PART TWO

EXPLANATORY SECTION
AND
TECHNICAL APPENDICES

Contents – PART TWO –

EXPLANATORY SECTION AND TECHNICAL APPENDICES

Technical Appendices.

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2	Urban Water Management Plan (UWMP)	July 2020
3	Bushfire Management Plan	Feb 2017
4	Vegetation Classification Table and BAL Contour Map	Dec 2024
5	Technical note: Risk Assessment	Mar 2020
6	Landscaping and Fencing Concept Plan	April 2025
7	Technical Note to Accompany Traffic Impact Statement.	Mar 2020

Part Two – Explanatory Section and Technical Appendices

The purpose of Part Two is to support the structure plan contained in Part One by providing the background and explanatory information used to prepare the structure plan.

Explanatory Report

1.0 INTRODUCTION AND PURPOSE

The purpose of this Structure Plan amendment is to respond to a change in market conditions and to allow for the future expansion of homesites for the Tuart Lakes Village up to the rear boundary of Lots 1 & 102.

Plan 1: Structure Plan (as amended in this application) details:

- the land use as being Park Home Village, to accommodate Park Homes, similar to the developed portions of Tuart Lakes;
- the movement network ,including road connection/s to adjoining land;
- the location of community facilities for the Park Home Park; and
- Indicative layout of future homesites.

2.0 SITE AND CONTEXT ANALYSIS

2.1 Physical Context

The following provides a description of the land the subject of the Structure Plan and more specifically the Structure Plan amendment

2.1.1 Subject Lots

Table 1 provides a description of the land subject of the Tuart Lakes Structure Plan and details the land subject of the Structure Plan amendment.

Table 1: Land description

Lot Number	Street Address	Lot Area	Area within Structure Plan	Subject of Structure Plan Amendment
102	831 Mandurah Road, Baldivis	15.7662 ha	12.6 ha	Yes
1	851 Mandurah Road, Baldivis	9.2154 ha	4.8 ha	Yes
101	823 Mandurah Road, Baldivis	2.0010 ha	0.7 ha	No

The land the subject of the Tuart Lakes Structure Plan is 18.2 hectares.

Lots 1 & 102 subject of the Tuart Lakes Structure Plan are owned by Serenitas Communities Holdings Pty Ltd and accommodate a Park Home Park being Tuart Lakes Lifestyle Village. Refer to the attached Certificates of Title for Lots 1 & 102 (**Appendix 1**). The area subject of the Structure Plan Amendment is predominantly cleared, with the exception of trees that were required to be retained in accordance with a planning approval issued by the City of Rockingham.

Lot 101 is owned by a separate entity and is not associated with the Tuart Lakes Village. Lot 101 accommodates a single dwelling and is used for rural lifestyle purposes. Lot 101 is not subject of the Structure Plan Amendment. The rear portion of Lot 101 that is zoned Development under LPS2 is designated Park Home Village in the currently approved Tuart Lakes Structure Plan and that is not proposed to change under this Structure Plan Amendment.

2.1.2 Location

The area subject of this Structure Plan Amendment is located 39 km from Perth CBD, in a generally southerly direction.

2.1.3 Area and Land Use

The area subject of this Structure Plan Amendment is presently vacant and is proposed to accommodate homesites for the expansion of Tuart Lakes Village. The land area of the Tuart Lakes Structure Plan is detailed below.

2.1.4 Surrounding Context

As demonstrated in **Figure 1**, the Structure Plan Amendment area, located alongside the eastern boundary of the subject site, sits adjacent to existing residential subdivisions to the east and north. The eastern boundary of the subject site interfaces with a gas pipeline easement which runs in a north-south alignment along the boundary, separating the land from the neighbouring residential development to the east.

2.2 Planning Framework

2.2.1 Zoning and Reservations

Refer to **Figure 2** for a copy of the zoning plan. The western (front) portion of Lots 1 & 102 is zoned Rural under both the Metropolitan Region Scheme (MRS) and the City of Rockingham Local Planning Scheme No. 2 (**LPS2**).

The eastern (rear) portion of Lots 1 & 102, subject of the proposed Structure Plan amendment, is zoned Development under the provisions of LPS2 and Urban under the MRS. The land zoned development is identified as “DA30” “Lifestyle Village” being the Tuart Lakes Struture Plan Area (that is subject of this Structure Plan Amendment). The provisions under DA30 read as follows:

> *An approved Structure Plan together with all approved amendments and Detailed Area Plans, where applicable, shall apply to the land in order to guide subdivision and development.*

This Structure Plan Amendment relates to the Development Area DA30 only.

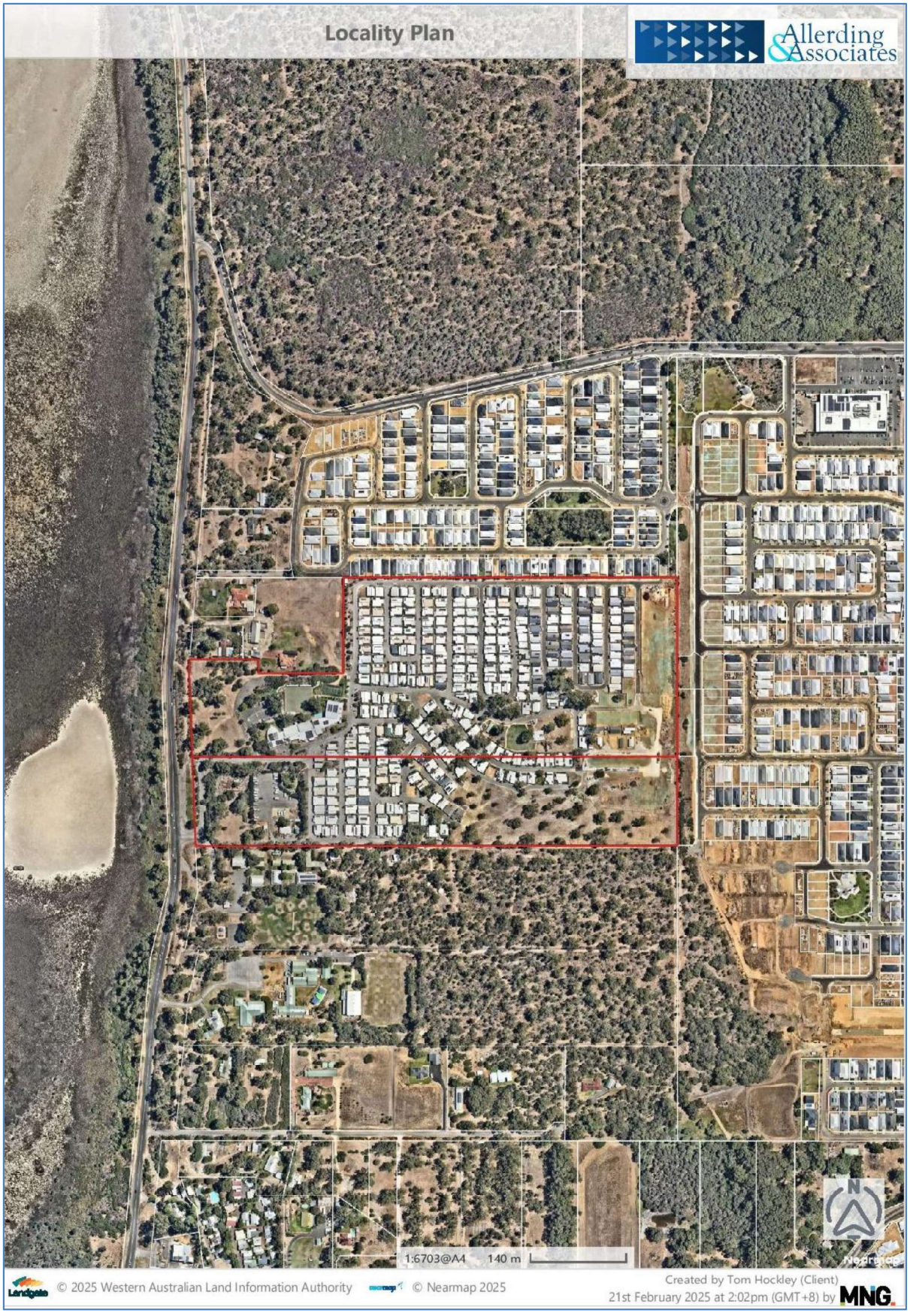

Figure 1: Locality Plan: Tuart Lakes Village

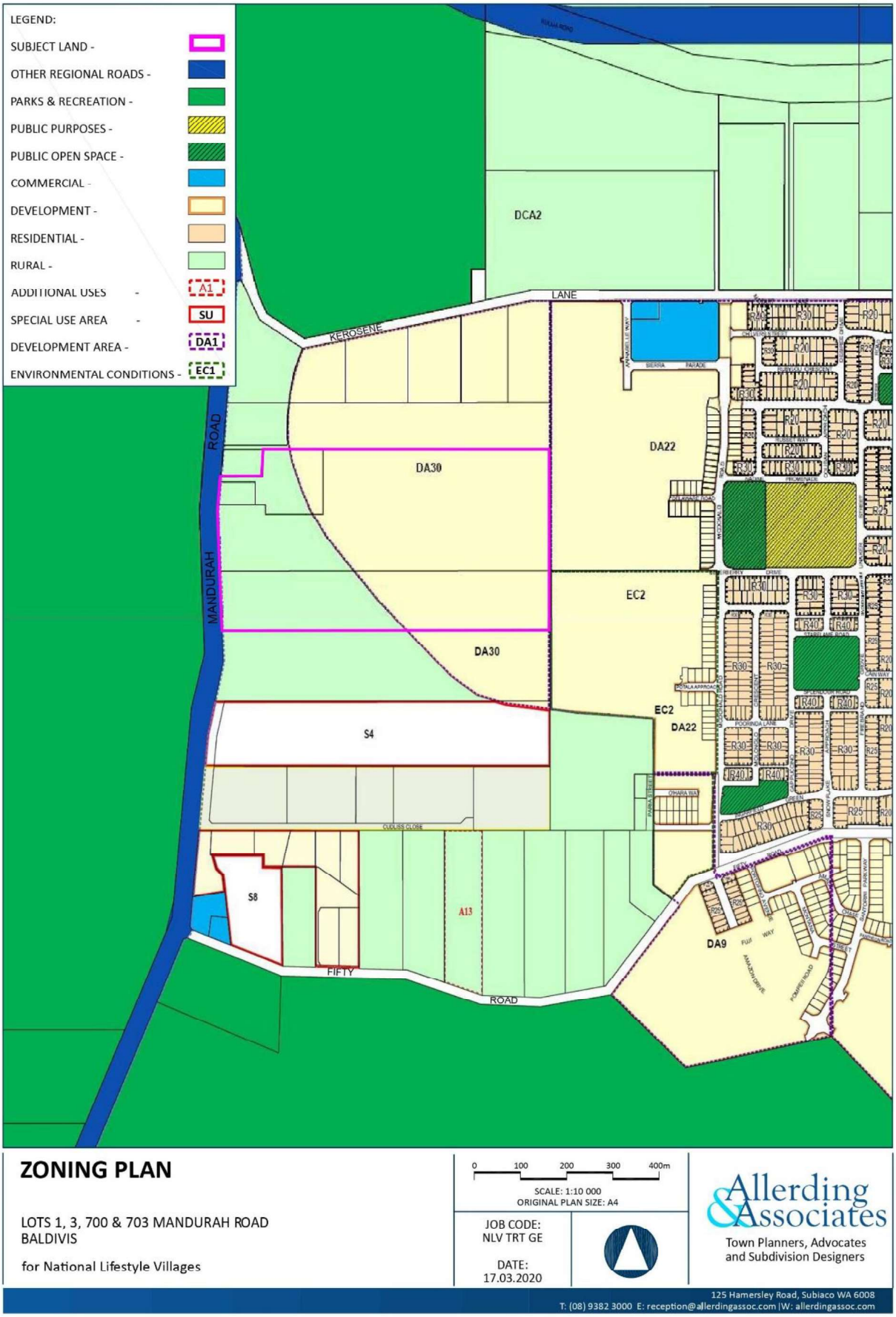

Figure 2 – Zoning Plan

2.2.2 Regional and Sub-Regional Structure Plan

The WAPC's South Metropolitan Peel Sub Regional Planning Framework, dated March 2018 applies to the subject land. **Figures 3 & 4** identifies the subject land within the context of this Framework.

2.2.3 Local Planning Framework

The land subject of the Structure Plan Amendment is zoned "Development" under LPS2. The land is further designated as "DA30" on the scheme Maps. Schedule 8 of LPS2 provides relevant provisions in regard to development areas. In regard to DA30, Schedule 8 refers to the area as "Lifestyle village" and the provisions state:

> *An approved Structure Plan together with all approved amendments and Detailed Area Plans, where applicable, shall apply to the land in order to guide subdivision and development.*

The area subject of this Structure Plan amendment is also subject to the Baldivis District Structure Plan. Refer to **Figure 5** for an extract of the Baldivis District Structure Plan.

The proposed Structure Plan Amendment is generally consistent with the Baldivis District Structure Plan.

Figure 3: An extract WAPC's South Metropolitan Peel Sub Regional Planning Framework

2.2.4 Planning Strategies

The western (front) portion of Lots 1, 101 and 102 are zoned Rural and are subject to the City of Rockingham Rural Land Strategy. However, the Rural Lands Strategy is not applicable to the land that is subject of this Structure Plan Amendment.

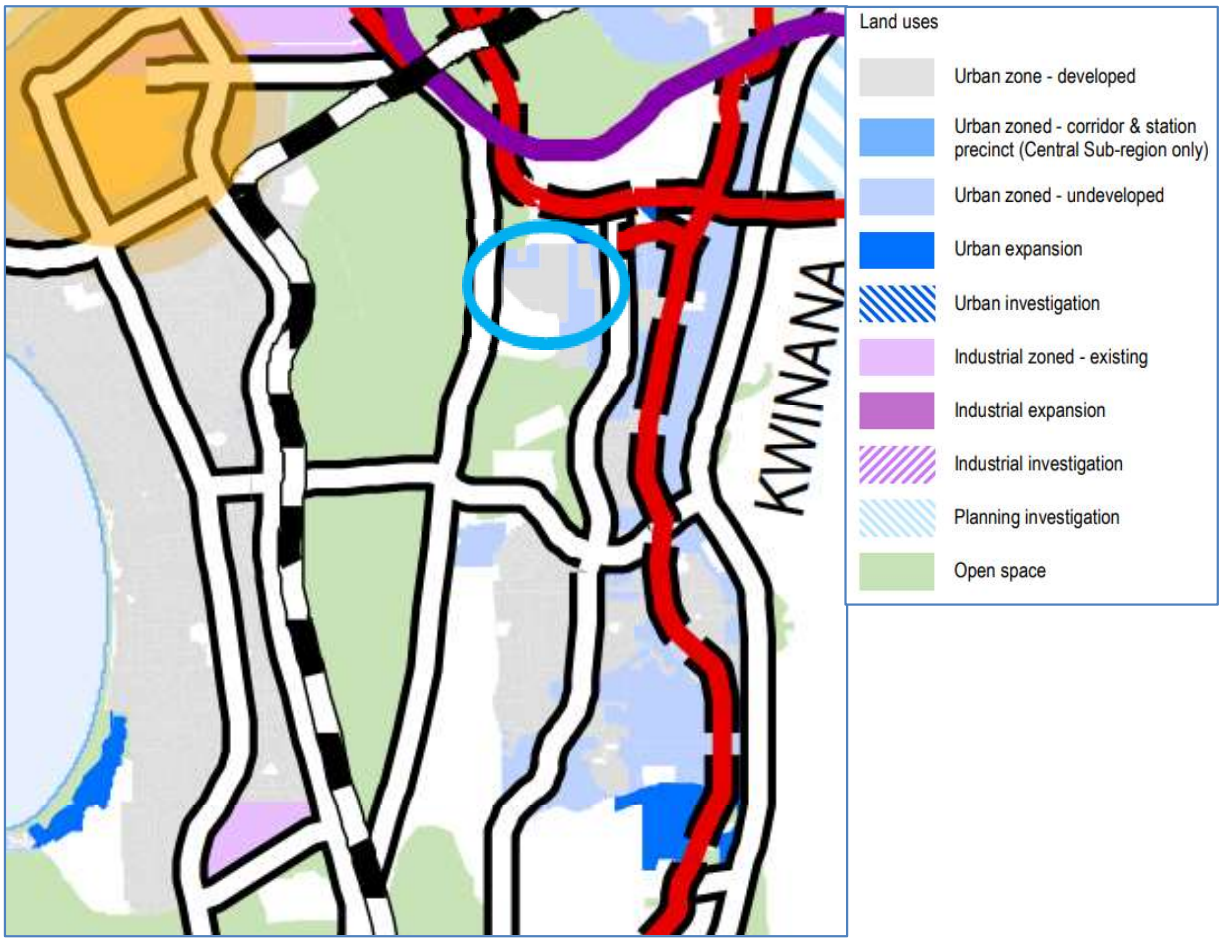

Figure 4 – Extract from WAPC's South Metropolitan Peel Sub Regional Planning Framework

2.2.5 Planning Policies

A desktop review of the City's Local Planning Policies revealed that the City's Planning Policy No. 3.4.3 Urban Water Management would be a relevant consideration. This requires the preparation of a Local Water Management Strategy for a local structure plan. Whilst there is a local water management strategy for Tuart Lakes, this has been updated to reflect this Structure Plan Amendment. A copy of the updated Urban Water Management Plan is contained at **Appendix 2**.

2.2.6 Other Approvals and Decisions

In December 2006, planning approval was granted for a park home estate for Tuart Lakes Village. In May 2009, planning approval was granted for revised plans associated with the park home park of Tuart Lakes Village. The 2009 approved plan identified the area subject of this structure plan Amendment as "Area subject of separate structure plan amendment."

In February 2023 the City granted planning approval for am amendment to the approved development plan, which provided an approved Earthworks and Tree Retention Plan for the eastern extent of the Tuart Lakes Village, including the area subject to this Structure Plan Amendment. The tree retention plan identified a total of four (4) trees to be retained within the Structure Plan Amendment Area.

