area. Nairn Drive will be constructed as a single carriageway to urban standard as part of subdivision of the SP area.

Local access roads will generally consist of two way single carriageways, with widths of 3.2m – 3.3m. Pathways will be provided in accordance with Liveable Neigbourhoods as shown indicatively in Plan 3. Further geotechnical investigations can confirm the exact design of the roads and drainage infrastructure in consultation with the City.

10.8 Drainage

Stormwater management for the SP development site will be designed to be self-contained. The SP area soils will allow for adequate site soakage, based on its geological characteristics and suitable depth to groundwater. The entire SP area can be accommodated within a single drainage catchment, with the low point for drainage infrastructure being located within the western portion of the POS area.

All urban water management infrastructure will be designed to the standards of the City, with a storage facility to contain the 1 in 100 year stormwater runoff, to be located in with the proposed POS area. The LWMS details the stormwater drainage management plan.

The details for stormwater drainage regarding Urban Water Management flows for the proposed residential development of the SP area will be undertaken at the subdivision and development stage, consistent with the principles of the LWMS.

11.0 STAGING

11.1 Staging and Anticipated Timeframes

Subdivision and development is likely to be influenced by market demand, however the SP area could be subdivided from the infrastructure and roads of the existing urban area to the west.

The Structure Plan is proposed to be developed in multiple stages due to the size of the development. There are no specific triggers for staging of development. The land within the Nairn Drive regional road reservation has already been acquired from the landowner by WAPC.

Staging is expected to be undertaken from the northern and the overall development could be completed in three stages (approximately 40 – 50 lots in each stage).

Servicing is readily available from the urban development to the west and to the south. Nairn Drive would be constructed to a single carriageway urban standard as part of the first stage of development (or could be delivered upfront prior to the first stage of residential lots. Upgrading to a dual carriageway in future will be undertaken by the local authority.

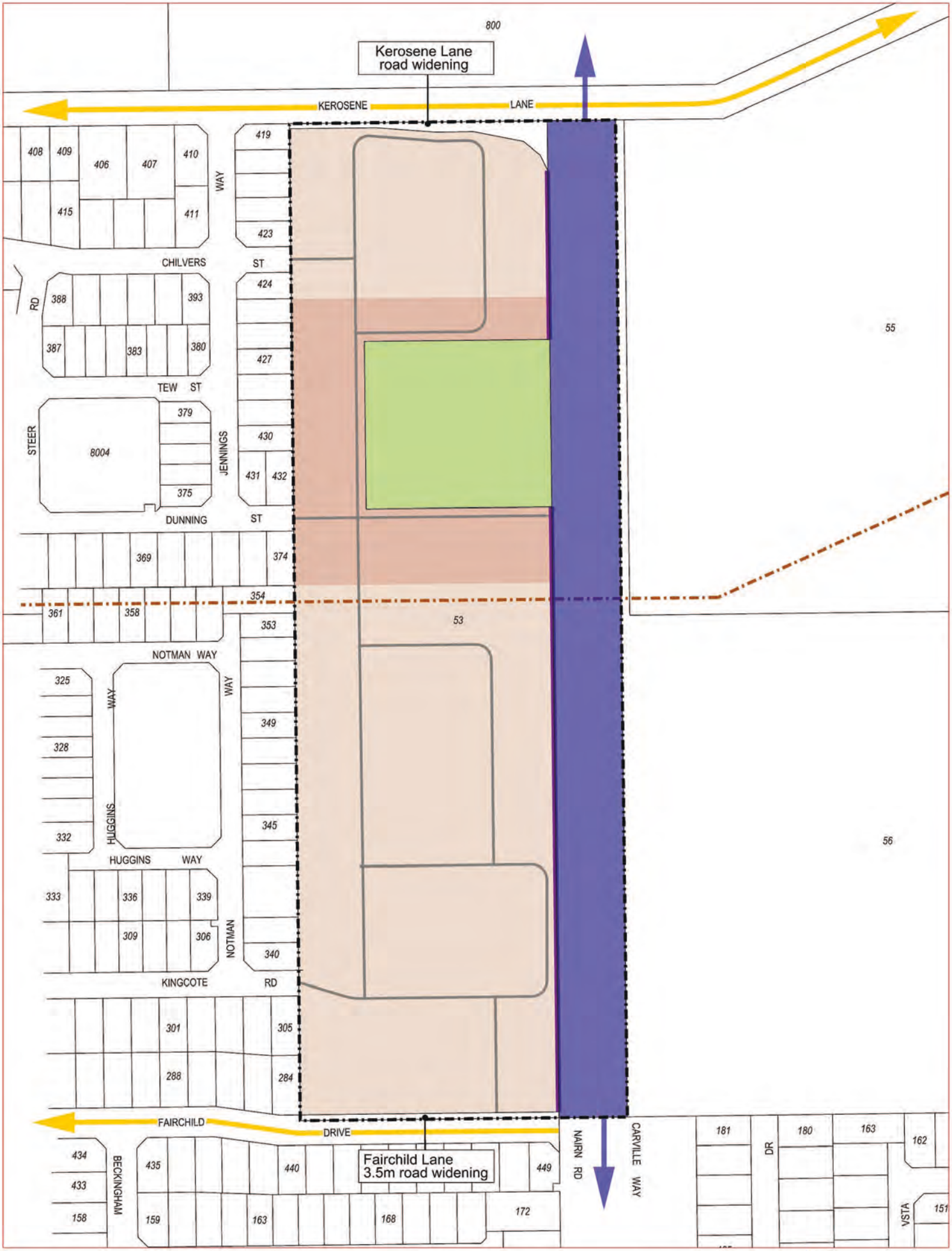
A conceptual Staging Plan (**Plan 6**) shows the potential areas for staging of subdivision, however the final staging boundaries and strategy would be determined as subdivision stage.