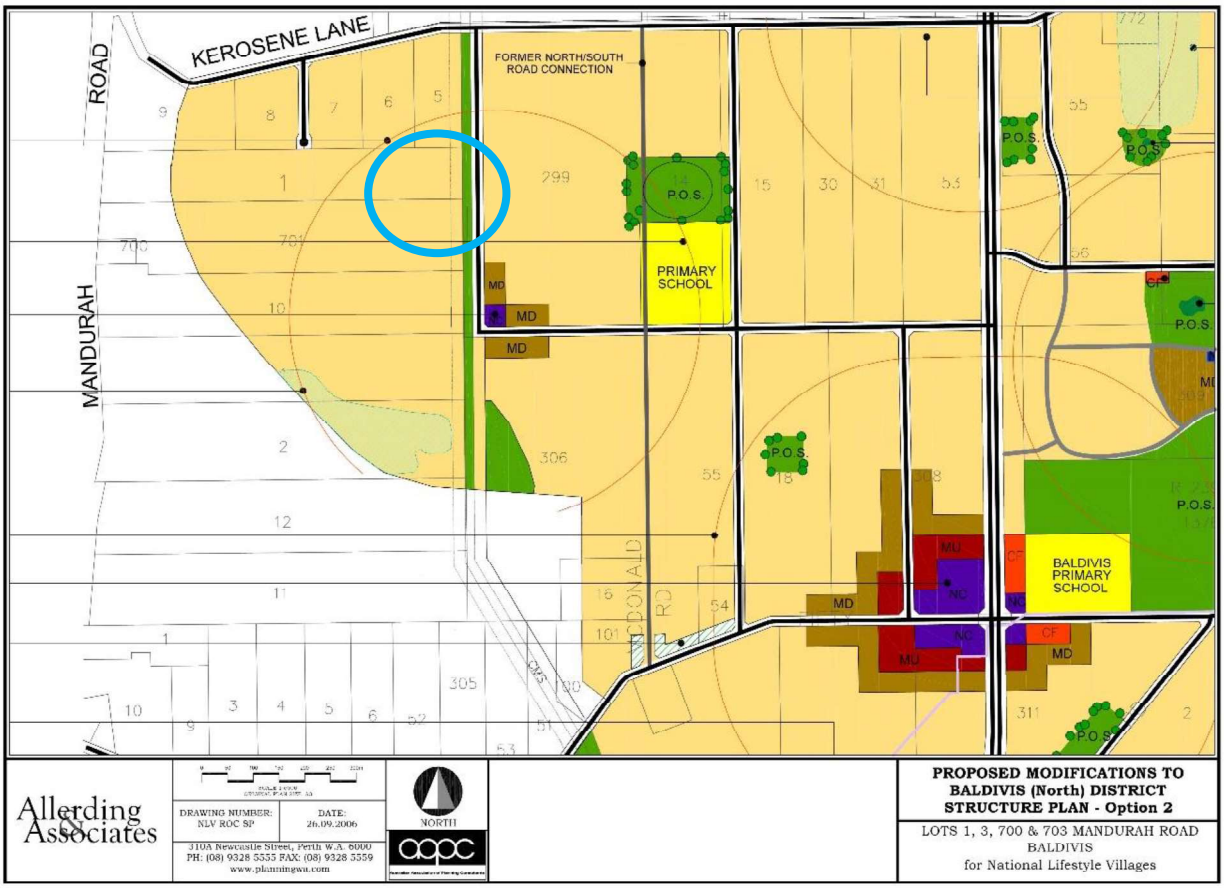

Figure 5: Extract of Baldivis District Structure Plan

2.2.7 Pre lodgement Consultation

In the years preceding lodging this Structure plan amendment, at least two meetings were held with the City officers to clarify requirements of the lodgement. Recently further consultation was undertaken with the City's officers.

The area subject to the Structure Plan Amendment is adjacent to the Parmelia High Pressure Gas Transmission Pipeline, operated by APA Group. Preliminary Consultation has been undertaken with APA and an updated Risk Assessment prepared.

Consultation has occurred with the adjoining landowners to the north, south and east to ensure that the proposed levels for this site are compatible with the levels on the adjoining sites and the proposed levels for the land within the gas pipeline easement.

It is noted that a subdivision approval has been issued for the land to the immediate east and that the subdivision approval for that land reflects the east west road connection as shown on the Tuart Lakes Structure Plan and as shown on this Structure Plan amendment. However, the land for the road connection has not been ceded to date and the road connection has not been constructed at the time of this amendment being lodged.

Consultation with the landowner to the south has been undertaken to ensure that there is consistency and compatibility between the proposed finished ground levels for the area subject of the structure plan amendment and that of the adjoining estate to the south.

2.3 Environmental Considerations

2.3.1 Biodiversity and Natural Area Assets

The land the subject of the Structure Plan Amendment is predominantly cleared, but contains isolated native vegetation adjacent to the southern boundary. In February 2023 the City approved a Tree Retention Plan for the eastern extent of the Tuart Lakes Village, including the area subject to this Structure Plan Amendment. The tree retention plan identified a total of four (4) trees to be retained within the Structure Plan Amendment Area as part of any future development.

2.3.2 Landform and Soils

The properties constituting Tuart Lakes Village slope up from Mandurah Road, with a contour in the vicinity of 6m AHD along Mandurah Road up to a ridgeline at 30m AHD central to the site, alongside the southern boundary.

The land the subject of the Structure Plan amendment is undulating with the lowest point being at the centre of the area on the western side of the Amendment at 6m AHD, sloping up to 14m AHD at the northern boundary of the Amendment area and up to 18m AHD at the southern boundary of the Amendment area.

The 2023 Development Approval for site works and tree retention provide approved levels with the highest point in the northern end of the Structure Plan Amendment Area being 14m AHD, with the land undulating down to 10m AHD central to the Amendment Area and the contours rising to 20m AHD at the southern end of the Structure Plan Amendment Area.

As outlined in the Urban Water Management Plan (**Appendix 2**), regional soil mapping suggests that most of the subject site is situated on a layer of limestone and white sand occupies the north east corner.

2.4 Groundwater and Surface Water

In terms of surface water, the site is at the interface between the Cockburn/Kwinana coast and Lower Serpentine River catchments, though there are no waterways on site.

In terms of groundwater, DWER regional groundwater mapping indicates that the maximum groundwater level within the Tuart Lifestyle Village site varies between 3mAHD and 4mAHD and the depth of the water table varies from approximately 5m to 33m.

An Urban Water Management Plan (UWMP) has been prepared for the whole of the Tuart Lakes Village and taking into account the future use contemplated in this Structure Plan Amendment. The UWMP is included as a Technical Report (**Appendix 2**). The UWMP , at the time of preparation was provided to the City separately for review and comment.

The UWMP provides design criteria for stormwater management and outlines the strategy for dealing with frequent events, minor events and major events in terms of surface water. The UWMP designates 3 basins for the whole of the site with the stormwater from the area subject of the structure plan amendment being directed to the central basin (to the west of the land subject of the structure plan amendment).

The UWMP also deals with:

- groundwater management:
- water quality management; and
- management of disease vectors and nuisance insects.

The implementation plan outlines the procedures and responsibilities during and following construction including the long term maintenance of the drainage structures.

2.5 Bushfire Hazard

The areas around the southern, eastern and western perimeters of the Tuart Lakes Village, including all of the land subject of the Structure Plan Amendment, is mapped as Bushfire Prone.

A Bushfire Management Plan (BMP) was previously prepared by Bushfire Prone Planning for the Tuart Lakes Lifestyle Village (dated July 2016). Refer **Appendix 3** for a copy of the Bushfire Management Plan. Whilst the BMP is dated July 2016 on the cover, it is noted that Version 1.2 of the report was provided to the City in February 2017. The BMP contemplated development in the location subject of the Structure Plan Amendment. The BMP addressed the relevant Bushfire Protection Criteria as contained within the *Guidelines for Planning in Bushfire Prone Areas* and outlined responsibilities in regard to vegetation management, vehicular access, fire fighting water supply and building construction standards.

As the village is existing and has been developed in accordance with the management measures outlined in the original BMP, the land subject of the Structure Plan Amendment will continue to be managed in accordance with the adopted BMP which sets out responsibilities for implementation which are consistent with current standards, including construction of the internal road network (private driveways), construction of habitable buildings to Australian Standard AS3959 *Construction of buildings in bushfire prone areas* (AS3959), installation and maintenance of Asset Protection Zones within the property boundary and compliance with the City of Rockingham Fire Control Notice.

Since the preparation of the BMP in 2017, various revised Bushfire Attack Level (BAL) assessments have been undertaken across the Tuart Lakes Lifestyle Village site to inform construction standards for park homes in accordance with AS3959 as land has been progressively cleared both within the boundaries of the subject site and on neighbouring lots to the north and east. **Figures 6 & 7** below demonstrate the extent of clearing which has occurred since 2016. BAL Assessments have been undertaken in January 2020, June 2021, November 2022, June 2023 and November 2024 to provide updated BAL ratings as staged development has occurred.

The most recent BAL Assessment undertaken in November 2024 assessed the applicable BAL ratings for development within the Structure Plan Amendment area. The Vegetation Classification Table and BAL Contour map produced in December 2024 for the Structure Plan Amendment area (refer **Appendix 4**) demonstrates how the majority of lots are identified as either BAL12.5 or BAL19, with only three (3) lots adjacent to the classified vegetation to the south of the subject site being identified as BAL40. At development application stage, siting and design investigations will be required to ensure that the three (3) southern lots will be capable of accommodating homes which achieve BAL29, unless otherwise approved at a higher BAL rating.

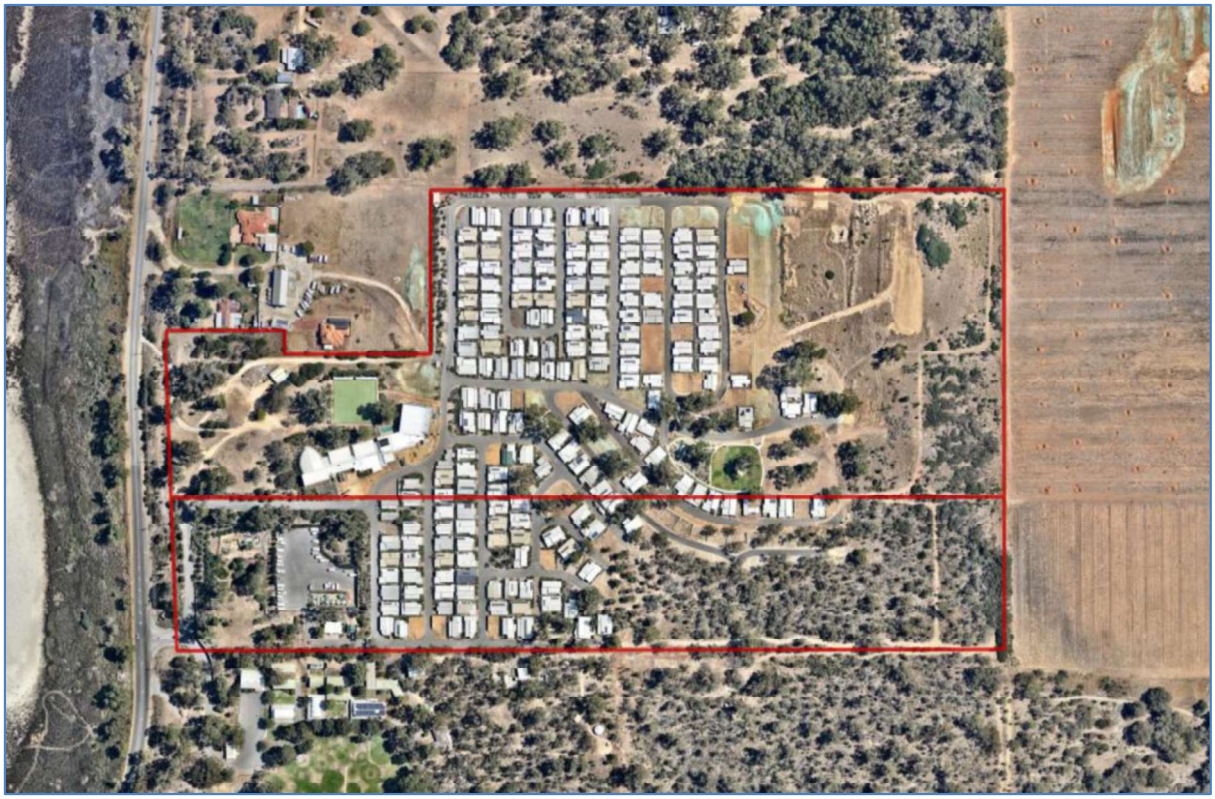

Figure 6: Aerial mapping from January 2016 showing vegetation within the southern and eastern extents of the subject site and along the northern boundary (Source: Nearmap, 2025)

Figure 7: Aerial mapping from December 2024 showing clearing areas within the southern and eastern extents of the subject site and along the northern boundary (Source: Nearmap, 2025)

2.6 Heritage

No relevant considerations.

2.7 Coast and Foreshores

Not a relevant consideration.

3.0 OPPORTUNITIES AND CONSTRAINTS

3.1 Gas Pipeline

In proximity to the Structure Plan Amendment area are easements for two gas pipelines being:

- Parmelia gas pipeline, operated by APA; and
- Alcoa of Australia pipeline.

The Parmelia gas pipeline easement is located to the immediate east of the rear boundary of Tuart Lakes Village within the following properties:

- Lot 294 which is a Crown Land Title; +
- Lot 9026, which is presently owned by A & P Galati;
- Lot 651 which is a Crown Land Title; and
- Lot 8002 (Reserve 54482) which has a management order to the City of Rockingham for the purpose of Public Recreation.

The easement runs north-south and measures 12.19m is width. The easement for Alcoa is to the immediate east of the Parmelia easement and the Alcoa easement measures 6.1m in width.

As part of the original development of Tuart Lakes Village, in 2007, Worley Parsons prepared a risk assessment pursuant to AS 2885 due to the proximity of the Village to the Parmelia Natural Gas Pipeline. A copy of the 2885 risk assessment dated 2007 is provided in **Appendix 5**.
As part of the due diligence work for the preparation of this Structure Plan amendment a meeting was conducted with APA in relation to the constraints on development due to the proximity to the Parmelia Gas Pipeline.

A copy of correspondence from APA is included in **Appendix 5** which identifies the requirement for a Technical Note to refresh the Existing AS2885 Risk Assessment.

Appendix 5 contains the technical note to update the 2007 risk assessment pursuant to AS 2885, prepared by Advisian. The technical note details threat identification, action status and update as well as a conclusion and recommendations.

The technical note recommends the preparation of a Safety Management Study in accordance with AS 2885.6-2018 prior to the commencement of construction. This could be imposed as a condition of development approval is issued for homesites within the Structure Plan Amendment Area.

3.2 Landscaping and Residential Interface

Resident safety and security are key objectives across all lifestyle villages managed and owned by Serpenitas Communities Holdings Pty Ltd, however it is also important to ensure that positive streetscape and passive surveillance outcomes are achieved where lifestyle villages front onto existing residential streets and public open space. As part of the Structure Plan Amendment, there is an opportunity to design the eastern boundary to promote visual interaction between the lifestyle village, the adjacent gas pipeline, open space and residential subdivision beyond.

A landscaping and fencing concept plan has been developed to demonstrate how this can be achieved (refer **Appendix 6**).

The landscaping and fencing concept plan incorporates open style garrison fencing along the boundary to enable views in both directions into and out of the village. Inside the village boundary, a strip of managed landscaping incorporating a combination of canopy and low plantings provide for a softening of the built form of the village beyond, but will enable surveillance to and from the public realm. In the event that the adjacent gas pipeline easement is maintained and landscaped, the proposed landscaping within the village boundary will complement these adjacent public open space areas.

3.3 Traffic and Transport

A traffic technical note has been prepared in regard to this Structure Plan Amendment (refer **Appendix 7**). The traffic technical note identifies that the approved structure plan accommodated 23 residential lots at an R20 coding. Whist the Structure Plan Amendment would increase the number of households to 46 homesites, traffic counts at similar type lifestyle villages suggest that trip generation of this type of household is significantly less than the standard vehicle movements of 8-10 vehicle movements per day per dwelling. A survey of a similar village found the average trip generation was 3.28 trips per household per day.
The conclusions from the traffic technical note is that the lifestyle homesites are likely to result in a "nett reduction to forecast traffic demands" and based upon this, a traffic assessment is not required.

As the main east west road alignment is not being changed from that approved in the 2006 planning approval and the current approved Structure Plan, no further assessment has been undertaken in regard to this road configuration. Noting that the subdivision approval for the land to the east identified a road connection consistent with the approved structure plan and this structure plan amendment.

4.0 STAKEHOLDER AND COMMUNITY ENGAGEMENT

Consultation has included meeting with the City of Rockingham on a number of occasions, spanning a number of years including in 2020 and 2024.

Consultation has also occurred with the developers of the subdivisions to the north, south and east to ensure that the levels on Tuart Lakes and the adjoining lots are compatible, particularly where there are road connections.

Consultation also was undertaken with the gas pipeline operators given the proximity of the Structure Plan Amendment Area to the pipelines.

5.0 DESIGN RESPONSE

The Structure Plan Amendment responds to the fact that there is an increasing demand for affordable housing for an aging population. The surrounding sites are being developed with single residential low density dwellings. This amendment seeks to provide affordable housing for the ageing population.

The inclusion of a landscaped interface with visual surveillance to the public open space/ pipeline easement will ensure a positive and attractive presentation to the adjoining land to the east.

The land subject of the Structure Plan amendment has been mostly cleared, with the trees to be retained in accordance with the development approval.

The design responds to the bushfire risk and development as proposed in this Structure Plan amendment is capable of satisfying the requirements of the Bushfire Management Plan.

Overall, the Structure Plan amendment is minor in nature and proposes an appropriate design response.

6.0 TECHNICAL STUDIES APPENDICES INDEX

Appendix 1 contains the Certificates of Titles for the subject lots.

6.1 Technical Appendices

The following Technical Reports have been prepared as part of this Structure Plan Amendment.

Appendix	Technical Report	Separate approval/ supporting document	Date	Status
2	Urban Water Management Plan (UWMP)	Supporting document, to be approved by DWER and City of Rockingham.	July 2020	This UWMS, prepared by Urbaqua supersedes the October 2009 UWMP prepared by VDM Environmental for Tuart Lakes.

Appendix	Technical Report	Separate approval/ supporting document	Date	Status
3	Bushfire Management Plan	Supporting document to be approved by City of Rockingham only.	Feb 2017	Approved by the City of Rockingham 2016/2017.
4	Vegetation Classification Table and BAL Contour Map	Supporting document to be approved by City of Rockingham only.	Dec 2024	This is intended to substitute the BAL Contour Mapping and Vegetation Classification contained within the 2017 BMP.
5	Technical note: Risk Assessment	Supporting document, to be provided to APA.	Mar 2020	This is intended to accompany and update the AS 2885 Risk Assessment prepared y Worley Parsons, dated March 2007, for Tuart Lakes (at that time, it referred to as Rockingham Lifestyle Village).
6	Landscaping and Fencing Concept Plan	Supporting document to be approved by City of Rockingham only.	April 2025	This concept is intended to guide future development outcomes.
7	Technical Note to Accompany Traffic Impact Statement.	Supporting document to be approved by City of Rockingham only.	Mar 2020	This Technical Note is intended to update the Traffic Report submitted in 2006 for Tuart Lakes (at that time, it referred to as Rockingham Lifestyle Village), prepared by Jonathon Riley.

Appendix 1

Certificate of Title

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
2692	**236**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

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

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 102 ON DEPOSITED PLAN 54139

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

SERENITAS COMMUNITIES HOLDINGS PTY LTD OF LEVEL 4 28 O'CONNELL STREET SYDNEY NSW 2000
(T O137577) REGISTERED 24/4/2019

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

1. N737405 CAVEAT BY RICHARD DEREK CLEVELAND, JENNIFER ANNE CLEVELAND AS TO PORTION ONLY LODGED 9/10/2017.
   N874440 CHANGE OF SERVICE OF NOTICE ADDRESS REGISTERED 13/4/2018.
2. P903627 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 29/2/2024.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

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

STATEMENTS:

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

SKETCH OF LAND:	DP54139
PREVIOUS TITLE:	276-179A, 2520-527
PROPERTY STREET ADDRESS:	831 MANDURAH RD, BALDIVIS.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ROCKINGHAM

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1385	**81**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

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BGRoberts
REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 1 ON DIAGRAM 27568

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

SERENITAS COMMUNITIES HOLDINGS PTY LTD OF LEVEL 4 28 O'CONNELL STREET SYDNEY NSW 2000
(T O137577) REGISTERED 24/4/2019

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

1. P903627 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 29/2/2024.

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

STATEMENTS:

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

SKETCH OF LAND:	1385-81 (1/D27568)
PREVIOUS TITLE:	1063-574
PROPERTY STREET ADDRESS:	851 MANDURAH RD, BALDIVIS.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ROCKINGHAM

Appendix 2

Urban Water Management Plan

Tuart Lakes Lifestyle Village Expansion

Urban Water Management Plan

Prepared for:

National Lifestyle Villages

By Urbaqua

July 2020

urbaqua
land and water solutions

Disclaimer and Limitation

This document is published in accordance with and subject to an agreement between Urbaqua and the Client, National Lifestyle Villages, for who it has been prepared for their exclusive use. It has been prepared using the standard of skill and care ordinarily exercised by environmental professionals in the preparation of such Documents.

This report is a qualitative assessment only, based on the scope of services defined by the Client, budgetary and time constraints imposed by the Client, the information supplied by the Client (and its agents), and the method consistent with the preceding. Urbaqua has not attempted to verify the accuracy or completeness of the information supplied.

Any person or organisation that relies upon or uses the document for purposes or reasons other than those agreed by Urbaqua and the Client without first obtaining the prior written consent of Urbaqua, does so entirely at their own risk and Urbaqua, denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this Document for any purpose other than that agreed with the Client.

Summary

Design Objective	Design response & compliance with objectives
Water sustainability • Promote efficient use of potable water and alternative water sources; • Potable water consumption target of not more than 60 kL/person/year; and, • Reduce urban temperatures.	• Education and advertising for residents is projected to reduce water use to 55-60 kL/person/year; • The site current gas a groundwater licence for 52,000 kL/year; and, • Planting of trees will be encouraged over impermeable surfaces.
Surface water management • Retain natural drainage lines and minimise the use of piped drainage systems; • Frequent events (≤ first 15 mm of rainfall) retained and infiltrated within property boundaries, using soak wells where possible; • Large events contained in landscape retention/detention areas, road reserves, and open space; and, • Retain runoff (≤ 1% Annual Exceedance Probability (AEP) Event) within the site boundary.	• Soakwells will be required for all dwelling to capture and infiltrate up to the first 15 mm of rainfall; • Road drainage (v-drains) will convey up to the 20% AEP to the open space areas for infiltration in basins; • There will be limited pit and pipe drainage across the site; • The central drainage basin will infiltrate and retain up to the 1% AEP event from the existing developed land and Zone C; • Two basins will be installed in the western for drainage of Zone B and D respectively; • Lots adjacent to the central drainage basin have at least 500 mm of clearance above 1% AEP levels; and, • No offsite drainage is required.
Groundwater management • Maintain appropriate recharge characteristics, groundwater levels; • Ensure appropriate separation from the maximum groundwater levels; and, • Maximise infiltration close to source or high in the catchment.	• Existing groundwater level information indicates there is at least 5 m of clearance to groundwater across the site. • Existing soils feature high infiltration rates (measured up to 40 m/day) and runoff is contained within the site. • All stormwater onsite will be retained onsite and infiltrated within soakwells (lots), open drains and infiltration basins.
Management of disease vectors and nuisance insects • Limit the creation of new sites for breeding of nuisance insects; • Prevent standing water in drainage infrastructure (infiltration within 96 hours); • Improve water quality throughout the development; and, • Design and construct new surface drainage infrastructure to provide healthy functioning ecosystems that will support natural predators.	• Engineering design will not create any new permanent or semi-permanent water bodies within the Study Area. • Stormwater drainage design ensures detained immobile stormwater is fully infiltrated within the basins within a time period not exceeding 96 hours per storm event.

Design Objective	Design response & compliance with objectives
Managing subdivision works • Prevent disruption to existing drainage pathways and infrastructure; • Ensure any dewatering is undertaken in accordance with DWER requirements; • Control sediment to prevent mobilisation from construction areas; • Treat any disturbance to Acid Sulphate Soils in accordance with the DWER requirements; and, • Provide maintenance of stormwater infrastructure to sustain performance outlined in the UWMP.	• DWER Regional mapping indicates the site has no known risk acid sulfate soils occurring within 3 m of the natural surface. • Sediment transport during subdivision works will be managed by establishing management procedures, minimising the disturbed area, installation of sediment and wind fencing and controlling access points to the site. • Proposed maintenance arrangements include specific actions to manage sediment, litter and other debris during the post-construction phase of the development.

CONTENTS

Figures

Tables

1 INTRODUCTION

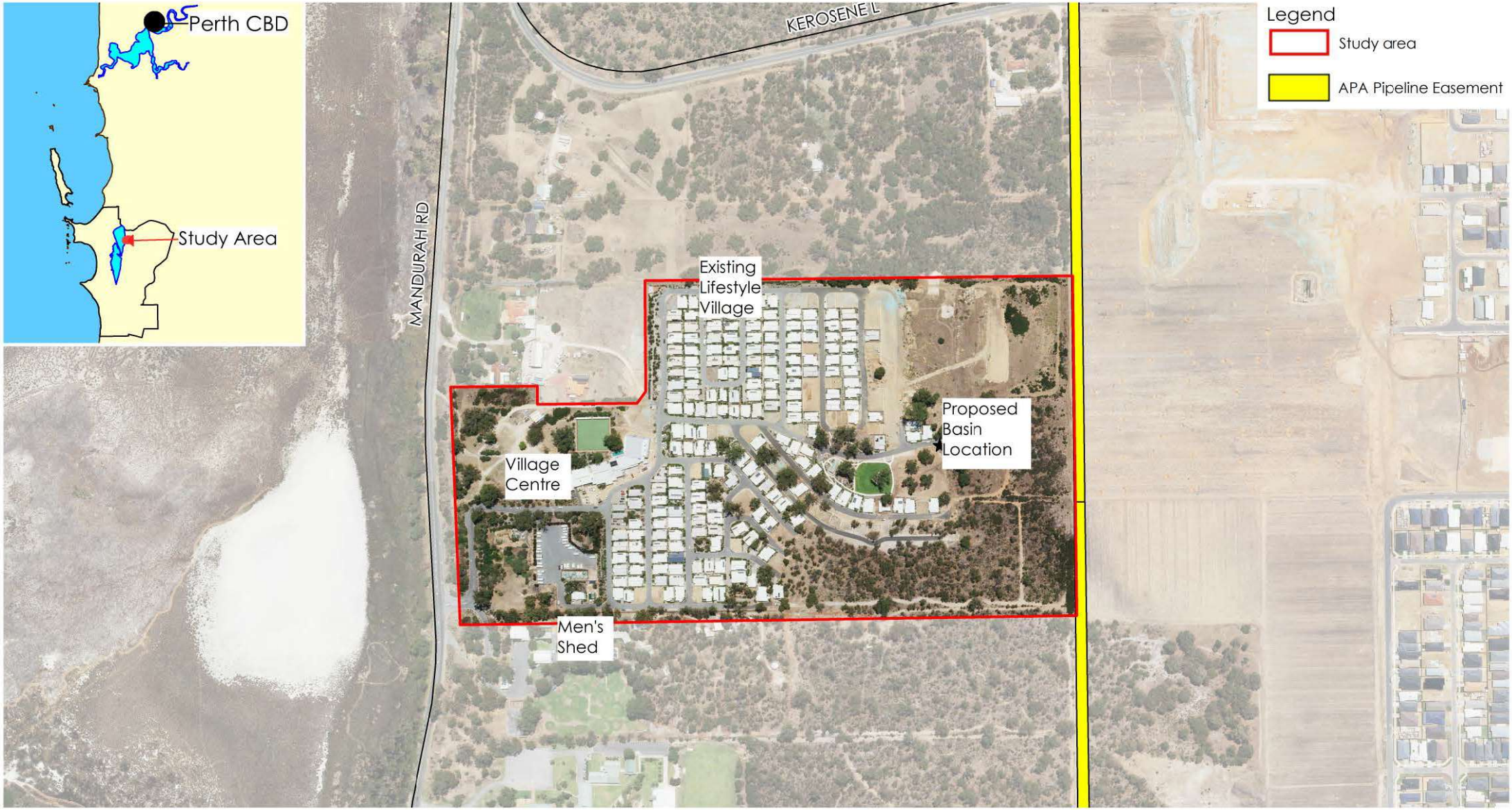
This Urban Water Management Plan (UWMP) has been prepared to support an amendment to the 2006 Tuart Lakes National Lifestyle Village Structure Plan for Lot 102 Mandurah Road & Lot 1 Mandurah Road (the Study Area) approximately 25 ha (Figure 1). The changes to the previous structure plan include expansion of the lifestyle village and alternative road layouts in the eastern portion of the site (zoned R20) and additional development on the western portion of the site. Water management on the site is proposed to utilise existing infrastructure and implement further Water Sensitive Urban Design (WSUD).

Detailed design of the drainage system for the subdivision will be prepared consistent with the UWMP. This document has been prepared consistent with *Better Urban Water Management* (WAPC, 2008) and the Department of Water and Environmental Regulation's (DWER) *Urban Water Management Plan: Guidelines for Preparing Plans and Complying with Subdivision Conditions* (DoW, 2008). The document is also prepared in consideration of the City of Rockingham's *Policy 3.4.3: Urban Water Management*. A checklist for the UWMP requirements is included in Appendix 1 and outlines the compliance with the documents outlined above.

Preparation of the UWMP is informed by, and replaces the *National Lifestyle Villages Tuart Lakes Baldivis Urban Water Management Plan* prepared by VDM (2009). The previous UWMP provided guidance regarding water conservation, water quality, flood control and groundwater management, however proposed amendments now require the previous water management approaches to be assessed and updated. The previous UWMP (VDM, 2009) was guided by an Urban Water Management Strategy prepared by National Lifestyle Villages in 2007.

The UWMP provides a summary of the design objectives (determined by guiding documents and City of Rockingham requirements), site characteristics (following a review of previous investigations, regional datasets and site information), proposed water management measures and steps to implement the UWMP.

National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 1 - Study area



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2 PROPOSED DEVELOPMENT

This section outlines the key elements of the current land use and proposed development that influence water management.

The original structure plan (2006) proposed to develop most of the site into the National Lifestyle Village development, while reserving a strip of land adjacent to the eastern boundary of the site for R20 residential dwellings (Zone C, Figure 2). The amended Structure Plan (Appendix 2) proposes to construct additional lifestyle homesites in the residential zone (Zone C). The new plan also offers greater detail regarding the western portion which now proposes to include a car park and sporting facilities as well as additional lifestyle village lots. A summary of the amendments to the site are provided in Table 1 (Allerding & Associates, 2020).

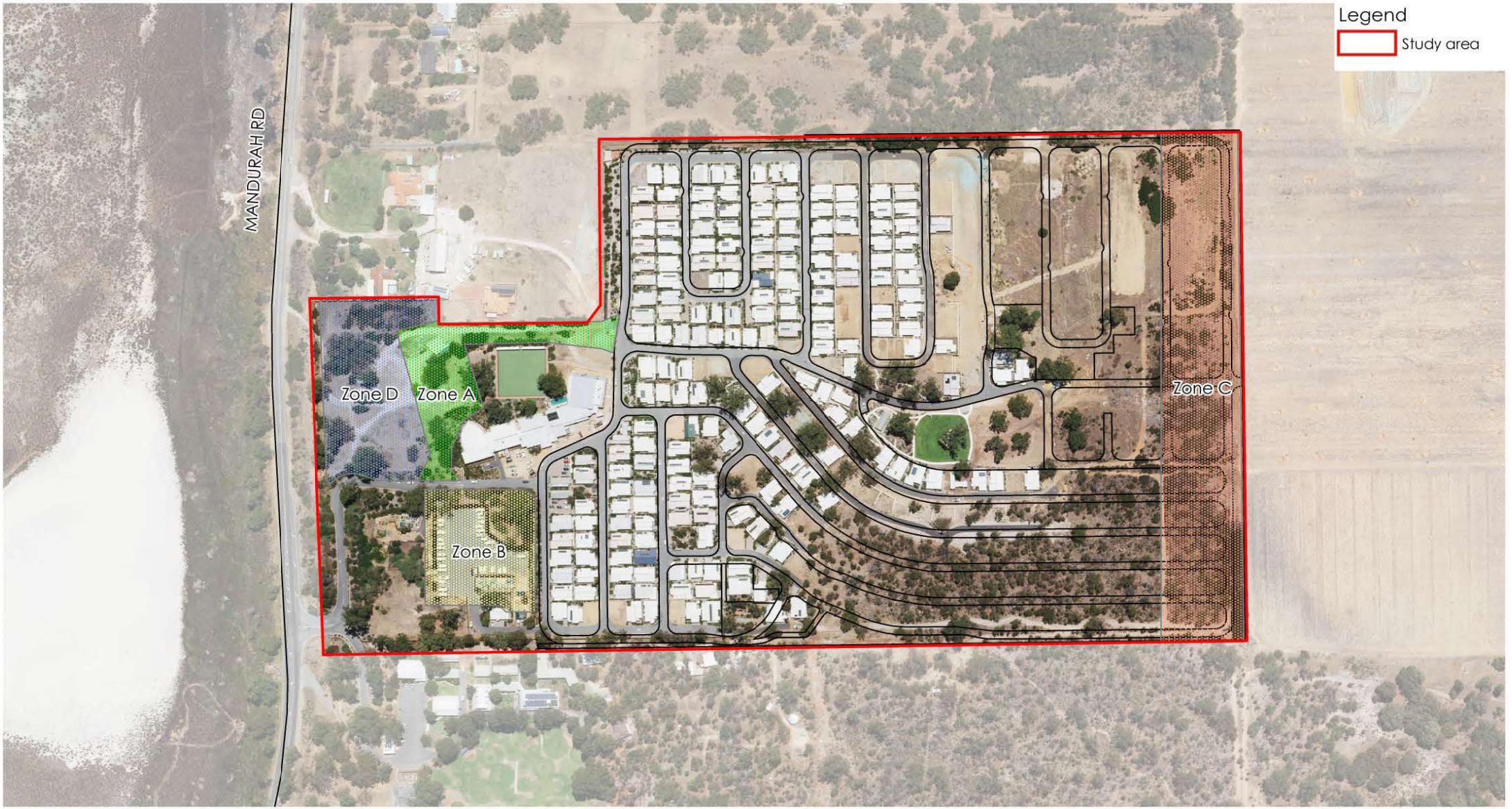
Table 1: Structure plan amendments

Zone	Current Land Use / Planning	Proposed Land Use
A	Zoned as R20 residential	Carpark and sporting facilities
B	Caravan Parking area	Lifestyle village lots
C	Undeveloped	Extension of the lifestyle village lots
D	Undeveloped	Lifestyle village lots

The eastern boundary of the site is adjacent to the Parmelia Gas Pipeline (APA) which is located underground, approximately 10 meters east of the site boundary.

The proposed development will utilise existing drainage infrastructure (where possible) and apply a similar approach as the previous UWMP (VDM, 2009) to the proposed new development areas. The existing drainage on site consists of a combination of soakwells, roadside v-drains, a central basin located in a park and several smaller informal drainage areas. Drainage is contained within the Study Area and does not discharge off-site, either to the gas pipeline easement or to significant surrounding environments.

National Lifestyle Village- Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 2 - Proposed amendment zones



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3 DESIGN CRITERIA

This UWMP provides a water management approach informed and in line with *Better Urban Water Management* (DoW, 2008) and *Urban Water Management Plans – Guidelines for preparing plans and for complying with subdivision conditions* (DoW, 2008). The approach to water management in the Study Area is to generally adhere to previous water management strategies whilst implementing improved WSUD outcomes. The design criteria of the previous UWMP (VDM, 2009) is summarised in Appendix 3.

Table 2 summarises the key design objectives to be achieved to as part of development proposed by the revised structure plan. These objectives have been considered in developing the proposed water management plan outlined in Sections 5 through 7 of this report.

Table 2: Design criteria

Design element	Criteria
Water sustainability	• Promote efficient use of potable water and alternative water sources; • Potable water consumption target of not more than 60 kL/person/year; and, • Reduce urban temperatures.
Surface water management	• Retain natural drainage lines and minimise the use of piped drainage systems; • Improve water quality throughout the development; • Frequent events (≤ first 15 mm of rainfall) retained and infiltrated within property boundaries, using soak wells where possible; • Large events contained in landscape retention/detention areas, road reserves, and open space; and, • Retain runoff (≤ 1% Annual Exceedance Probability (AEP) Event) within the site boundary.
Groundwater management	• Maintain appropriate recharge characteristics, groundwater levels; • Ensure appropriate separation from the maximum groundwater levels; and, • Maximise infiltration close to source or high in the catchment.
Management of disease vectors and nuisance insects	• Limit the creation of new sites for breeding of nuisance insects; • Prevent standing water in drainage infrastructure (infiltration within 96 hours); and • Design and construct new surface drainage infrastructure to provide healthy functioning ecosystems that will support natural predators.
Implementation	• Prevent disruption to existing drainage pathways and infrastructure; • Ensure any dewatering is undertaken in accordance with DWER requirements; • Control sediment to prevent mobilisation from construction areas; • Treat any disturbance to Acid Sulphate Soils in accordance with the DWER requirements; and, • Provide maintenance of stormwater infrastructure to sustain performance outlined in the UWMP.

4 SITE CHARACTERISTICS

A detailed site analysis has been presented for the Study Area in the previous UWMP (VDM, 2009) and geotechnical investigation (Douglas Partners, 2006). Site Characteristics are summarised in Table 3 below incorporating information from the previous document and the latest regional and local datasets.