11.2 Development Contributions

A Development Contribution Plan for the SP area is not required for the provision of key infrastructure. The ultimate intersection of Kerosene Lane and Nairn Drive and the ultimate Nairn Drive dual carriageway regional road infrastructure will be funded by others. All other necessary infrastructure for the urbanisation of Lot 53 will be funded by the Proponent, with necessary agreements with service providers.

The SP area is within Development Contribution Area as shown on the TPS 2 Scheme Map as DCA 2. Development Contribution Plan No.2 (DCP 2) applies to all land within the City which is capable of being developed for residential dwellings. The SP area more specifically is contained within the Baldivis North Sub-Area of DCP 2. Contributions towards DCP 2 is applicable for future subdivision and/or development within the SP area.

PLANS



Plan No. : 20617-10
Revision : REV.0
Scale : 1:2000@A3

0 20 40 60

Level 10, 3 Hasler Road Osborne Park WA 6017 www.veris.com.au

LEGEND

- MRS 'Other Regional Roads'
- Structure Plan Boundary
- Noise Wall (Indicative Location)
- Neighbourhood Connector
- Public Open space and Drainage
- Residential (R25)
- Residential (R30)
- 300m Buffer from Extractive Sand Industry
- Access Roads (Indicatively shown subject to detailed design)

STRUCTURE PLAN
LOT 53 KEROSENE LANE
BALDIVIS

DATE DRAWN: 29/6/18
DRAWN BY: CdeL/RM
CHECKED BY: JP

FILE: 170629 Structure Plan
V DATUM: AHD
H DATUM: MGA94 (50)

PLAN 1

veris

Plan No. : 20617-1
Revision : REV.0
Scale :1:2000@A3

0 20 40 60

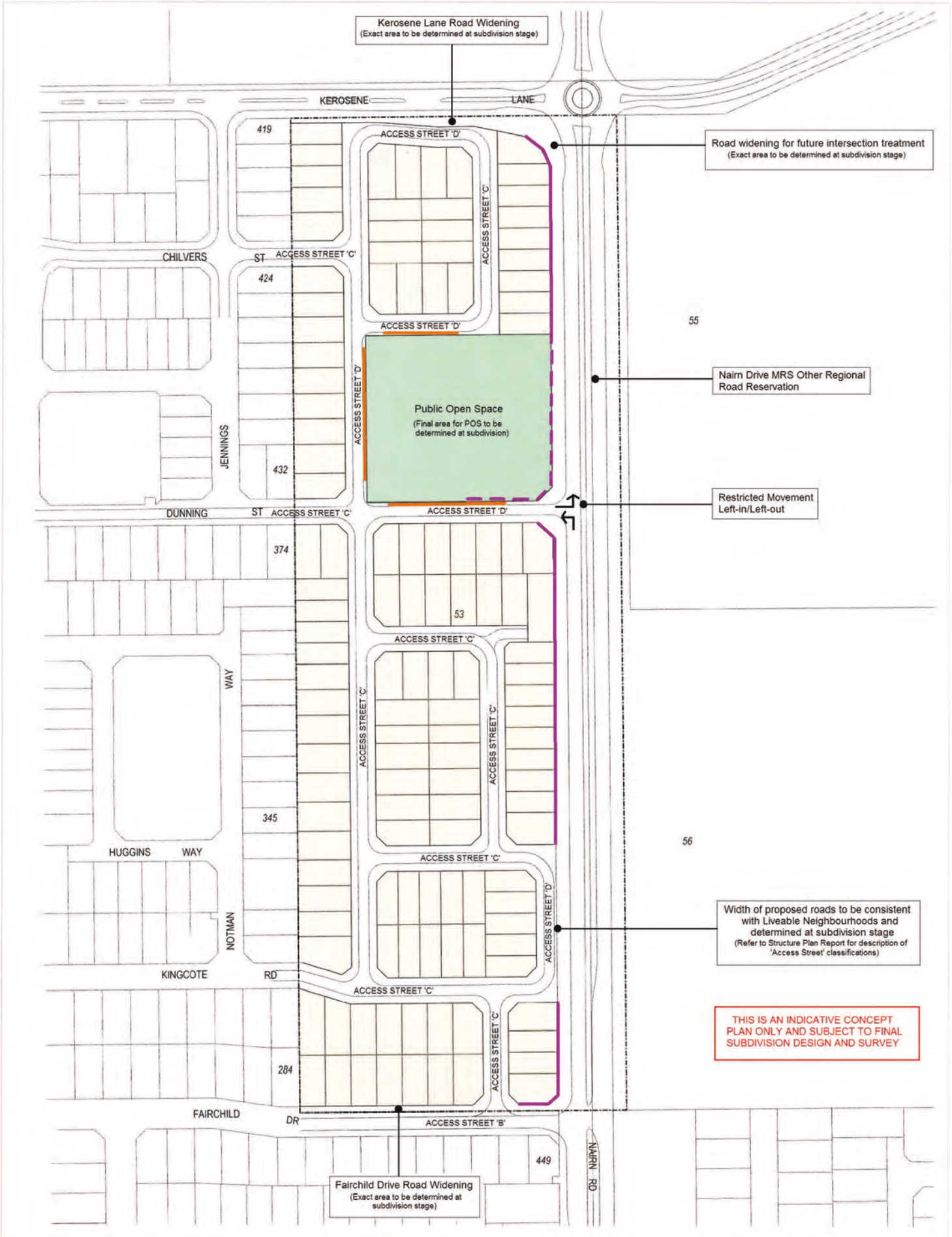
Suite 4 First Floor 40 Hasler Road Osborne Park WA 6017 www.whelans.com.au

LEGEND
- Water Mains
- Sewer Mains
- Power Lines
- 135 Contours
- MRS 'Other Regional Roads'
- Subject Site

LOT 53 KEROSENE LANE BALDIVIS PLAN 2

DATE DRAWN: 19/03/2015
DRAWN BY: CdeL
CHECKED BY: JP
FILE: 150319 Kerosene Lane Baldivis.dgn
V DATUM: AHD
H DATUM: MGA84 (50)

whelans TOWN PLANNING



Plan No. : 20617-1
Revision : REV.12
Scale : 1:2000@A3

20 0 20 50

Legend

- Structure Plan Area
- Conceptual subdivision residential lots
- Conceptual public open space
- Indicative location for on-street parking abutting public open space
- Indicative acoustic wall
- Indicative developer uniform open style fencing

SUBDIVISION CONCEPT PLAN

veris

PLAN 3

TIMBER 'NATURE PLAY' CLIMBER WITH SLIDE IN MULCH.

FEATURE RETAINING WALL WITH LOW UPSTAND & SEATING AREA.

RETAINING WALL FLUSH WITH TOP OF FOOTPATH, 900MM HIGH.

TUBESTOCK PLANTING TO UNDER BRIDGE.

2.5M WIDE TIMBER BOARDWALK

1% AEP TWL 17.64

20% AEP TWL 16.97

63.2% AEP TWL 16.73

FEATURE PAVED SEATING NODE WITH BENCH SEAT

PLAYGROUND ARE WITH CAROUSEL SPINNER AND DOUBLE SWING IN MULCH

CEMENT STABILISED COMPACTED LATERITE OR ROAD BASE KIDS BIKE TRACK.

STREET TREES. SPECIES AS PER STREET TREE MASTERPLAN.

GROUPING OF LARGE NATIVE TREES. EG. TUARTS (EUCALYPTUS GOMPHOCEPHALA)

INSITU CONCRETE FOOTPATH.