Table 3: Site Characteristics

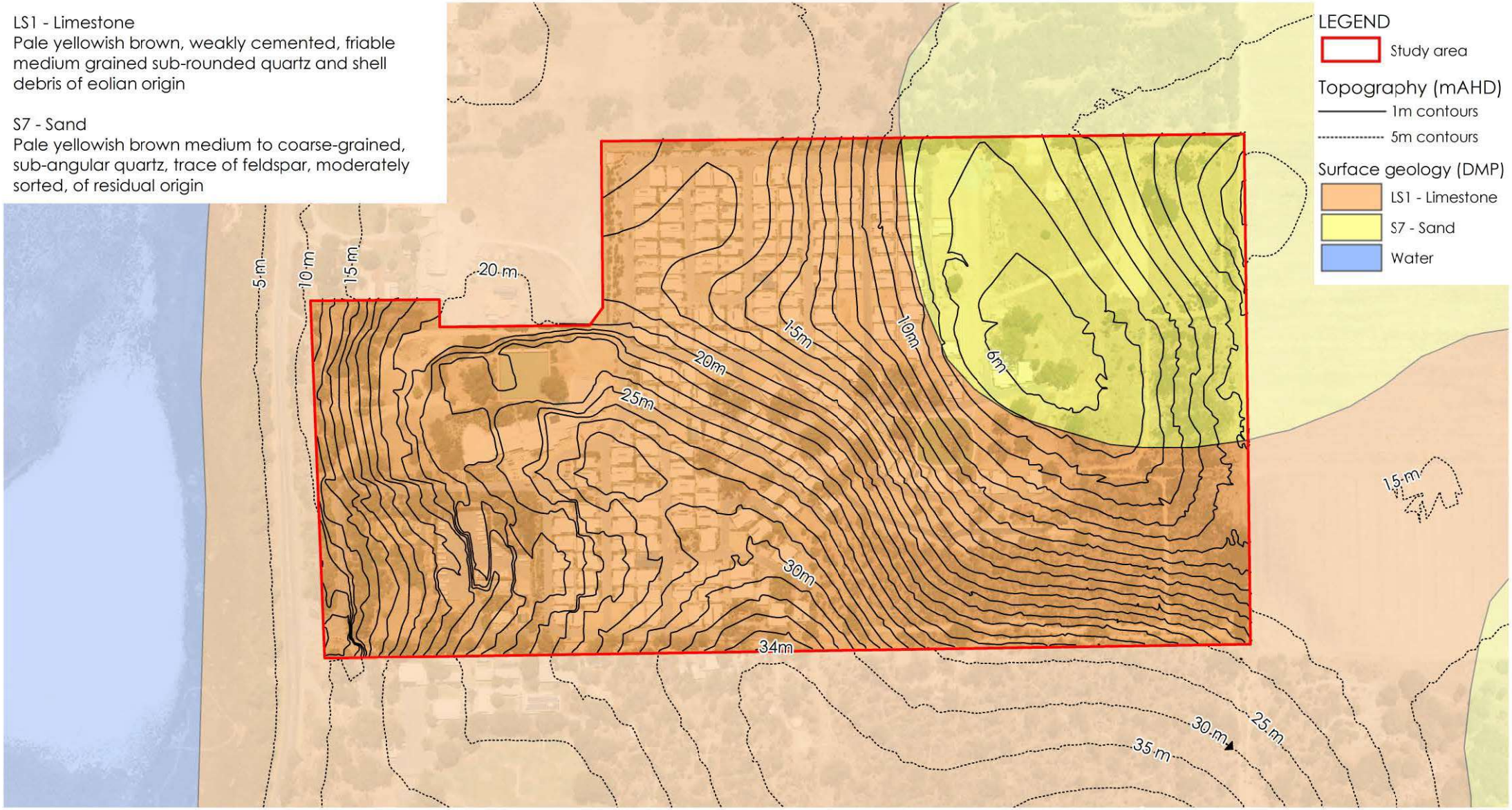
Category	Site Characteristic
Climate	• Typical of the Perth region with hot, dry summers and mild, wet winters. • Average annual rainfall (Hopelands station 9253) since 2000 is 768.2 mm; • Evaporation peaks during the summer months December, January, and February.
Topography	• The topography ranges between 6 mAHD and 34 mAHD (Figure 3). • The highest point is located on the slope of a hill at the southern boundary of the study area. • The central portion of the site slopes down in both the western direction (towards the low-lying lakes interface) and eastwards.
Land Use	The site was historically used as a poultry farm and market gardens, but has been developed as a lifestyle village since 2010. The surrounding environment and land use include: • Oasis Baldivis, a residential development to the north that is currently under construction; • South, the land has been redeveloped into the Christian Youth Camps; • The lot borders Mandurah Rd directly west and Lake Cooloongup beyond that; and, • Several developments border the study area to the east, additionally, the APA Parmelia Gas Pipeline runs parallel to the east boundary of the site. The pipe centreline is located around 10m east of the site boundary and the easement is estimated to measure around 32m (Creative, 2016).
Geotechnical	• Regional soil mapping suggests that most of the study area is situated on a layer of limestone (LS1), while sand (S7) occupies the north east corner (Figure 3); • This is consistent with the 2006 geotechnical investigation by Douglas Partners (2006); and, • The same report encountered the unsaturated permeability of the sand to be 43.2 m/day (Douglas Partners 2006).
Groundwater	• DWER regional groundwater mapping (DWER 2020) indicates that the maximum groundwater level within the site varies between 3 mAHD and 4 mAHD across the site (Figure 5); • Groundwater flows generally from east to west towards Lake Cooloongup; and, • The depth to the water table varies from approximately 5 m to 33 m.
Surface Water	• The Study Area sits at the interface between the Cockburn/Kwinana Coastal and the Lower Serpentine River catchments, though there are no waterways on the site; • The highest point on site coincides approximately with the centre point of the southern boundary (35 mAHD);

Category	Site Characteristic
	• The slope is steepest (approximately 1:10) in the direction SW-NE (highest to lowest) that leads into an existing drainage basin located in the North West quadrant of the site (6 mAHD - Figure 3); and, • East to West, the site slopes continuously (approximately 1:12) towards Lake Cooloongup with a number of smaller drainage basins to collect runoff (Figure 6).
Water Resources	• The site is located in the Tamworth Swamp subarea; • Groundwater is available within the superficial aquifer (Superficial Swan), however the site is already licensed for 52,000 kL of groundwater abstraction, which is further discussed in Section 5.1 of this report; • Additionally, the underlying semi-confined Leederville aquifer is fully allocated.
Wetlands	• No conservation category wetlands are within the site; however, • Lake Cooloongup, situated west of the site, is classified as a conservation wetland (Figure 7).
Vegetation	• Previous surveys have observed that very little native vegetation remains, other than scattered trees across the southern portion (VDM 2009); • The adjacent lake is listed as Bush Forever Site 356 – Lake Cooloongup, Lake Walyungup and Adjacent Bushland, Hillman to Port Kennedy (Figure 7);
General Environment	• Acid Sulfate soil risk mapping (DWER 2020b) does not indicate that there is any risk of ASS within 3 m of the surface across the Site (Figure 4); • There are no Registered Contaminated Sites identified on the Contaminated Sites Database (DWER 2020c) within the subject land (Figure 7); • Contaminated sites, however, have been recorded northwest, north, and northeast of the site and are classified as 'Remediated for restricted use'. The nature of the contamination was reported in 2018 as Ammonia, Sulfate and Nitrate present in groundwater (DWER, 2018).
Heritage	• No registered Aboriginal Sites within or adjacent to the Site were identified in a search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal heritage enquiry system (2018).

National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 3 - Topography and geological features

LS1 - Limestone
Pale yellowish brown, weakly cemented, friable medium grained sub-rounded quartz and shell debris of eolian origin

S7 - Sand
Pale yellowish brown medium to coarse-grained, sub-angular quartz, trace of feldspar, moderately sorted, of residual origin



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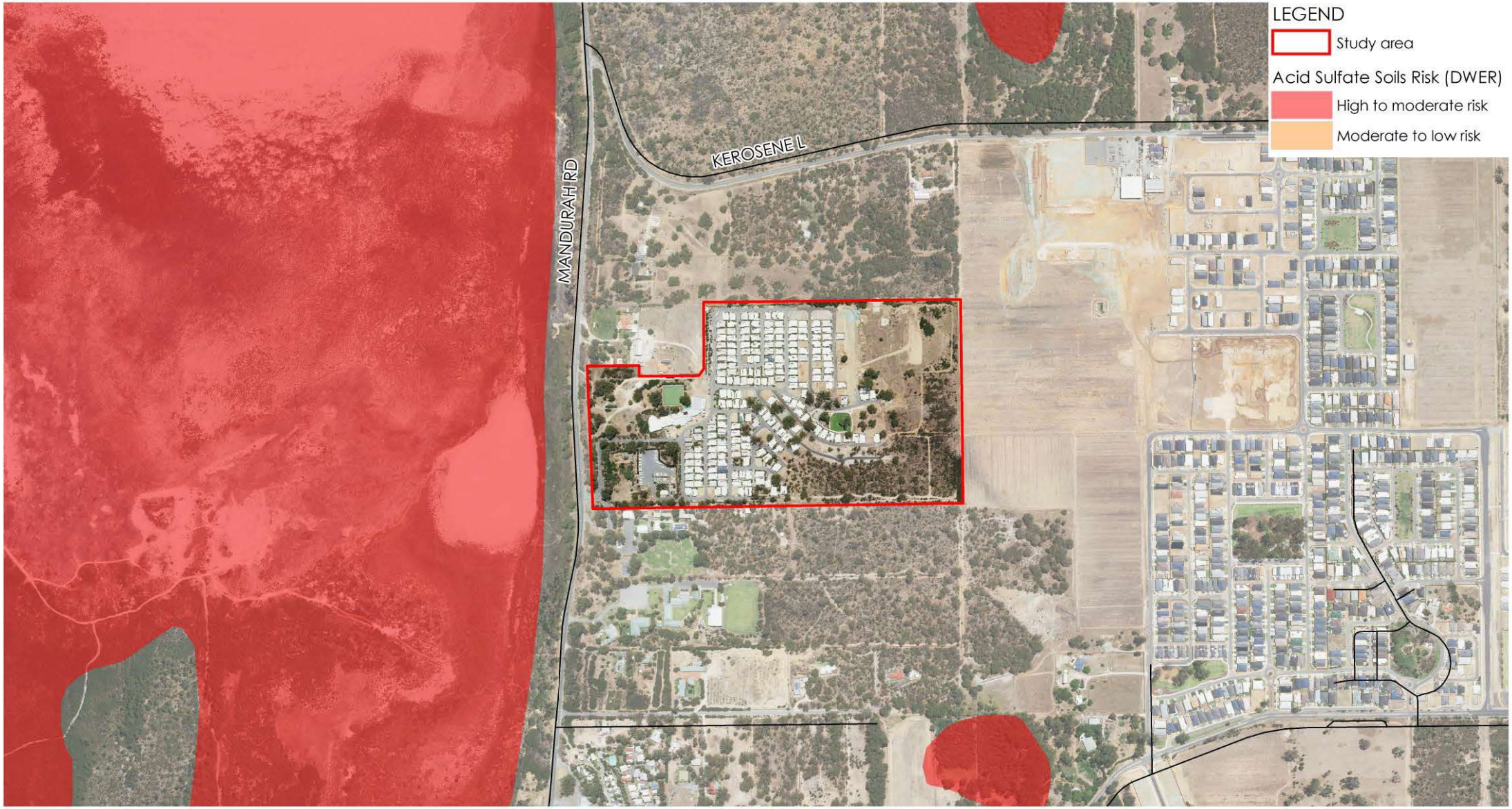
National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 4 - Acid sulfate soil risk



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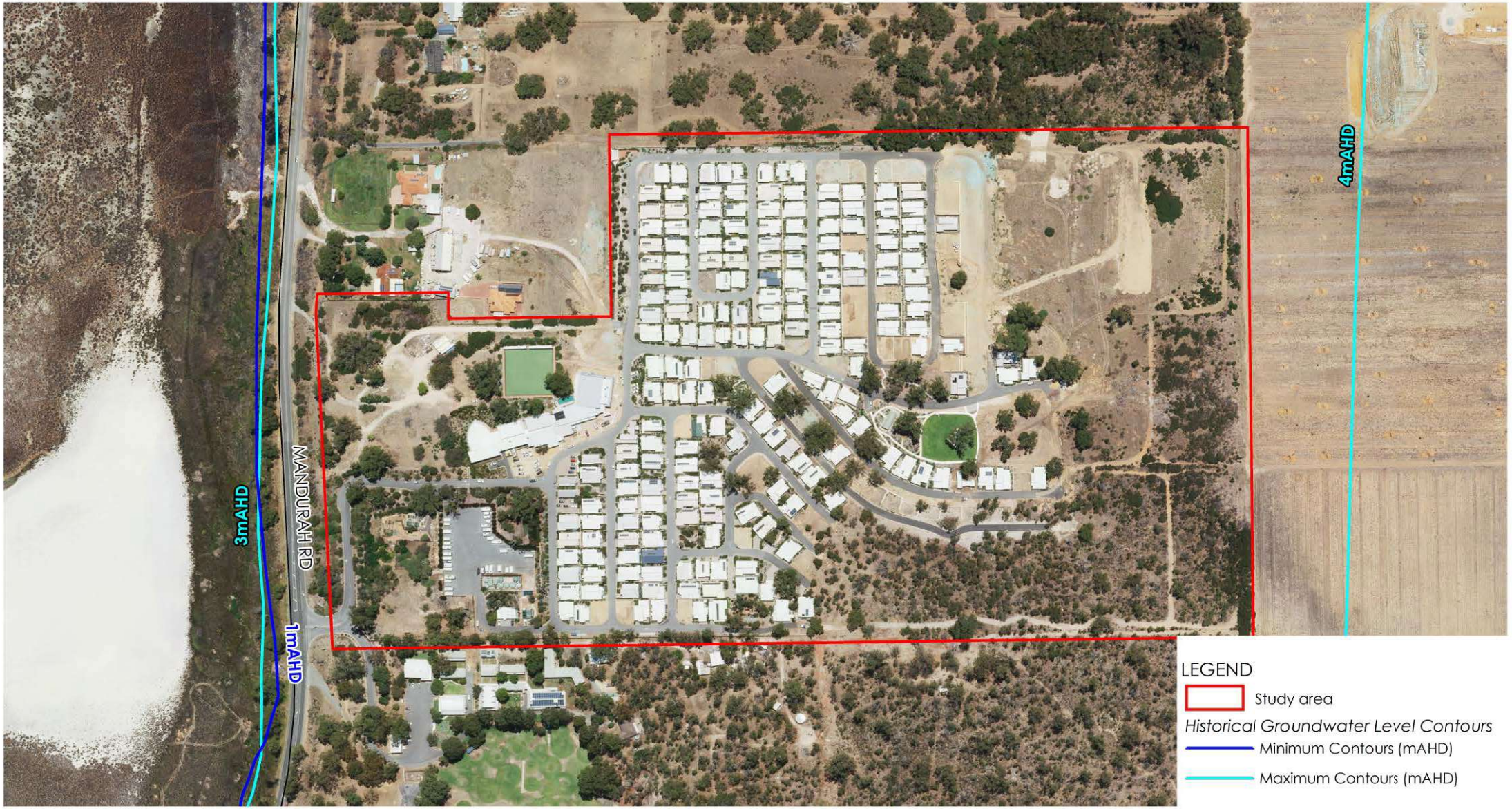
National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 5 - Groundwater conditions



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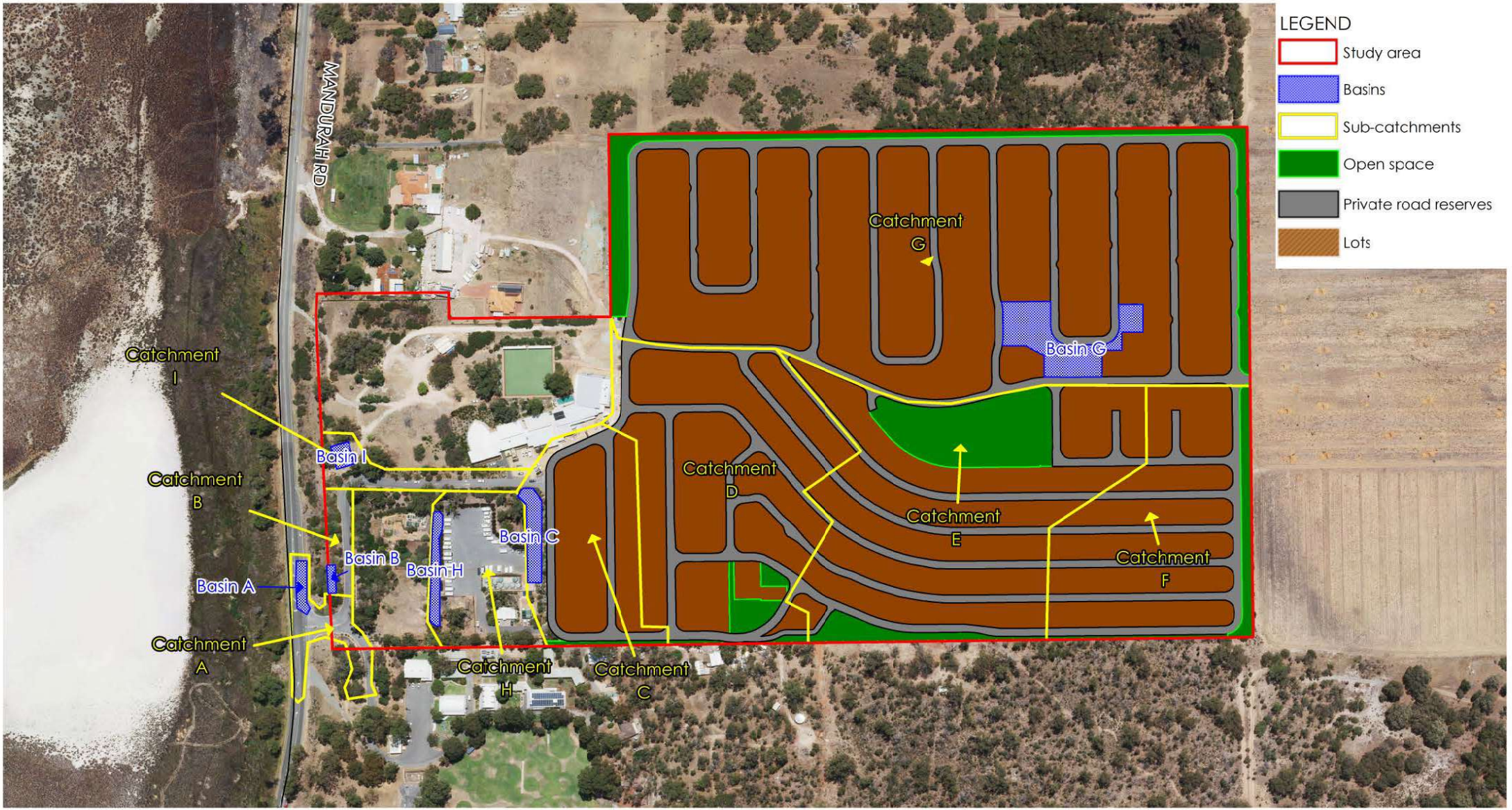
National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 6 - Proposed Stormwater Management in 2009 UWMP



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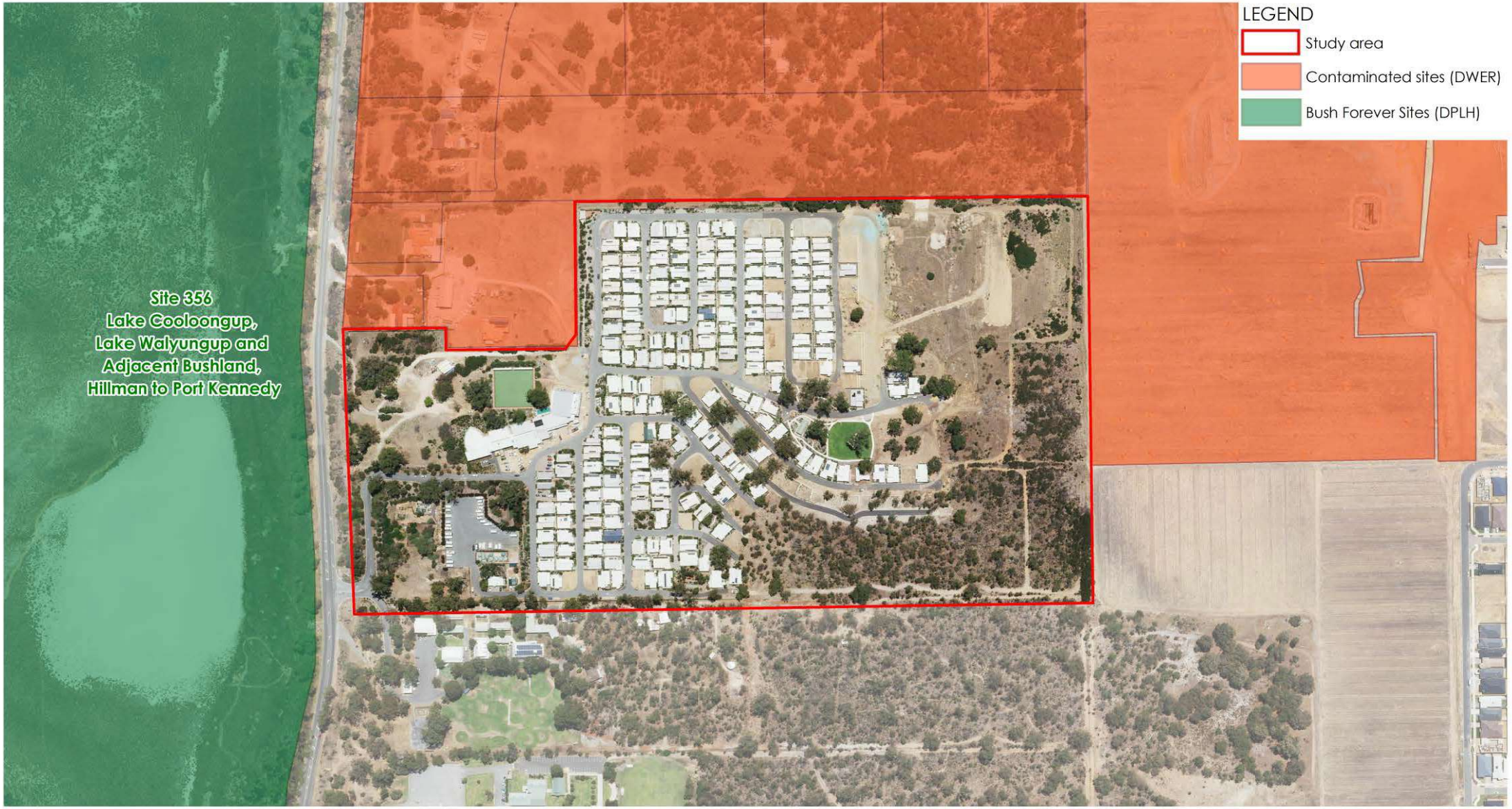
National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 7 - Environmentally sensitive areas



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5 WATER SUSTAINABILITY INITIATIVES

Water sustainability measures including the supply of water and the treatment and disposal of wastewater for the residential lots is described below.

Design Criteria:

- *Promote efficient use of potable water and alternative water sources;*
- *Potable water consumption target of not more than 60 kL/person/year; and,*
- *Reduce urban temperatures.*

5.1 Water Supply

Water Corporation supplies scheme water to the National Lifestyle Village. Potable water will be supplied to the proposed additional development as an extension of the existing infrastructure.

There is a current groundwater abstraction licence (Licence Number 166442) for Lot 102 Mandurah Rd Baldivis and Lot 1 Mandurah Rd Baldivis from the Perth – Superficial Swan aquifer. The licence provides for 52,000 kL/yr to irrigate existing open space. Additional open space, potentially in Zone B (Figure 2), will be irrigated under this existing allocation.

5.2 Wastewater

The Study Area will be connected to the Water Corporation's integrated sewerage scheme. Each Property will be connected to the reticulated sewer network and wastewater will be removed using this conventional system.

5.3 Water Conservation and Efficiency Measures

The old UWMP (VDM, 2009) outlines the use of education material and advertising to reduce water consumption onsite. Further reductions in the consumption of scheme water can be achieved by constructing new residences to meet the Water Corporation's waterwise criteria, including:

- All showerheads installed will be better than the minimum WELS 3 Star rating;
- All taps installed will be better than the minimum WELS 4 Star rating;
- All toilets will be duel flush and exceed the minimum WELS 4 Star rating; and,
- All water using appliances installed are rated WELS 4 Star or above.

Water balance modelling undertaken by VDM (2009 estimates that water consumption is approximately 55 kL/year through the implementation of these water saving measures.

Throughout the lifestyle village, water efficiency will be improved in new open space areas by using waterwise native plants, retaining existing trees (where possible) and use of water sensitive irrigation designs.

Previous efforts to reduce water use included using a 1:1 mix of hardstand areas to turf and garden beds (at the entry statement). New areas of open space or entry statements will favour retention and planting of trees to improve shading and reducing urban heat effects.

6 SURFACE WATER AND GROUNDWATER MANAGEMENT

The water management plan for surface water and groundwater resources within the Study Area has been prepared based on the guiding documents (Section 1) and site considerations (Section 4). The following management measures address the design objectives (Section 3), including providing protection to the residents and improving water quality.

6.1 Stormwater Management

Design Criteria:

- *Retain natural drainage lines and minimise the use of piped drainage systems;*
- *Frequent events (≤ first 15 mm of rainfall) retained and infiltrated within property boundaries, using soak wells where possible;*
- *Large events contained in landscape retention/detention areas, road reserves, and open space; and,*
- *Retain runoff (≤ 1% Annual Exceedance Probability (AEP) Event) within the site boundary.*

Development across the Study Area will result in additional impervious areas and runoff downstream. Management is therefore required to address this, with specific measures provided for frequent, minor and major rainfall events. The Study Area forms several catchments which discharge to the east and west of the site. Specific measures for the frequent and infrequent rainfall events are provided in the following sections.

The proposed approach to earthworks is to generally maintain the natural surface levels and catchments. In the absence of significant cut and fill, the site levels will tie into surrounding development (and the pipeline easement). The topography of the site allows for drainage to be contained within the Study Area boundary and there are no external catchments.

6.1.1 Frequent Events (63.2% AEP)

As outlined in the *Decision process for stormwater management in Western Australia* (DWER, 2017) and the City of Rockingham Planning Policy No. 3.4.3 (City of Rockingham, 2018) the first 15 mm of rainfall requires management at-source as much as practical. Rainfall events up to this magnitude are responsible for mobilisation of the majority of pollutants in urban development and retention/detention of this runoff contributes to the protection of downstream environments. Management of these storm events also contributes to reducing runoff downstream, nuisance flooding and erosion.

Consistent with DWER requirements, frequent rainfall will be captured and treated within the development area, close to source. This requirement was recognised in the previous UWMP (VDM, 2009) and was managed through the use of soakwells on lots, and v-drains in roads. Extension of this approach is considered appropriate, with additional structures for new carparks and miscellaneous impervious surfaces.

Within individual residential lots, the first 15 mm of rainfall will be managed through the installation of soakwells that will capture and infiltrate runoff from roof areas, driveways and garden areas. The duration of the 15 mm of rainfall is not specified in the *Decision process for stormwater management in Western Australia* (DWER, 2017), suggesting instantaneous runoff of the entire volume into the soakwells. In reality, the rainfall will have a duration of at least 10 mins (and typically assumed to be around 1 hour) which allows for some infiltration during the event (onsite testing indicates >40 m/day infiltration), and reduces the volume required.

The management of the first 15 mm of rainfall can be achieved by both retention (losses, soakwell storage and infiltration) and detention of runoff. In the context of the soakwell configuration, grated covers from the soakwells will allow overflow in the street drainage system following detention in the soakwells. Overflows from the lots will then be managed within the road drainage system.

The previous UWMP (VDM, 2009) provides calculations for soakwell size based on a catchment area of 250 m^2, detailing that twin 1,050 mm diameter, 1,200 mm deep soakwells are sufficient, based on an infiltration rate of 20 m/day. Whilst 20 m/day is significantly less than onsite infiltration testing indicates (>40 m/day), it is still a high rate for design purposes where infiltration may be reduced over time through clogging from a lack of maintenance. A more conservative infiltration rate of 10 m/day is applied in this document (apart from the central basin), which accounts for onsite variability and potential diminishing performance over time.

Despite the lower infiltration rate, the twin 1,050 mm diameter, 1,200 mm deep soakwells configuration is still appropriate for the site as losses from roof material and gutters appear underestimated in the previous document. Results from soakwell water balance calculations are shown in Table 4.

Table 4: Soakwell Sizing

Source	Soakwell Size	Infiltration Rate	Initial Loss	Maximum Depth
Old UWMP (2009)	1.05 m width x 1.20 m depth	20 m/day	1.5 mm	1.19 m
2020 Calculation		10 m/day	4.0 mm	1.20 m

Runoff from at least the first 15 mm on the road surface is captured and infiltrated within the roadside drains in established areas. For areas that are yet to be constructed and expansion areas, frequent runoff will be captured and infiltrated using underground infiltration cells. The cells, including systems like *stormtech*, contain water beneath the road surface and reduce the risk of local flooding along roadside drains either from reduced infiltration performance (clogging), blockages or other damage.

The locations of these units are provided in Figure 9 and the number of units for respective sub-catchments is provided in Table 5. Further detail is provided in the engineering drawing *C350 Overall Stormwater Drainage Plan* in Appendix 4. The units are sized to contained larger rainfall events, as discussed in Section 6.1.2 as shown in Table 5.

Table 5: Underground storage

Sub-catchment	Total catchment area	No. of units	Total volume	Event Contained
2	0.75 ha	42	88.2 m^3	20% AEP
3	0.97 ha	28	58.8 m^3	20% AEP
4	0.65 ha	44	92.4 m^3	1% AEP
5	0.75 ha	20	42.0 m^3	20% AEP
6	2.38 ha	64	134.4 m^3	63.2% AEP
7	0.08 ha	6	12.6 m^3	1% AEP
8	0.65 ha	18	37.8 m^3	20% AEP
9	1.19 ha	45	94.5 m^3	20% AEP
10	0.80 ha	33	69.3 m^3	20% AEP

Infiltration cells will also be installed in residential lots throughout Zones B, C and D with specific configurations to be confirmed during detailed design. Specific measures for treatment of water quality, including amended soils beneath these cells is considered unnecessary given the depth to groundwater and nature of the roads within the development. The roads are private used only by residents and visitors with significantly less use than public roads, reducing the source of nutrients and metals.

Passive watering of verges and trees by stormwater will be considered within larger roads and car parks. This approach provides the benefit of reducing nutrient export to the local groundwater system. An example of paved areas, including footpaths designed to runoff into vegetated areas is provided in Figure 8.

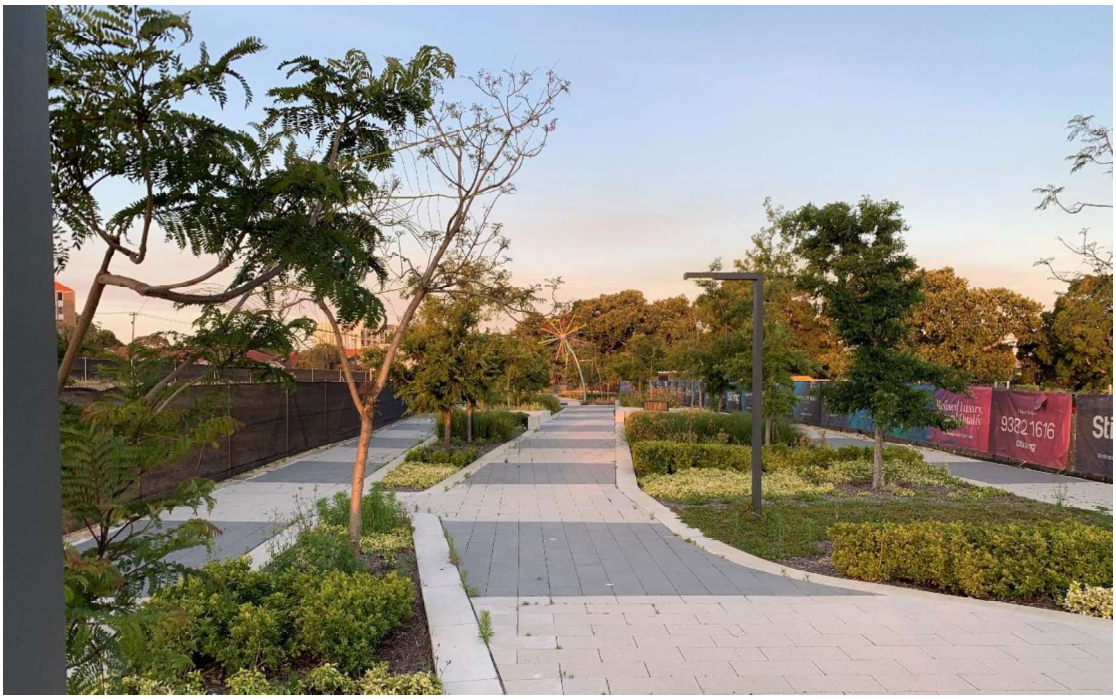


Figure 8: Design for runoff to passively irrigated vegetation

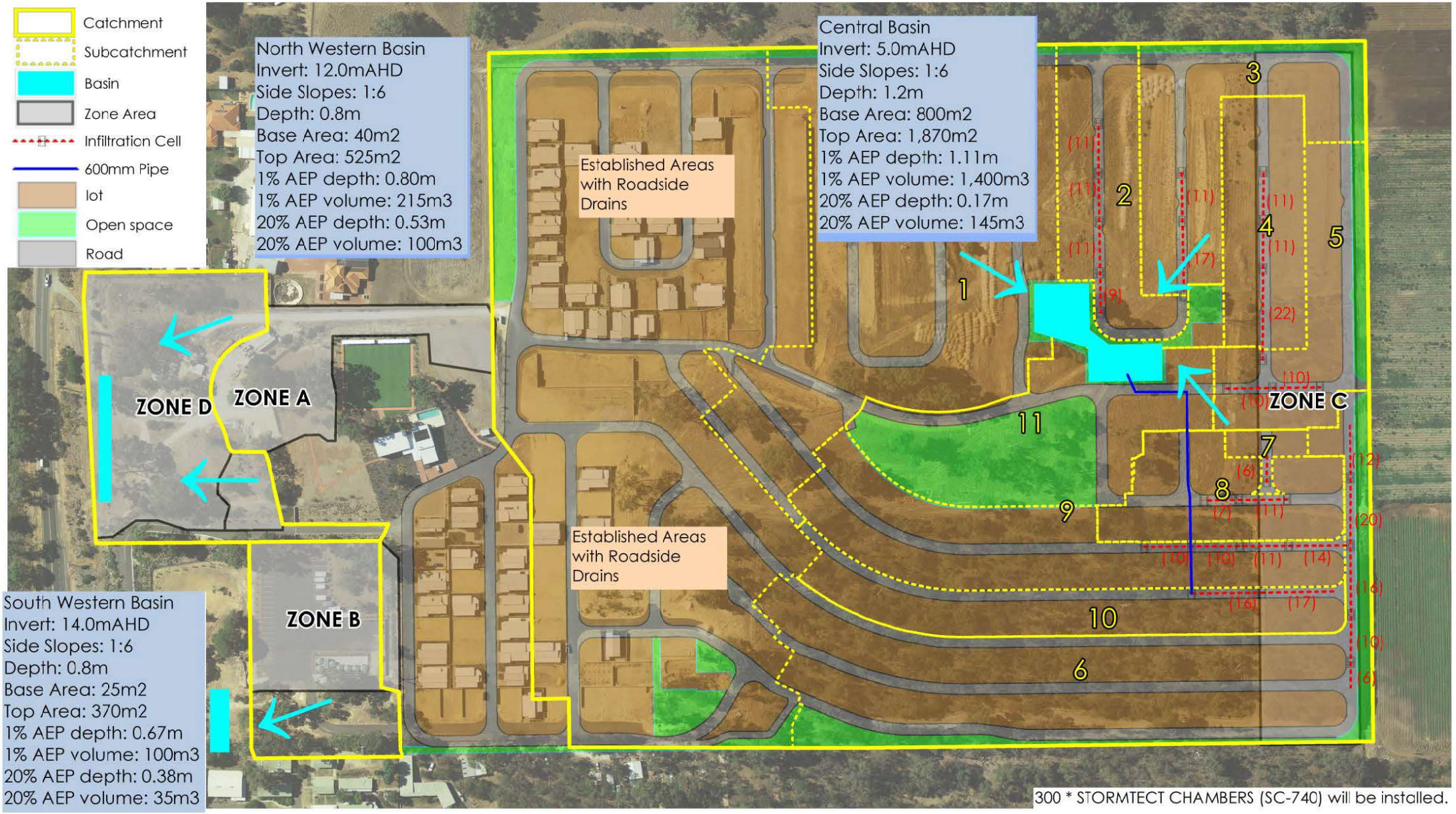
6.1.2 Minor Events (20% AEP)

In order to determine the requirements for the stormwater management system, the hydrological and hydraulic model XP-Storm was utilised. The model was run with the latest ARR 2016 IFD to confirm the critical storm durations for the site between 1hr and 72hr and determine peak water levels within key infrastructure in Zones A to D. Table 4 provides the parameters used in the post development modelling to determine runoff using the XP-Storm model. Note that established areas in Catchment D and E have not been assessed as drainage is contained internally within these catchments and is not impacted by new development areas.

Table 6: Modelling parameters

Item	Initial Loss	Runoff Coefficient	Notes
Lots	15 mm	60%	Initial loss from soakwells on lots
Roads	10 mm	80%	Includes roads, footpaths and verges
Open Space	15 mm	10%	Runoff retained within its boundary
Infiltration Rate	10 m/day		

National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 9 - Stormwater Management Plan



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Modelling parameters (losses and runoff rates) in the previous UWMP (VDM, 2009) are not presented, and would have been completed with 1987 IFD data making comparison difficult. Similarly the proposed main basin (Zone C) featured 1:4 side slopes and a top area (2,855 m^2) that is inconsistent with the open space area (2,400 m^2). The proposed modelling approach for this basin was therefore to determine whether the open space could contain runoff from the surrounding catchments (Figure 9) with a 1:6 side slope rather than using the previous dimensions. This is feasible as the basin has not yet been constructed.

As discussed above, the adopted infiltration rate is 10 m/day, despite >40 m/day recorded on site. The previous UWMP (VDM, 2009) used varying infiltration rates within each location, with (peak) rates as high as 200 m/day used the central basin. The infiltration rate of 10 m/day is a conservative estimate to account for decreasing infiltration performance associated with clogging and build-up of sediment.

Runoff from the minor event (20% AEP) throughout the development will be conveyed within the existing road v-drain drainage network or captured in underground cells and conveyed downstream via pipework to ensure serviceability. The road drainage system will discharge into either the central open space system or minor basins shown in Figure 9. The additional drainage infrastructure described below is new for the site and has been sized based on the modelling parameters outlined above. The type of infrastructure and sizing for each catchment is provided below.

Central Basin (Zone C)

The central basin was proposed in the previous UWMP (VDM, 2009) though with different dimensions. The catchment for this basin includes the existing (constructed) lots, and the proposed Zone C, shown in Figure 9. The basin collects runoff directly from existing areas north and west of the open space, and other sub-catchments following capture in infiltration cells. Areas south of the open space are connected to the basin via a 600 mm pipe.

The basin proposed in this document is integrated into the open space landscaping and features a minimum of 1:6 side slopes with a design infiltration rate of 5 m/day. Where possible, trees within this area will be retained, but otherwise the basin will contain turf and limited planting of native vegetation. The proposed basin dimensions are provided in Table 7 and shown in Figure 9.

Table 7: Central Basin Dimensions

Component	20% AEP (5yr) event	1% AEP (100yr) event
Basin invert	5.0 mAHD	
Base area	800 m^2	
Water Depth	0.17 m	1.11 m
Water Level	5.17 mAHD	6.11 mAHD
Top Water Area	930 m^2	1,775 m^2
Volume	145 m^3	1,400 m^3
Critical Duration	3 hours	3 hours
Emptying Time	4 hours	5 hours

The key results are that the water is within a maximum depth of 1.11 m (1% AEP), consistent with the City of Rockingham Policy 3.4.3 (CoR, 2018). Emptying time is also within 96 hours and therefore does not present a mosquito breeding problem. An example of the basin style is shown in Figure 10.

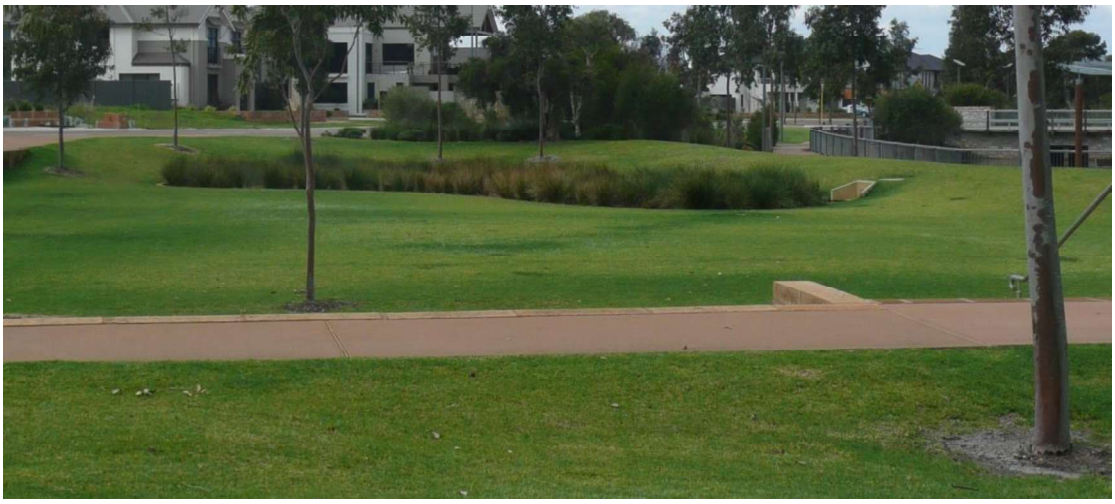

Figure 10: Example basin design

The 20% AEP event is only 0.17 m deep within this basin owing to the capture of runoff within roadside drains and infiltration cells. The basin at full depth (1.11 m) occupies approximately 75% of the open space, allowing for flexibility in the location and configuration to enable tree retention. The final basin configuration will be confirmed in detailed engineering and landscaping designs.