1200MM HIGH PERMEABLE FENCE

ENTRY STATEMENT WITH FLORAL GARDEN AND TREE PLANTING










LOT 53 KEROSENE LANE, BALDIVIS

LANDSCAPE CONCEPT PLAN

AUGUST 2018

JOB NO. 1605801

1:250 @ A1

C1.101

REV F

0 2.5 5 10 15 25m

PLAN E

LANDSCAPE ARCHITECTS

414 ROKEBY RD SUBIACO WA 6008

T: (08) 9388 9566 E: mail@plane.com.au

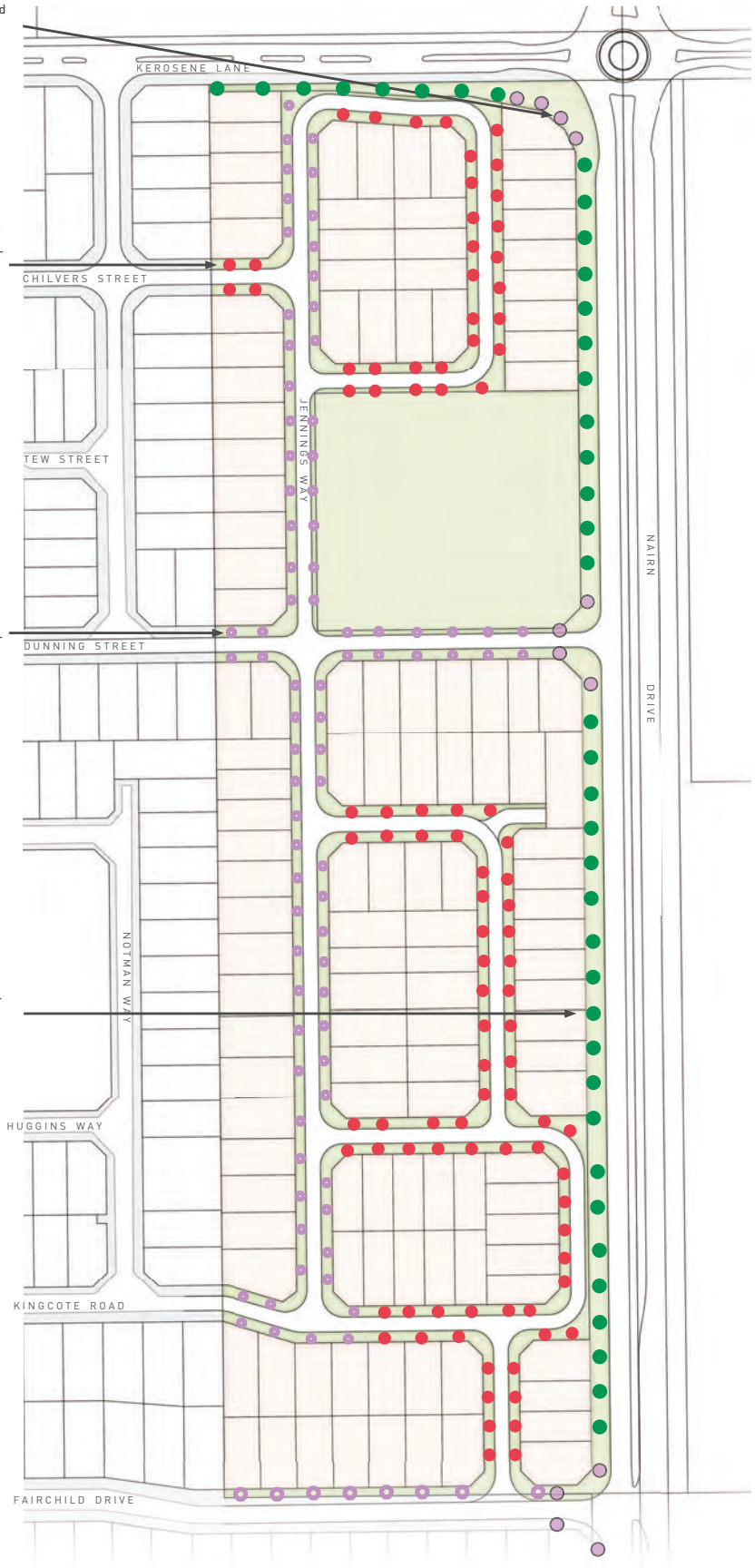
LANDSCAPING CONCEPT PLAN - PLAN 4

ESTATE ENTRY LANDSCAPE:
Brachychiton 'Clarabelle' proposed for Estate entries (minimum 500L install size) to define "gateways" into the development.

DECIDUOUS TREES TO INTERNAL STREETS:
Deciduous trees, Ornamental Pear have been selected for internal residential streets due to their smaller mature size and seasonal colour.

DECIDUOUS TREES FOR SEASONAL COLOUR:
Deciduous trees, Chinese Elm have been selected for for their fast grow rate and seasonal colour throughout the year.

NATIVE TREE SPECIES TO WIDER ROAD RESERVES:
A native tree species, Eucalyptus gomphocephala, were selected for wider road verges to the perimiter of the Estate to compliment existing native vegetation and provide habitat amenity.