South Western Basin (Zone B)

The south western basin will retain drainage from proposed residential lots within Zone B and the men's shed to the south. The basin is proposed for an area to the west (downslope) and is generally linear to minimise cut across the existing contours to limit earthworks on site. The area where the basin is located may be considered for further development which will require relocation accordingly. As with other new infrastructure proposed in this document, the basin will feature 1:6 side slopes. The proposed basin dimensions are provided in Table 7 and shown in Figure 9, with the example configuration similar to Figure 10. Infiltration cells may also be considered to reduce the basin dimensions further.

Table 8: South Western Basin Dimensions

Component	20% AEP (5yr) event	1% AEP (100yr) event
Basin invert	14.0 mAHD	
Base area	25 m^2	
Water Depth	0.38 m	0.67 m
Water Level	14.38 mAHD	14.67 mAHD
Top Water Area	165 m^2	300 m^2
Volume	35 m^3	100 m^3
Critical Duration	1 hour	1 hour
Emptying Time	3 hours	3 hours

North Western Basin (Zone D and A)

The north western basin will be located along the western boundary of the site, in a similar form to the south western basin, parallel with site contours to minimise the earthworks on site. The basin will receive drainage from Zone D, along with the main entrance road and a portion of Zone A. The basin will feature 1:6 side sloes and the dimensions shown in Table 9. To allow

connection from the roadway, a small easement is required in between the two lots in the northwest corner of the site which may be piped, depending on the final engineering design. Flow directions are shown in Figure 11. As with Zone B, infiltration cells may also be considered to reduce the basin footprint.

Table 9: North Western Basin Dimensions

Component	20% AEP (5yr) event	1% AEP (100yr) event
Basin invert	12.0 mAHD	
Base area	40 m^2	
Water Depth	0.53 m	0.80 m
Water Level	12.53 mAHD	12.80 mAHD
Top Water Area	340 m^2	525 m^2
Volume	100 m^3	215 m^3
Critical Duration	1 hour	1 hour
Emptying Time	3 hours	3 hours

Within Zone A, infiltration cells will be used to capture local runoff from the carpark (Appendix 4). Roof runoff from the Village Centre and runoff from the bowling-green will be captured in basins, infiltration cells or a combination. These systems are subject to further detailed engineering and landscaping designs.

6.1.3 Major Events (1% AEP)

As outline in Section 6.1.2, the major event (1% AEP event) is contained within the respective basins and there is no flow outside of the site. The event plan shown in Figure 11 demonstrates the stormwater flow directions for the 1% AEP event in Zones A to D. To provide adequate flood protection, all homes will be constructed with a habitable floor level at least 500 mm above the 1% AEP flood level in adjacent basins.

6.2 Groundwater Management

Design Criteria:

- *Maintain appropriate recharge characteristics, groundwater levels;*
- *Ensure appropriate separation from the maximum groundwater levels; and,*
- *Maximise infiltration close to source or high in the catchment.*

The clearance between the existing surface and groundwater across the Study Area is estimated to be between 5 m and 33 m (Section 4). Significant cutting on the site is not proposed (existing levels maintained where possible) and therefore direct management of groundwater, including installation of subsoil drainage is therefore not required.

Localised subsoil drainage for retaining walls and roads will be considered during the construction phase. Areas of shallow or perched groundwater are not anticipated however subsoil drainage may be required to alleviate any problematic soil moisture. Where these conditions are identified short length subsoil drains will be installed. To be cost effective and free draining, these drains will be connected to the nearest road drainage system, with water quality treatment provided downstream, consistent with City of Rockingham (2018) requirements.

National Lifestyle Village - Urban Water Management Plan: Tuart Lakes Lifestyle Village Expansion
Figure 11 - Stormwater Management Event Plan

Data source: Landgate, MRWA, Created by:YY Projection: MGA: zone 50.

N

0 100
meters
Scale 1:2,800 @ A4

urbaqua
land and water solutions

6.3 Water Quality Management

Design Criteria:

- *Improve water quality throughout the development.*

Water quality management within the Study Area will focus on utilising the deep sandy soils and infiltrating water high in the catchment. Infiltration is promoted high in the catchment through:

- On-site infiltration using soakwells within the front of residential lots;
- V-drains to convey and infiltrate road runoff (established areas); and,
- Infiltration cells to infiltrate roof runoff.

These structural controls will be complemented by non-structural controls targeted at improving behaviour and reducing sources of nutrients. Non-structural controls will include minimising the use of fertilisers in road reserves by using native plantings and street sweeping to reduce nutrient transport. Owing to the proposed land uses, particularly the low traffic on private roads and small garden areas within residential lots, it is not anticipated that nutrient application within the development will be significant.

6.4 Management of Disease Vectors and Nuisance Insects

Design Criteria:

- *Limit the creation of new sites for breeding of nuisance insects;*
- *Prevent standing water in drainage infrastructure (infiltration within 96 hours); and,*
- *Design and construct new surface drainage infrastructure to provide healthy functioning ecosystems that will support natural predators.*

The presence of permanent or seasonal water bodies close to residential areas provides the potential for Mosquitos and Chironomid Midges to become a nuisance to the resident population. Physical, chemical and biological control methods can be used to manage mosquito populations.

The most effective physical method is to not create any new permanent or semi-permanent water bodies within the development. There are no new permanent or semi-permanent water bodies proposed for the Study Area. There is adequate separation between the base of the basins and the groundwater across the Site to ensure any stormwater will infiltrate within 96 hours, particularly during summer periods, as shown in Table 7 to Table 9.

Should Mosquito and Chironomid Midges become a nuisance, pesticides (larvicides and/or adulticides) will be used as required to eliminate mosquito larvae in breeding sites.

7 IMPLEMENTATION PLAN

Successful water management is dependent on the implementation of the plan. The following section outlines the implementation procedures and responsibilities during and following construction including the long-term maintenance of drainage structures.

Design Criteria:

- *Prevent disruption to existing drainage pathways and infrastructure;*
- *Ensure any dewatering is undertaken in accordance with DWER requirements;*
- *Control sediment to prevent mobilisation from construction areas;*
- *Treat any disturbance to Acid Sulphate Soils in accordance with the DWER requirements; and,*
- *Provide maintenance of stormwater infrastructure to sustain performance outlined in the UWMP.*

7.1 Detailed Design

Stormwater management plans presented in this document will be supported by detailed engineering and landscaping designs prior to construction. These drawings will outline the specific location and sizing of infiltration cells and other drainage infrastructure, final earthwork levels and landscaping treatments. Drawings will be submitted to the City for approval prior to construction.

7.2 Construction

Water management measures during construction are aimed at preventing damage to infrastructure and downstream environments.

7.2.1 Sediment control

During the expansion works there is potential for sediment to be blown or washed off the construction site into existing drainage infrastructure and flow paths. The slope on parts of the site also presents a risk for erosion from concentrated flows. The contractor will be required to identify appropriate management practices and controls to prevent transport of sediment off site during subdivision works. As a minimum, the following measures will be undertaken:

- Minimising the area of the site which is disturbed;
- Install sediment fencing near areas of concentrated flow;
- Reinstate and/or stabilise completed parts of the sites in a timely manner;
- Ensure the site is stabilised prior to forecasted rainfall events;
- Establish dust management procedures to limit the transport of wind-blown sediment from the site including the use of water carts and installation of wind fencing; and,
- Control of vehicle access to the site using a limited number of stabilised access points to limit tracking of soil into sealed roads by vehicles.

Following construction of drainage infrastructure, temporary sediment traps may be required to prevent sedimentations and blockage prior to building construction on individual lots. Vegetated areas should also be inspected to remove any sediment build up or weeds.

7.2.2 Dewatering

Earthworks should ideally be undertaken during the drier summer period when groundwater is at its lowest and therefore it is unlikely that there will be a need for dewatering during the earthworks phase of the works. As the civil works progress, there may be a need for dewatering to enable construction of drainage and sewerage infrastructure. Any dewatering will be managed through a separate Dewatering Management Plan to be approved by the DWER (if required).

7.2.3 Acid sulfate soils

Onsite geotechnical testing indicated that the risk of ASS was no known risk. As the existing levels on the site will be maintained, no direct management of acid sulfate soils is required. Where excavation will be undertaken for installation of drainage and sewer infrastructure (below 3 m) for example, further testing may be required to determine the presence of acid sulfate soils.

7.3 Roles and Responsibilities

Table 10 provides the roles, responsibilities and funding for implementing the water management plans.

Table 10: Roles, responsibilities and funding for implementation

Implementation issue	Responsibility and funding
Expansion earthworks and construction of service infrastructure including water, wastewater and drainage	Landowner/developer
Landscaping of streetscape and open space	Landowner/developer
Sediment management during construction	Landowner/developer
Construction of lifestyle residences including soakwells	Landowner/developer
Landscaping of private lots	Landowner/ Future lot owners
Sediment management during building	Landowner/developer
Maintenance of subdivision drainage	Landowner/developer

7.4 Agreed Maintenance Arrangements

Subdivision drainage structures will require regular maintenance to ensure efficient operation. Table 11 outlines the proposed maintenance schedule.

Table 11: Drainage infrastructure maintenance schedule

Maintenance task	Quarterly	Interval Bi-Annually	As required
Removal of litter, rocks, sand and other debris from stormwater system		✓	
Street sweeping	✓ *(min)*		
Visual inspection of basins to check for erosion, sedimentation or standing water (infiltration performance)			✓ (1 week after significant rainfall)
Inspection of vegetation health and weed removal from open space	✓		

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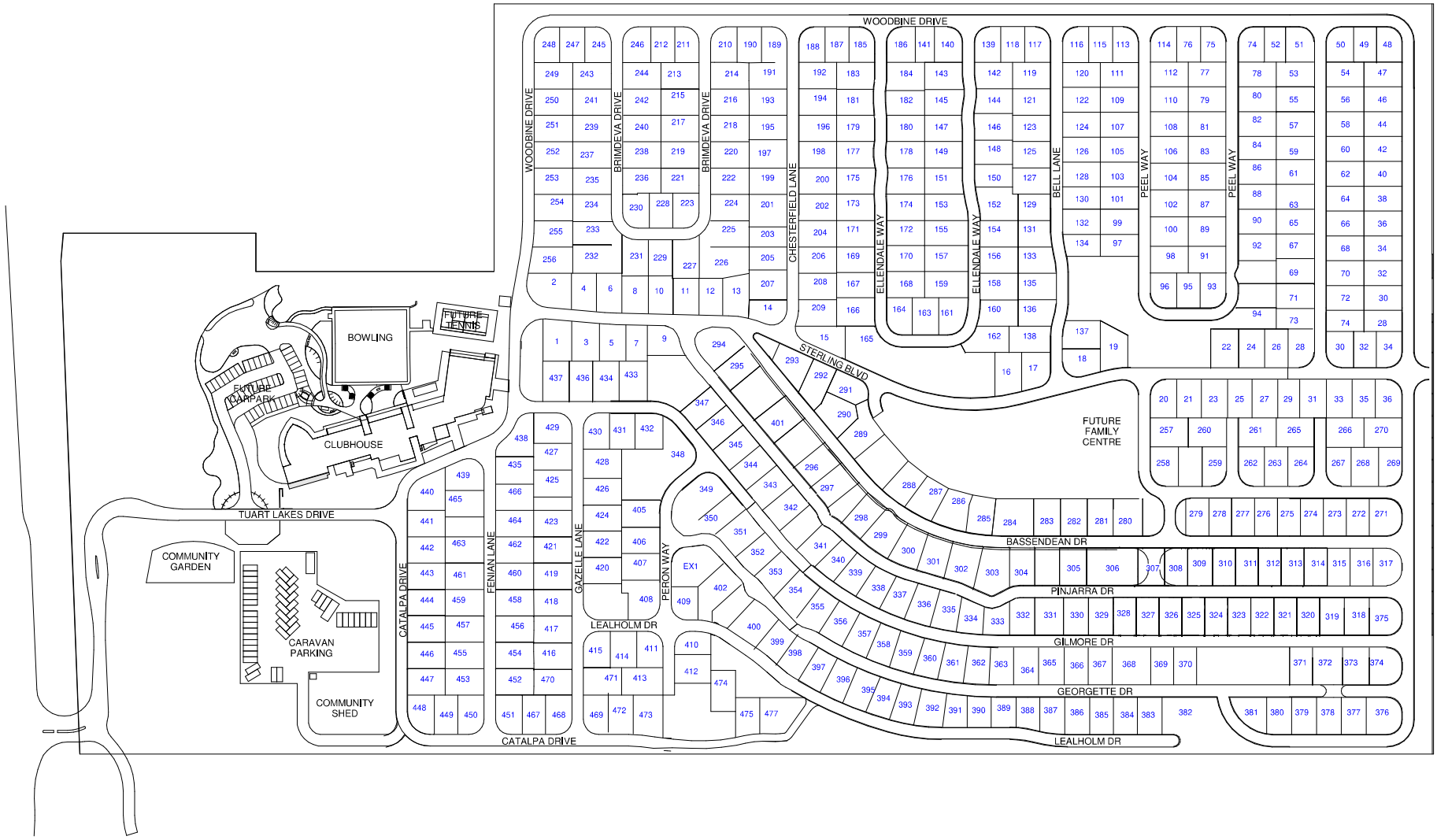
APPENDIX 1 – UWMP CHECKLIST

UWMP item	Deliverable	☑
Summary		
Development of design elements and compliance with design objectives	Table 1: Design elements and compliance	☐
Key design requirements for detailed design – critical control points and elements	Table 2: Design requirements for critical control points	☐
Introduction and Planning approval		
Location plan, adjoining lots, key landscape features and roads, local water management strategy Structure plan, zoning and land use Subdivision plan and/or approval	Location plan	☐
	Site context plan	☐
	Subdivision layout plan	☐
	OR a combination of the above	☐
Design objectives		
Agreed design objectives and demonstration of compliance		☐
Site characteristics		
Existing information and more detailed assessments (monitoring) of site; explanation of how the site characteristics affect the design		☐
Site conditions – existing topography/contours, aerial photo underlay, major physical features	Site condition plan	☐
Geotechnical – topography, test pit locations, soil zones and descriptions, site classification zones, Proposed earthworks and approximate finished contour levels	Geotechnical plan	☐
Environmental – sensitive or significant vegetation areas, wetlands and buffers, waterways and buffers, contaminated sites	Environmental plan, plus supporting data where appropriate	☐
Surface water – topography, 100-year floodways and flood fringe areas, 100-year proposed flow paths, water quality of flows entering and leaving (if applicable)	Surface water plan	☐
Groundwater – topography, test bore locations, groundwater pre- and post-development, water quality, groundwater variation hydrograph	Groundwater plan, plus details of groundwater monitoring and testing	☐
Landscape – proposed public open spaces, water source, bore(s), lake details (if applicable), approx. watering requirements and water balance, indicative irrigation schedule; demonstrate compliance with *Interim position statement: Constructed lakes* (if applicable)	Landscape plan	☐
Water sustainability initiatives		
Water supply and efficiency measures		
Fit-for-purpose strategy and agreed actions; if	Alternative supply	☐

UWMP item	Deliverable	☑
non-potable supply, support with water balance	scheme and plan	
Wastewater management		☐
Stormwater and groundwater management		
Flood protection – peak flow rates, top water levels at control points,100-year flow paths – floodways and flood fringe zones and/or along roads and reserves, 100-year inundation areas and volumes	100-year flood plan Long section of critical points	☐ ☐
Stormwater management system – storage areas, flows and hydraulic grade lines for both major and minor events including controlling inverts (critical control points); locations and arrangements for agreed structural and non-structural management practices and treatment trains, supported by sizing criteria, areas of inundation, flow paths and cross sections; show integration with landscaping	1-year event plan 5-year event plan Typical cross sections	☐ ☐ ☐
Post-development groundwater levels and fill requirements (including existing and final surface levels), outlet controls, and any subsoils (showing drawdown/effects near sensitive environments; describe modelling assumptions	Groundwater/subsoil plan Typical cross section (max and minimum)	☐ ☐
Actions to address acid sulfate soils or contamination		☐
Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages		☐
Management of disease vectors and nuisance insects		☐
Other issues		
Any other issues as explained in Table 2		☐
Managing subdivision works		
Management of construction activities including dewatering, acid sulphate soils, constructed best-management practices, and dust, sediment and erosion control – timing and possible staging		☐
Monitoring program		
Sampling and assessment plan including duration and arrangements for ongoing actions		☐
Implementation plan		
Roles, responsibilities, funding for implementation		☐
Agreed maintenance arrangements		☐
Assessment and review		☐

APPENDIX 2 – STRUCTURE PLAN AMENDMENT



Date: 13.12.2019				
H(m²)				
Drawn: D.FOR	C	11.06.2020	EASTERN BOUNDARY LOTS AND EXIT UPDATED	D.FOR
Checked: A.GOO	B	17.05.2020	ZONES SHOWN	D.FOR
	A	12.12.19	LOT LAYOUTS AND ROAD NAMES	D.FOR
	Rev:	Date:	Description:	Signed:

NOTES:

Client: NLV	PROJECT: TLB MASTER PLAN
Location: TUART LAKES	Drawing Title: MASTER PLAN - LOTS
PROJECT No: TLB001	CLIENT No: -
Scale @ A1: 1 : 1000	DRAWING No.: TLB001
SHEET No: 002	REV No: C

APPENDIX 3 – OLD UWMP SUMMARY

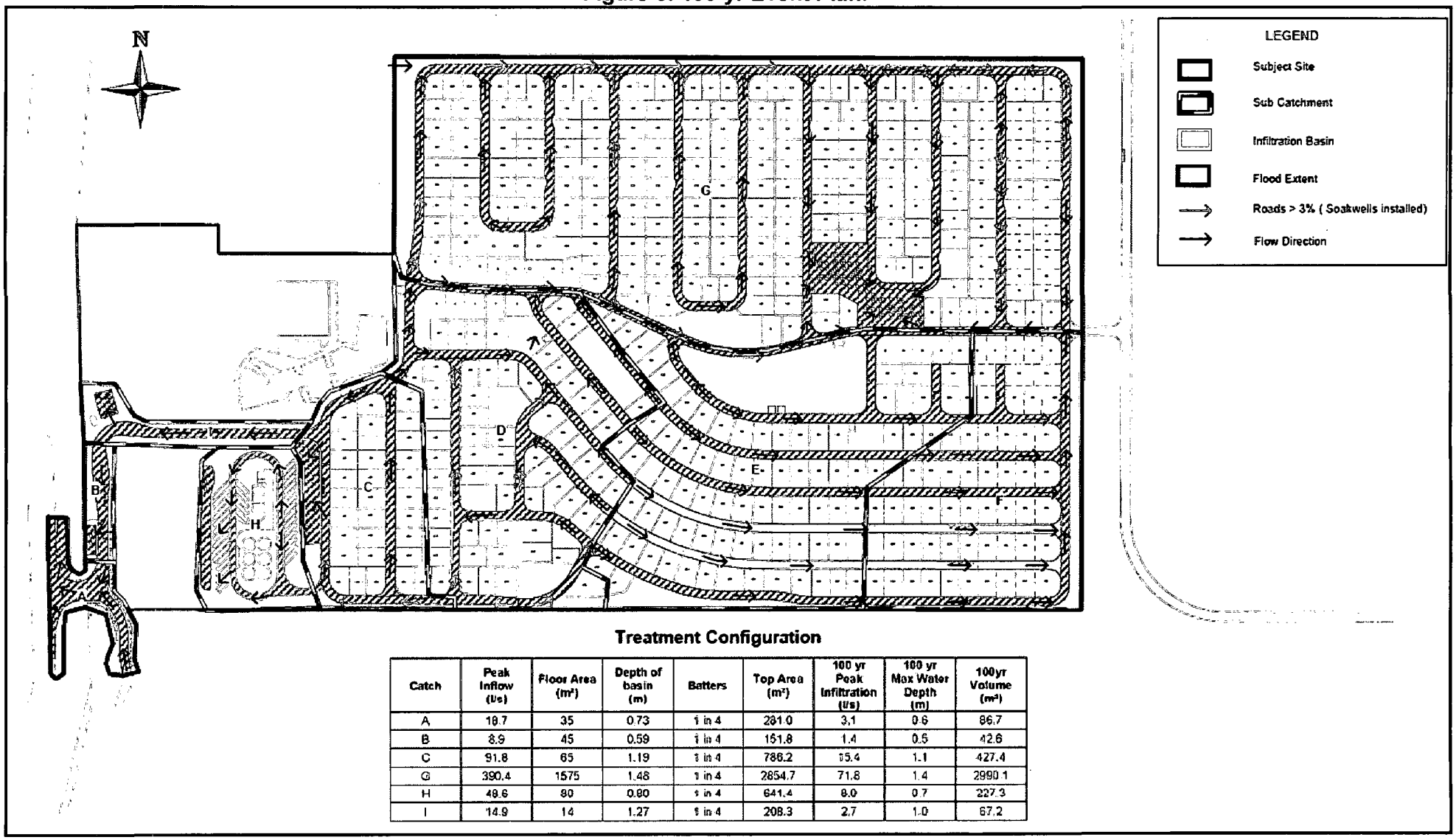
The original UWMP (VDM, 2009) addressed four design elements outlined in Table 12.

Table 12: Previous design management practices

Design element	Management Practice
Water Conservation	• Use of waterwise landscaping, garden and lawn care; and, • Use of water efficient appliances and rainwater tanks.
Water quality	• Lots shall retain stormwater up to the 63.2% AEP (1 yr 1 hr ARI); • Soakwells in the drainage system facilitate infiltration at the source; • Roadside v-drains provide infiltration close to source for up to the 1 hr 63.2% AEP event; and, • Use of non-structural practices to ensure the storm water management systems function as designed.
Flood Control	• Roadside v-drains (with side entry inlets and soak-wells for grades over 3%) will convey and infiltrate up to the 1% AEP (1 in 100 year) event; • In the event that blockage occurs, the road reserve will be capable of conveying the 1% AEP event runoff to the central open space which is also capable of infiltrating the entire event; and, • Flood storage in v-drains and the central open space provide adequate storage to retain all post development flows on site up to the 1% AEP event.
Groundwater Management	• Owing to a deep ground water level, ground water management will not be required.

Relevant figures from that document are provided on subsequent pages.

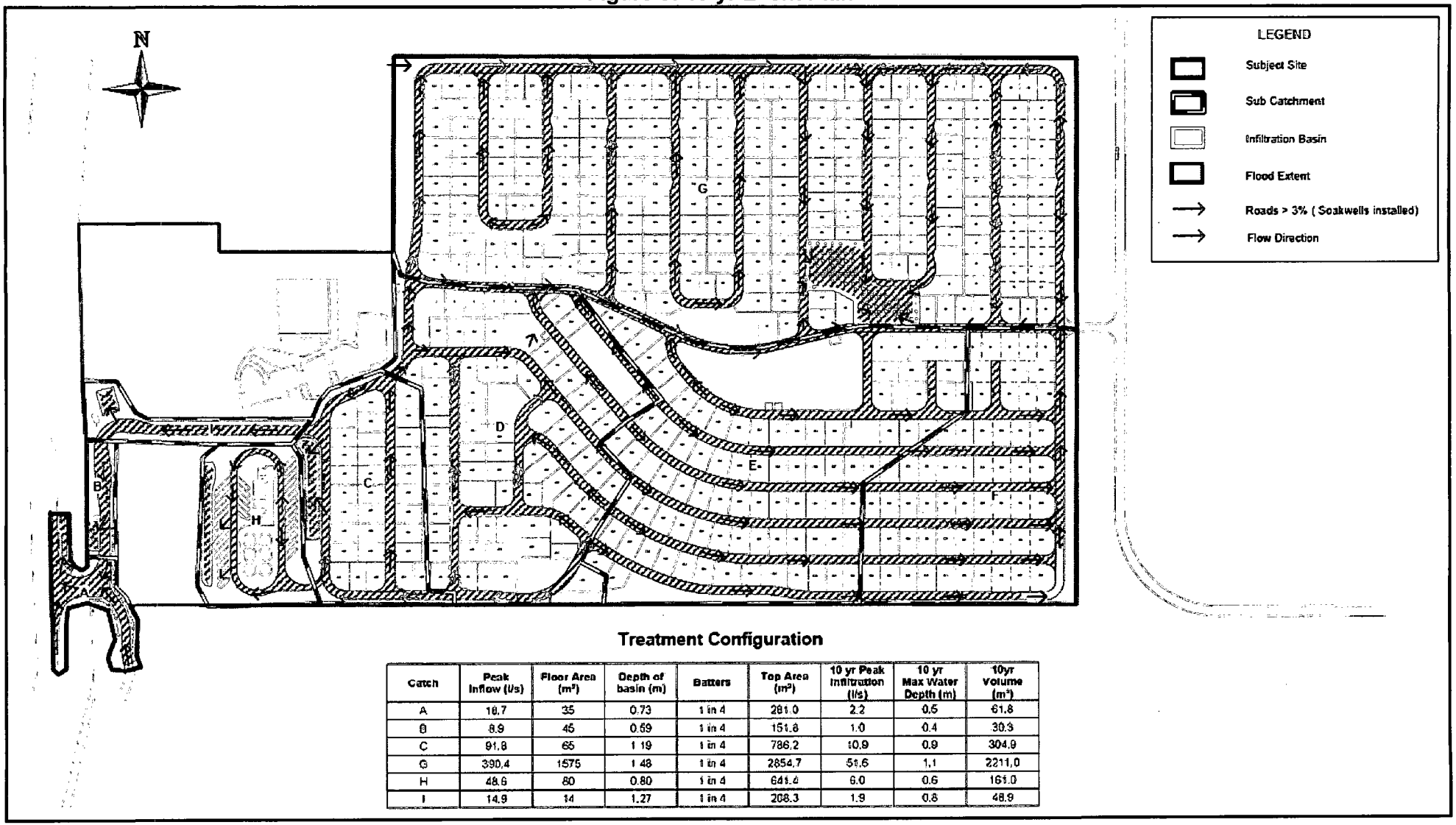
Figure 8: 100-yr Event Plan.



Treatment Configuration

Catch	Peak Inflow (l/s)	Floor Area (m²)	Depth of basin (m)	Batters	Top Area (m²)	100 yr Peak Infiltration (l/s)	100 yr Max Water Depth (m)	100yr Volume (m³)
A	18.7	35	0.73	1 in 4	281.0	3.1	0.6	86.7
B	8.9	45	0.59	1 in 4	151.8	1.4	0.5	42.6
C	91.8	65	1.19	1 in 4	786.2	15.4	1.1	427.4
G	390.4	1575	1.48	1 in 4	2854.7	71.8	1.4	2990.1
H	48.6	80	0.80	1 in 4	641.4	8.0	0.7	227.3
I	14.9	14	1.27	1 in 4	208.3	2.7	1.0	67.2

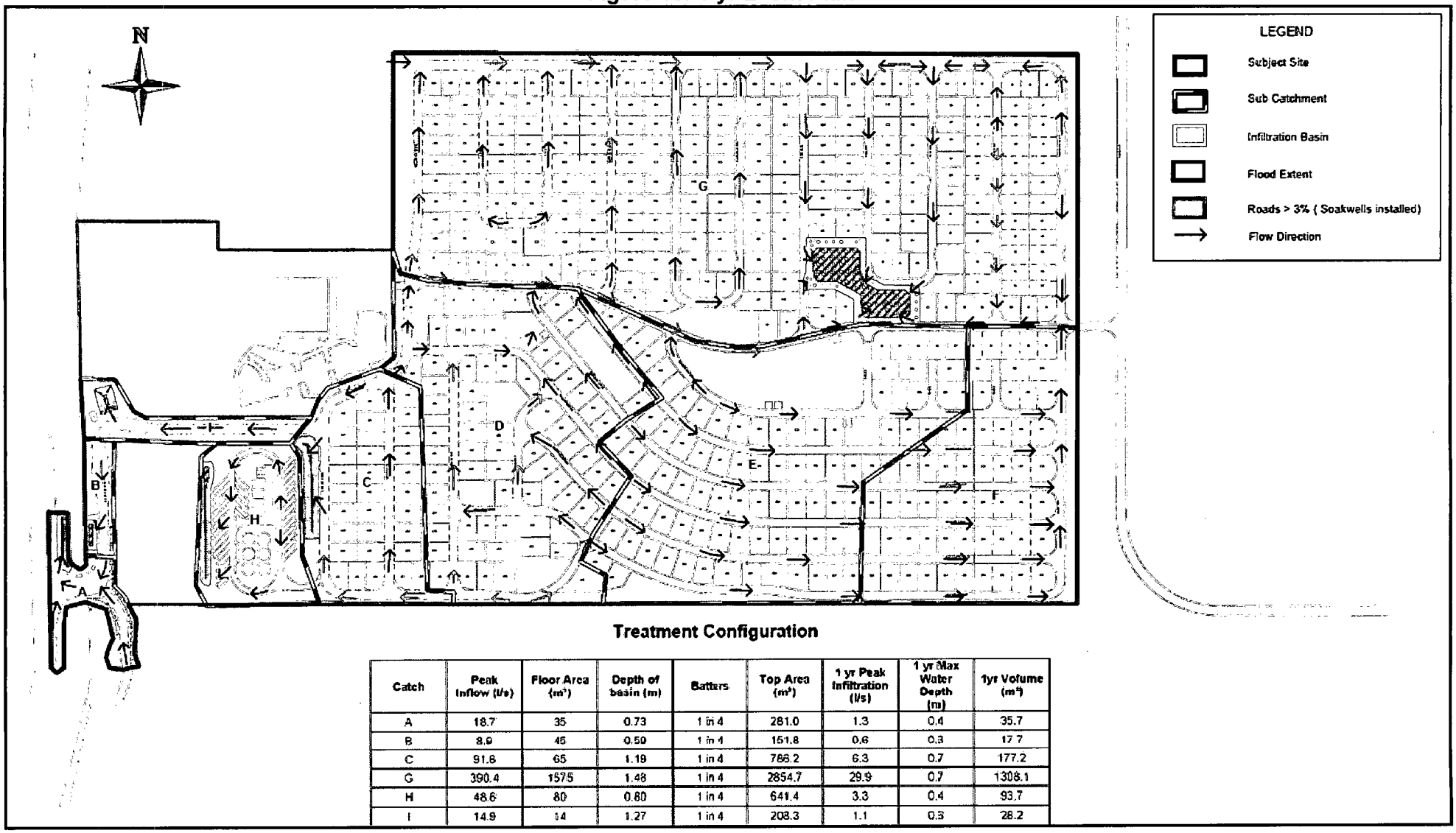
Figure 9: 10-yr Event Plan.



Treatment Configuration

Catch	Peak Inflow (l/s)	Floor Area (m²)	Depth of basin (m)	Batters	Top Area (m²)	10 yr Peak Infiltration (l/s)	10 yr Max Water Depth (m)	10yr Volume (m³)
A	18.7	35	0.73	1 in 4	281.0	2.2	0.5	61.8
B	8.9	45	0.69	1 in 4	151.8	1.0	0.4	30.3
C	91.8	65	1.19	1 in 4	786.2	10.9	0.9	304.9
G	390.4	1575	1.48	1 in 4	2854.7	51.6	1.1	2211.0
H	48.6	80	0.80	1 in 4	641.4	6.0	0.6	161.0
I	14.9	14	1.27	1 in 4	208.3	1.9	0.8	48.9

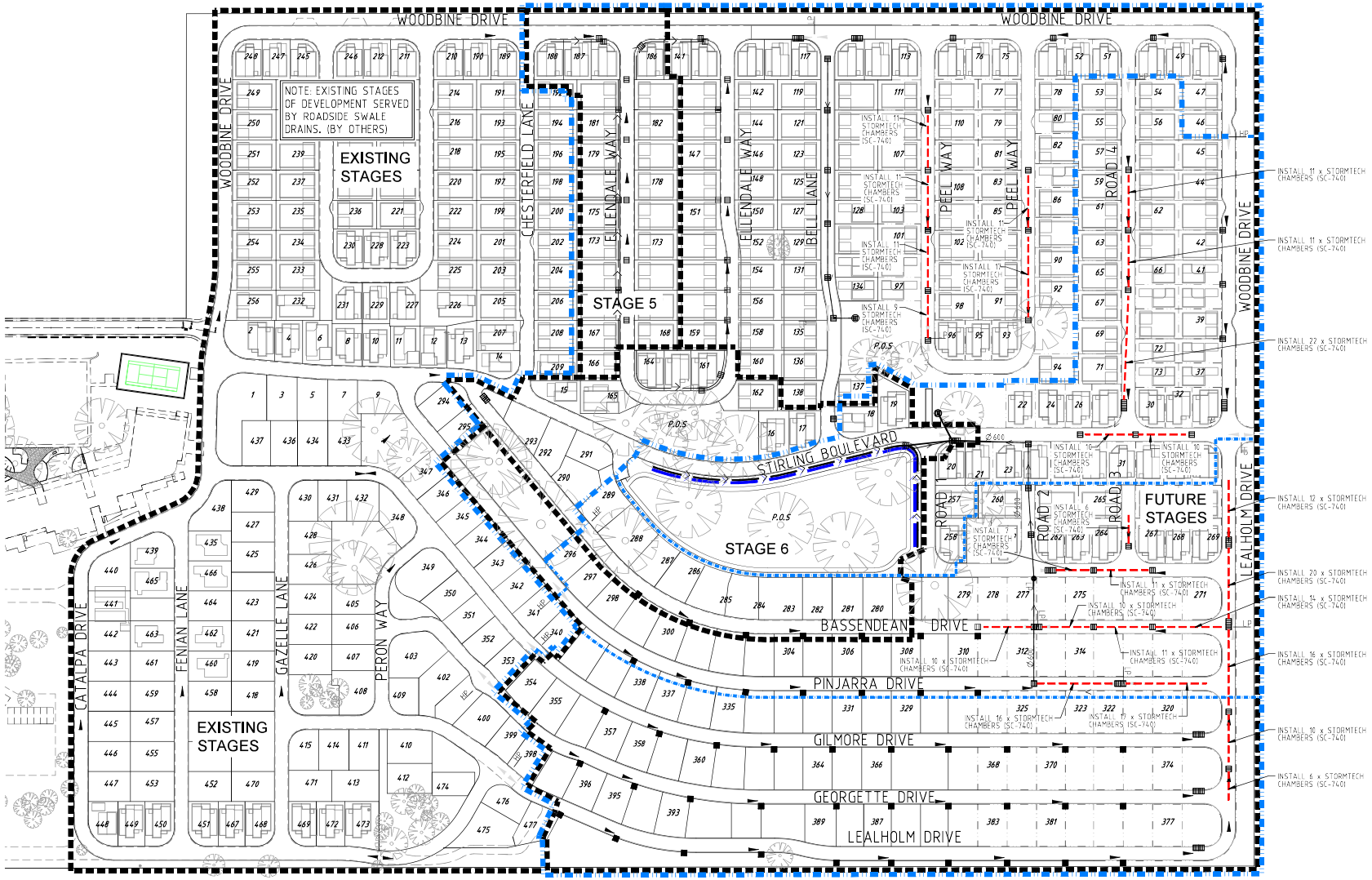
Figure 10: 1-yr Event Plan.



Treatment Configuration

Catch	Peak Inflow (l/s)	Floor Area (m²)	Depth of basin (m)	Batters	Top Area (m²)	1 yr Peak Infiltration (l/s)	1 yr Max Water Depth (m)	1yr Volume (m³)
A	18.7	35	0.73	1 in 4	281.0	1.3	0.4	35.7
B	8.9	45	0.59	1 in 4	151.8	0.6	0.3	17.7
C	91.8	65	1.19	1 in 4	786.2	6.3	0.7	177.2
G	390.4	1575	1.48	1 in 4	2854.7	29.9	0.7	1308.1
H	48.6	80	0.80	1 in 4	641.4	3.3	0.4	93.7
I	14.9	14	1.27	1 in 4	208.3	1.1	0.3	28.2

APPENDIX 4 – ENGINEERING DRAWING



PLAN
SCALE 1:1000

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION.
2. ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE.
3. ALL LEVELS SHALL BE DETERMINED FROM BENCHMARKS ESTABLISHED BY THE PROJECT SURVEYOR.
4. DRAINAGE PIPE SHALL BE CLASS 2 Ø 300 UNLESS OTHERWISE NOTED.
5. ALL TRENCHING, PIPE BEDDING AND BACKFILLING SHALL BE IN ACCORDANCE WITH AS3725.
6. AT LOW POINTS THE ENTRY PITS SHALL BE A DOUBLE PIT LOCATED AT THE LOW POINT OF THE ROAD PAVEMENT.
7. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY DISCREPANCY OR CLASH WITH OTHER SERVICES TO THE SUPERINTENDENT.
8. NO TREES SHALL BE REMOVED WITHOUT SUPERINTENDENT WRITTEN INSTRUCTIONS. REFER TO SPECIFICATIONS.
9. ALL DRAINAGE PIPE CONNECTIONS TO BE CLOSED JOINTED WITH RUBBER RINGS AND SEALED WITH MORTAR.
10. ALL DRAINAGE PITS TO BE TRAPPED.