Eucalyptus gomphocephala - Tuart Tree


Ulmus parvifolia - Chinese Elm


Pyrus Calleryana 'Chabticleer' - Ornamental Pear


Brachychiton 'Clarabelle'

LEGEND

- EUCALYPTUS GOMPHOCEPHALA
  (Tuart Tree - Fast growth rate - 30m tall x 10m wide)
- ULMUS PARVIFOLIA
  (Chinese Elm - Reasonably fast growth rate - 12m tall x 12m
- PYRUS CALLERYANA 'CHANTICLEER'
  (Ornamental Pear - Fast growth rate - 7m tall x 4m wide)
- BRACHYCHITON 'CLARABELLE'
  (Slow to medium growth rate - 8m tall x 5m wide)

INSTALLATION NOTES
- Street Trees are to be a minimum of 1.2 metres from back of kerb;
- All street trees planted in verges are to be mulched at the base, to prevent damage and retain moisture. The stem is to be kept clear of mulch to prevent fungal attack;
- No street tree shall be planted any closer than 5.0 metres from any overhead service pole or street lamp;
- No street tree shall be planted closer than 2 metres from any side entry drainage pit or service chamber located within road reserve;
- All street trees shall be installed in accordance with the Utility Providers Code of Practice;
- If any tree is planted between the path and the kerb with insufficient space, the City will require them to be removed; and
- If a street tree is installed behind the lot boundary, the City will not maintain the tree in the future.

LOT 53 KEROSENE LANE, BALDIVIS

STREET TREE MASTERPLAN
SEPTEMBER 2018

JOB NO. 1605801
1:1000 @ A1

M1.101

REV A

0 20 40 60 100m

PLAN E
LANDSCAPE ARCHITECTS
414 ROKEBY RD SUBIACO WA 6008
T: (08) 9388 9566 E: mail@plane.com.au

Plan No. : 20617-1
Revision : REV.12
Scale : 1:2000@A3
20 0 20 50

Legend

- Structure Plan Area
- Conceptual subdivision residential lots
- Conceptual public open space
- Drainage infrastructure (1yr)
- Connection to existing dual use pathway network
- Connection to existing pathway network
- Shared Paths
- Standard Path

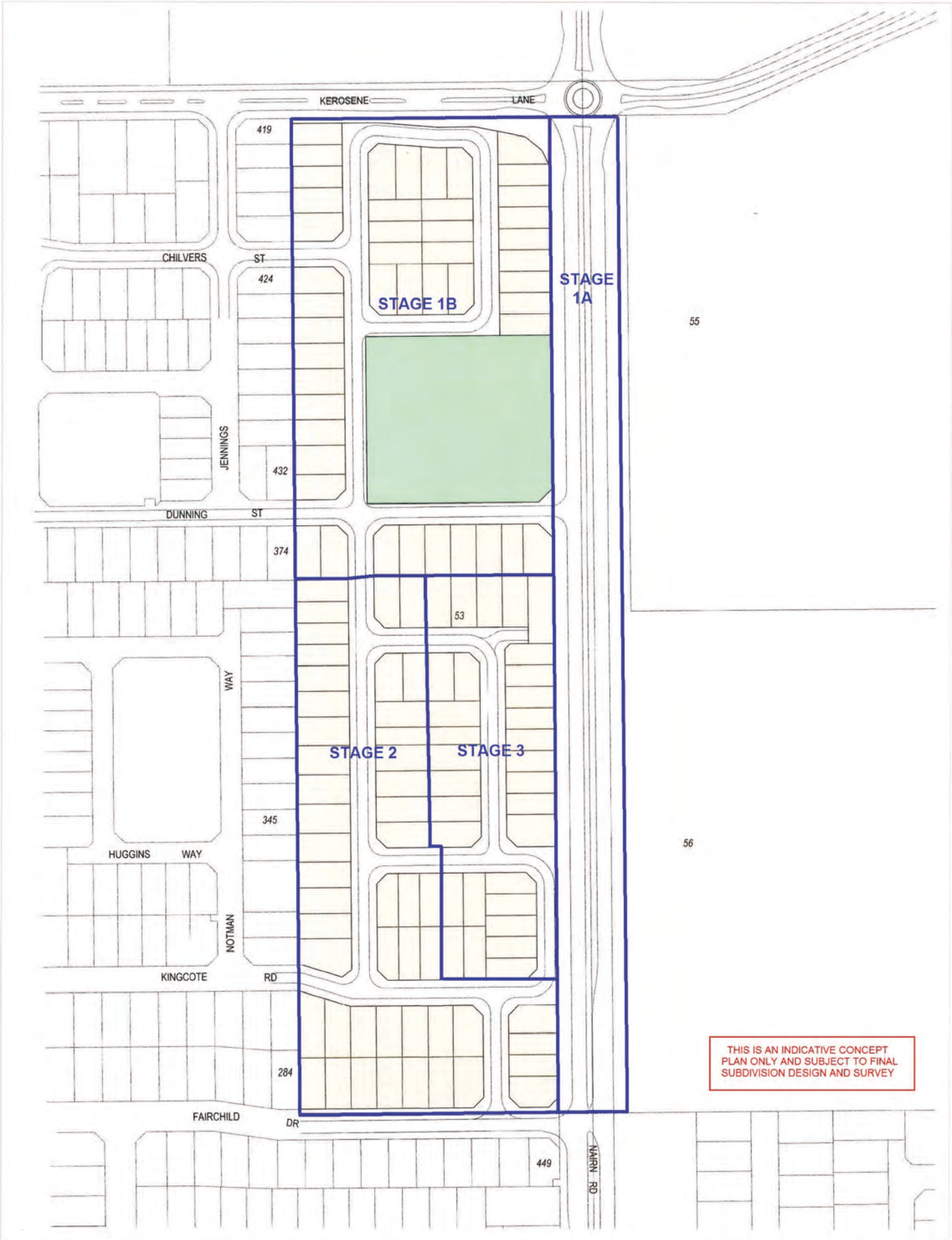
POS Ped-Shed Walkability

- 200m from POS
- 400m from POS

PATHWAY NETWORK & PUBLIC OPEN SPACE

PLAN 5

veris



Plan No. : 20617-1
Revision : REV.12
Scale : 1:2000@A3

20 0 20 50

Legend

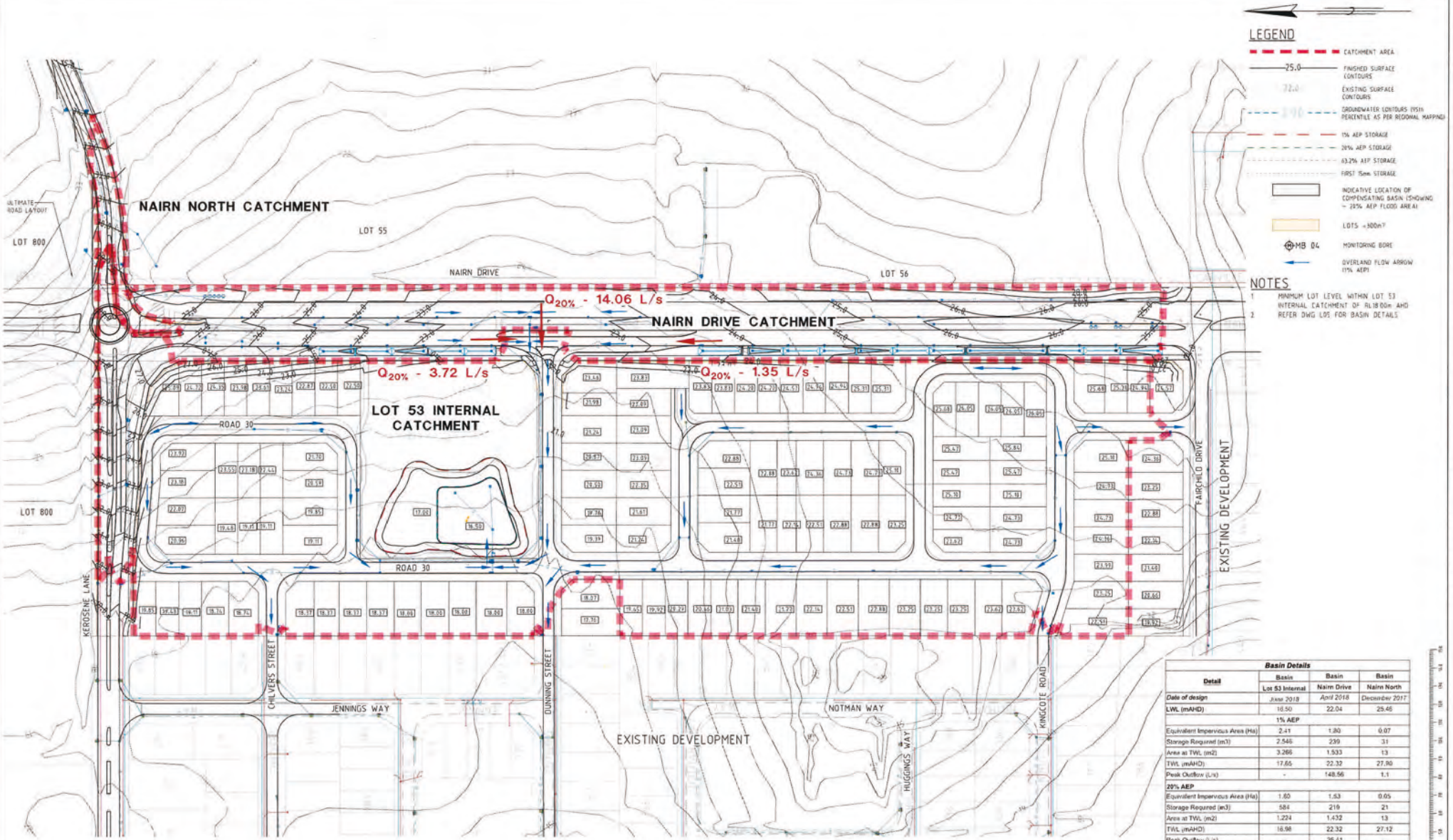
- Structure Plan Area
- Conceptual subdivision residential lots
- Conceptual public open space
- Indicative staging boundaries

STAGING PLAN

PLAN 6

veris

PRELIMINARY EARTHWORKS & DRAINAGE - PLAN 7



Gross Catchment Area Information

Catchment	Total Area (m2)	Lot Area - Unconnected (m2)	Lot Area - Connected (m2)	Road Reserve Area (m2)	School Area (m2)	POS Area (m2)
Basin-Lot 53 Internal	86,021	49,635	-	25,769	-	10,617
Basin-Nairn Drive	25,713	-	-	25,713	-	-
Basin-Nairn North	810	-	-	810	-	-

Basin Details

Detail	Basin Lot 53 Internal	Basin Nairn Drive	Basin Nairn North
Date of design	June 2018	April 2018	December 2017
LWL (mAHD)	16.50	22.04	25.46
1% AEP			
Equivalent Impervious Area (Ha)	2.41	1.80	0.07
Storage Required (m3)	2,546	239	31
Area at TWL (m2)	3,266	1,533	13
TWL (mAHD)	17.65	22.32	27.90
Peak Outflow (L/s)	-	148.56	1.1
20% AEP			
Equivalent Impervious Area (Ha)	1.60	1.53	0.05
Storage Required (m3)	584	219	21
Area at TWL (m2)	1,224	1,432	13
TWL (mAHD)	16.98	22.32	27.12
Peak Outflow (L/s)	-	25.41	-
63.2% AEP			
Equivalent Impervious Area (Ha)	1.80	1.29	0.05
Storage Required (m3)	282	131	8.62
Area at TWL (m2)	1,224	947	13
TWL (mAHD)	16.74	22.23	26.13
Peak Outflow (L/s)	-	-	-
First 15mm			
Storage Required (m3)	281	111	8.62
Area at TWL (m2)	1,224	820	13
TWL (mAHD)	16.72	22.22	25.99
Peak Outflow (L/s)	-	-	-

1:1000 @ A3

No.	DATE	BY	REVISION	CHK
G	23/8/18	BWB	CATCHMENTS REVISED. BASIN DETAILS TABLE REVISED.	SRA
F	29/6/18	JEG	DESIGN AMENDED	SRA
E	23/05/18	BWB	BASIN DETAILS PEAK OUTFLOW REVISED	SRA
D	1/5/18	JEG	UPDATED NUMBERS	SRA
C	18/04/18	WJB	DRAINAGE DESIGN AND BASIN DETAILS AMENDED	SRA
B	18/12/17	WJB	BASIN DESIGN AMENDED	SRA
A	29/9/16	DPH	INITIAL ISSUE	SRA

CLIENT: TERRANOVIS PTY LTD

DEVELOPMENT ENGINEERING CONSULTANTS
SUITE 3, 123A COLIN ST, WEST PERTH, 6005 WESTERN AUSTRALIA
Ph. (08) 9481 1900
Fax. (08) 9481 1788

PROJECT: LOT 53 KEROSENE LANE BALDIVIS
W.A.P.C. No. - 153579

DRAWING: CATCHMENT PLAN POST DEVELOPMENT
CAD DRAWING DO NOT MANUALLY ALTER

SCALE	DRAWN	CHECK	REV No.
1:1000	DPH	SRA	G
DATE 15/6/16	DESIGNED DPH	APPROVED SRA	

PROJECT NUMBER: BDVTER50 L04
DRAWING NUMBER

Scale :1:1000@A3

0 10 20 30

Suite 4 First Floor 40 Hasler Road Osborne Park WA 6017 www.veris.com.au

LEGEND

- Extension Nairn Drive
- Subject Site
- Future Road Connections
- 300m Buffer from Extractive Sand Industry
- 500m Buffer from Extractive Sand Industry

OPPORTUNITIES AND CONSTRAINTS
LOT 53 KEROSENE LANE BALDIVIS

PLAN 9

FILE: 172809 Lot 53 Kerosene Lane Baldivis MRS Opportunities and Constraints.dgn
DRAWN BY: PD
CHECKED BY: JP
DATE DRAWN: 09/02/2017
V DATUM: AHD
H DATUM: MGA94 (50)

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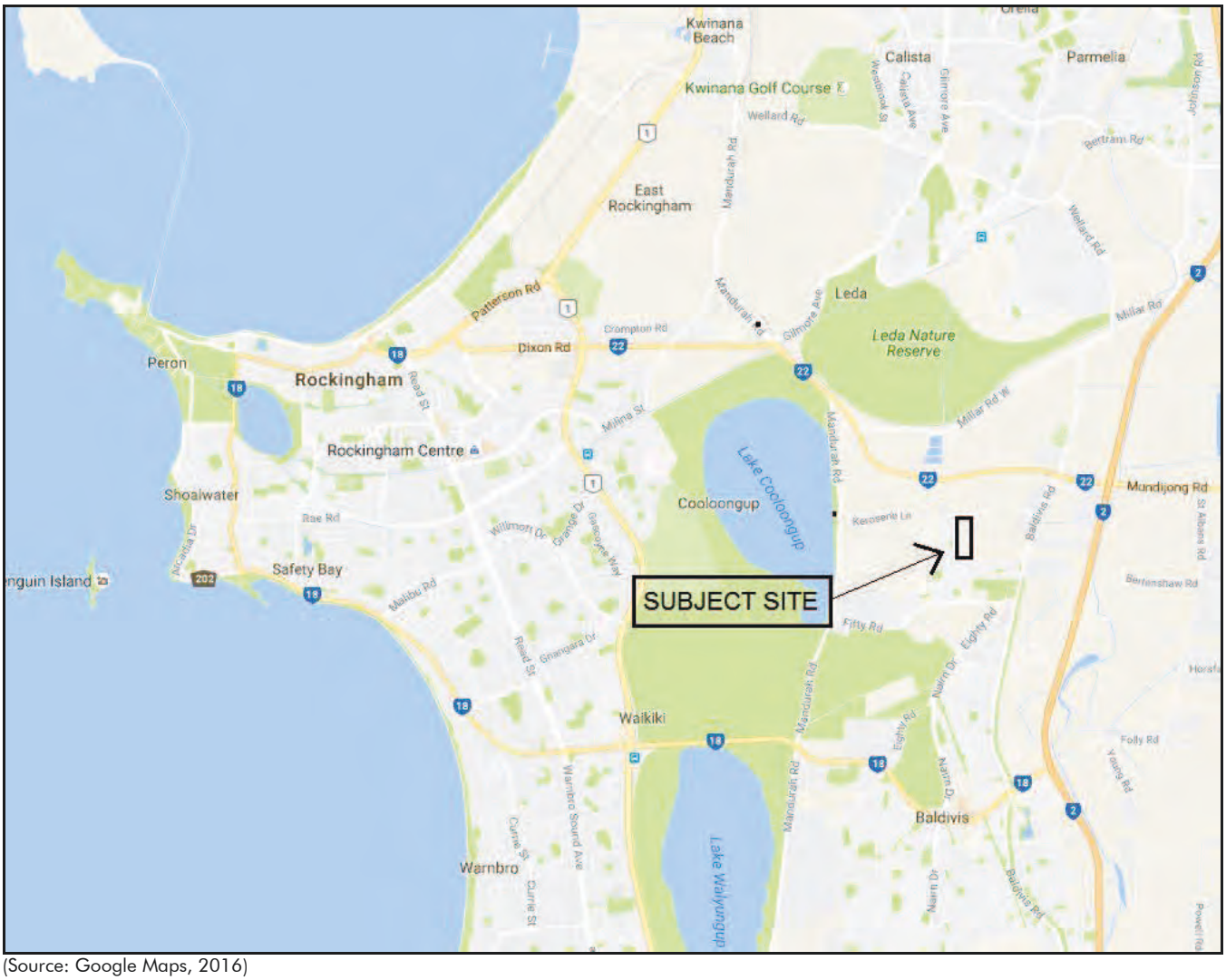
FIGURES



(Source: Google Maps, 2016)

FIGURE 1
LOCATION PLAN

(Source: Landgate - modified, October 2016)

FIGURE 2
CADASTRAL/AERIAL PLAN