LEGEND

- PROPOSED ROAD
- EXISTING ROAD
- EXISTING TREES TO BE RETAINED
- 32 LOT NUMBER
- PROPOSED STORMWATER DRAINAGE
- PROPOSED ROCK PITCHED OPEN DRAIN
- STAGE BOUNDARY
- CATCHMENT BOUNDARY
- SUB-CATCHMENT BOUNDARY
- JP PROPOSED JUNCTION PIT
- SEP PROPOSED SIDE ENTRY INLET PIT
- GP PROPOSED GRATED PIT
- BUP PROPOSED BUBBLE UP PIT
- DENOTES GUTTER FLOW DIRECTION
- DENOTED DUAL INLET PIT
- PIT NUMBER, TYPE AND CHAINAGE
- HP HIGH POINT
- LP LOW POINT
- PROPOSED STORMTECH STORMWATER PIPEWORK

FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

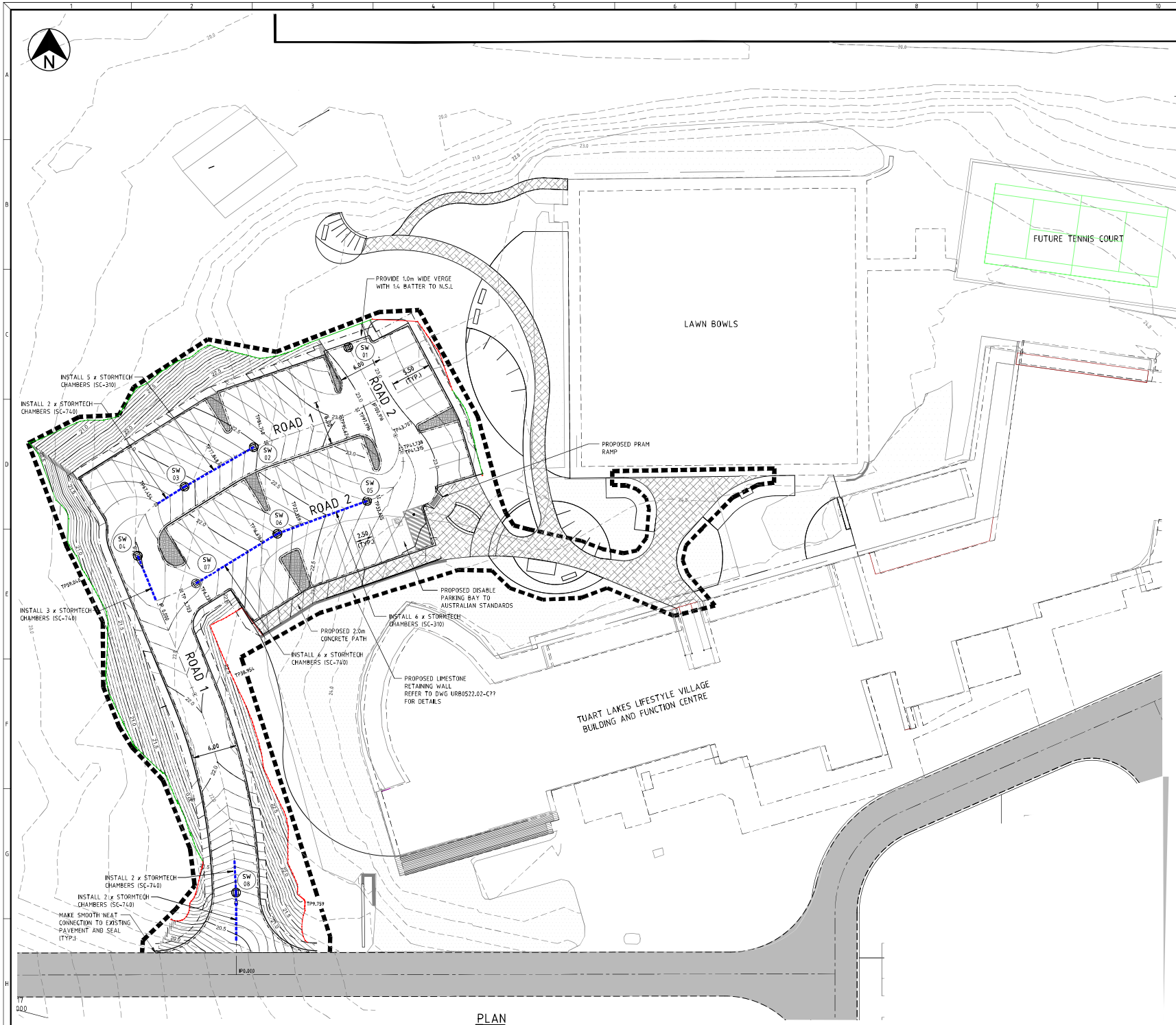
0 20 40 60m
1:1000 (A1) 1:2000 (A3)

REV No.	DATE	DRAFT/DESIGN CHECK/REVIEW	APP'D P.D.R.	AMENDMENT DESCRIPTION
A	24/05/22			ISSUED FOR INFORMATION

urbanise wa ENGINEERING SOLUTIONS
217/396 Scarborough Beach Road, Osborne Park, WA 6017
Email : info@urbanise.net.au
Web : www.urbanise.net.au

CLIENT: TRUSTEE FOR SERENITAS DEVELOPMENT TRUST
PROJECT: TUART LAKES LIFESTYLE VILLAGE ENTRY CARPARK
TITLE: OVERALL STORMWATER DRAINAGE PLAN

DRAFTER T.WILLIAMS	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
DESIGNED B.PATON	DESIGN REVIEW		
DATUM AHD	SCALE 1:1000	PROJECT No. URB0522.04	DRAWING No. C350 REV A
GRID PCG94	WAPC No. -		



PLAN
SCALE 1:250

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION.
2. THE CONSTRUCTION OF THE WORKS SHALL BE TO THE APPROVAL OF THE LOCAL AUTHORITY FOR ALL INTERNAL ROADS.
3. ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE.
4. ALL LEVELS SHALL BE DETERMINED FROM BENCHMARKS ESTABLISHED BY THE PROJECT SURVEYOR.
5. ALL TRANSITIONS TO EXISTING WORK SHALL BE SMOOTH AND OF NEAT APPEARANCE.
6. THE CONTRACTOR SHALL SAW-CUT EXISTING PAVEMENT IN A STRAIGHT LINE AND MAKE ALLOWANCE TO TRANSITION THE NEW PAVEMENT DESIGN 1.0m TO CREATE A SMOOTH RIDE TO TRAFFIC
7. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY DISCREPANCY OR CLASH WITH OTHER SERVICES TO THE SUPERINTENDENT.
8. NO TREES SHALL BE REMOVED WITHOUT SUPERINTENDENT WRITTEN INSTRUCTIONS. REFER TO SPECIFICATIONS.
9. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION ON SITE.
10. FOR SET OUT DETAILS OF CUL-DE-SAC AND INTERSECTIONS REFER TO KERB GRADING DRGS.
11. ALL KERB TO BE MOUNTABLE TYPE UNLESS OTHERWISE SHOWN. (ALL MOUNTABLE KERBING ON A RADIUS OF 40m OR LESS MUST BE KEYED)
12. TRANSITIONS BETWEEN DIFFERENT KERB SECTIONS SHALL BE MADE OVER A LENGTH OF 2m AND SHALL COMMENCE AT THE TANGENT POINT OF KERB RETURNS IN THE CASE OF INTERSECTIONS.
13. EXCESS SPOIL FROM EARTHWORKS SHALL BE PLACED ON SITES AS DIRECTED BY THE SUPERINTENDENT.
14. ALL ROAD VERGES SHALL BE SURFACED WITH 75mm OF TOPSOIL. IF REQUIRED, HYDROMULCHING WILL BE INSTRUCTED BY THE SUPERINTENDENT.
15. PAVEMENT THICKNESS MAY BE VARIED FROM THE PLANS BY THE SUPERINTENDENT ACCORDING TO SITE SUBGRADE CONDITIONS.
16. ASPHALT TO BE AC10 25mm THICK UNLESS NOTED OTHERWISE.
17. AT LOW POINTS THE ENTRY PITS SHALL BE LOCATED AT THE LOW POINT OF THE ROAD PAVEMENT

LEGEND

- PROPOSED EDGE OF ROAD (BARRIER KERB)
- FUTURE ROAD
- EXISTING ROAD PAVEMENT
- EXTENT OF WORK BOUNDARY - STAGE 1
- 20.0 PROPOSED FINISHED SURFACE CONTOUR - MINOR
- 20.0 PROPOSED FINISHED SURFACE CONTOUR - MAJOR
- PROPOSED ROAD BATTER - FILL
- PROPOSED ROAD BATTER - CUT
- PROPOSED RETAINING WALL
- 20.0 EXISTING SURFACE CONTORS (0.5m INTERVAL)
- PROPOSED CONCRETE PATHWAYS
- PROPOSED PIT SYMBOL REFERENCE (SW - 1200Ø SOAKWELL)
  PROPOSED PIT NUMBER
- PROPOSED BRICK PAVED ISLANDS
- PROPOSED STORMTECH STORMWATER PIPEWORK

0 10 20 30m
1:500 (A1) HORIZONTAL 1:1000 (A3)

ISSUED FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

REV No.	DATE	DRAFT	CHECK	DESIGN REVIEW	APP'D PURP.	AMENDMENT DESCRIPTION
A	05/05/20	BP	BP	BP		ISSUED FOR APPROVAL

urbanise wa ENGINEERING SOLUTIONS
217/396 Scarborough Beach Road, Osborne Park, WA 6017
Email : info@urbanisewa.net.au
Web : www.urbanisewa.net.au

CLIENT: TRUSTEE FOR SERENITAS DEVELOPMENT TRUST

PROJECT: TUART LAKES LIFESTYLE VILLAGE ENTRY CARPARK

TITLE: ROADS AND DRAINAGE PLAN

DRAFTER: T.WILLIAMS	DRAFTING CHECK: B.PATON	REVIEWED PROJECT MANAGER: B.PATON	APPROVED PROJECT DIRECTOR: B.PATON
DESIGNED: B.PATON	DESIGN REVIEW: B.PATON		
DATUM AHD	SCALE 1:250	PROJECT No. URB0522.02	DRAWING No. C301 REV A
GRID PCG94	WAPC No. -		

Client: National Lifestyle Villages

Report	Version	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
Preliminary draft	V1	RP	SSh	Electronic	April 2020
Submission	V2	RP	SSh	Electronic	June 2020

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land & water solutions
Suite 4/226 Carr Place
p: 08 9328 4663 | f: 08 6316 1431
e: info@urbaqua.org.au
www.urbaqua.org.au

Appendix 3

Original Bushfire Management Plan

PO Box 3489
MIDLAND WA 6936

08 6477 1144
admin@bushfireprone.com.au

Bushfire Management Plan -BAL Contour Map

Tuart Lakes Lifestyle Village
Lot 102 Mandurah Road, Baldivis

City of Rockingham

Project Number: 168475

Assessment Date: 21 June 2016

Report Date: 4 July 2016

Report and BPAD Accredited Practitioner Details

BMP DA Template Version 1.0	©2016 BPP Group Pty Ltd

Plan Version	Submitted to	Submitted Date
Ver. 1.0	Proponent	5-Jul-16
Plan Version	**Amendment Record**	**Submitted Date**
Ver. 1.1	Update of plan from City of Rockingham comments	21-Oct-16
Ver. 1.2	Update of Lot numbers on figures	28-Feb-17

This Plan meets the requirements of both the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) and the supporting *Guidelines for Planning in Bushfire Prone Areas* (WAPC 2015; the Guidelines).

Site Assessor/Document Author	Bushfire Planning and Design (BPAD) Accreditation Level	Number
Alex Aitken	Level 2 Bushfire Planning Practitioner - Prescriptive	BPAD37739
Document Review/Approval		
Kathy Nastov	Level 3 Bushfire Planning Practitioner - Performance	BPAD27794

Reliance on the assessment and determination of the Bushfire Attack Level contained in this report should not extend beyond a period of 12 months from the date of issue of the report. If this report was issued more than 12 months ago, it is recommended that the validity of the determination be confirmed with the Accredited Practitioner and where required an updated report issued.

Contents

Appendices

1 Executive Summary

This Bushfire Management Plan (the Plan) has been prepared to accompany the BAL Contour map associated with the expansion of the Tuart Lakes Lifestyle Village at Lot 102 Mandurah Road, Baldivis within the City of Rockingham.

The BAL Contour map has been updated based on the future development of the remaining stages of the lifestyle village with respect to the gaining a clearing permit and the assessment of the development against the State Planning Policy 3.7- Planning in Bushfire Prone Areas (SPP 3.7) and the Guidelines for Planning in Bushfire Prone Areas (Guidelines).

The assessment of the Proposed Development against the Bushfire Protection Criteria of the Guidelines has determined that full compliance is able to be achieved against all four elements.

The clearing and management of the existing vegetation is planned for the whole site. All on site vegetation including planned retained trees are to be managed as low threat vegetation.

The proposed development can achieve BAL-29 or lower as shown on the BAL Contour map with the required vegetation management and appropriate separation distances. There are 2 lots on the southern boundary and numerous lots on the northern boundary that have a BAL-40 rating. At present the northern associated lots are not proposed to be developed until the vegetation associated with the BAL rating is removed or modified. The southern lots may be assessed in the future once an actual location of the building is finalised and BAL-29 or lower may be achieved.

The proposed land use is a 'vulnerable' land use and may require a Bushfire Evacuation (Response) Plan. The required information for the planning assessment is included in this Bushfire Management Plan.

2 The Requirement for a Bushfire Management Plan

The Bushfire Provisions: The Planning and Development (Local Planning Schemes) Amendment Regulations 2015 establishes the deemed provisions relating to bushfire risk management. These then work with State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7); Guidelines for Planning in Bushfire Prone Areas (Guidelines); Map of Bushfire Prone Areas; Building Regulations 2012; and the Building Code of Australia to guide planning and development proposals in bushfire prone areas.

Development Application and Planning Approval: The Planning and Development Act 2005, defines development as (a) any demolition, erection, construction, alteration of or addition to any building or structure on the land and (b) the carrying out on the land of any excavation or other works.

Planning legislation considers development to relate to not only physical works but to the actual use of any land or building.

This Bushfire Management Plan

For the proposed development, the visit to the site and the BAL assessment is demonstrated with a BAL Contour map. The bushfire planning provisions and requirements are demonstrated by the application of the Performance Criteria to the development to assist with planning approval.

To accompany the development application, the required bushfire assessments and supporting information are provided in the required format of a Bushfire Management Plan.

Determination of the Requirement for a Bushfire Management Plan	
The proposed building work (or change of land use) requires planning approval under the Planning and Development (LPS) Amendment Regulations 2015. The development application is to be accompanied by a Bushfire Management Plan addressing the requirements of State Planning Policy 3.7 (SPP 3.7) and the associated Guidelines.	**Yes**
The proposed building work (or change of land use) does not require planning approval under the Planning and Development (LPS) Amendment Regulations 2015. However, it is a requirement of the relevant local government through their local/town planning scheme or special control area provisions, that a development application be submitted. The same assessments and supporting information is required to accompany the application, as per the bushfire provisions.	**N/A**

3 Subject Site and Proposed Building Work

Is the development site in an area identified on the current 'Map of Bushfire Prone Areas' (DFES) as being subject to bushfire?			
Yes			
Subject Lot size (m^2)	157,662 m^2	**Proposed Building Class (BCA)**	Class 1a
Description of primary building work or works			
Construction of a habitable building other than a single house or ancillary dwelling			
Description of associated building work or works			
N/A			

Attached and Separated Structures (Class 10a building or deck) The Requirement for the Application of Construction Requirements (*AS 3959-2009 Section 3.2.3*)	
Attached Structure: Is the proposed Class 10a building or deck attached to a Class 1, 2 or 3 building or another 10a building that is required to comply with AS3959 (i.e. not separated by a fire resistant wall)?	-
Adjacent Structure: Is the proposed Class 10a building or deck adjacent to a building required to comply with the standard (i.e. within 6 metres of a Class 1, 2 or 3 building or another 10a building required to comply with AS3959 and not separated by fire resistant wall that meets specifications)?	-
The proposed Class 10a building or deck is attached or adjacent to a building that is required to comply with AS3959. It requires a BAL assessment and the application of bushfire construction standards. Does this apply?	-
Irrespective of AS3959 requirements, the local government require a BAL assessment for the proposed 10a building and the application of bushfire construction standards. Does this apply?	-

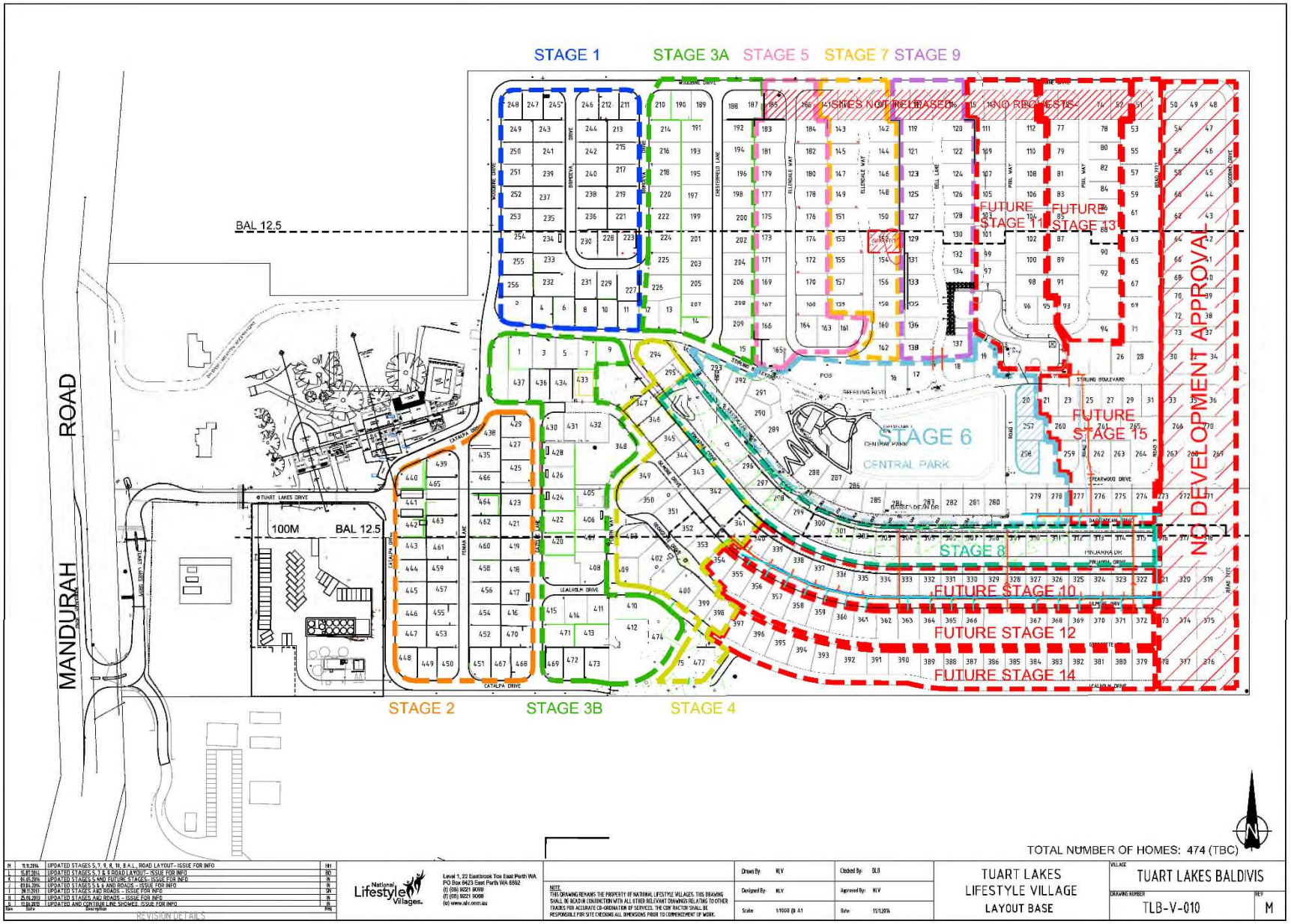


Figure 3.1: Site Plan of development at Lot 102 Mandurah Road, Baldivis (Source: National Lifestyle Villages)

4 Assessment of Bushfire Risk

4.1 Vegetation Identification and Classification

4.1.1 Existing Vegetation

All vegetation within 100 metres of the site work has been identified and classified or excluded and presented in Table 4.1 This has been done with accordance with *AS 3959-2009* and reference to the *Visual Guide for Bushfire Risk Assessment in WA* (WAPC February 2016).

The vegetation has been assessed as it will be in its mature state and where deemed appropriate, in its unmanaged state. The areas of classified vegetation that will determine bushfire risk are defined on the site assessment map Figure 4.1. Representative photos of each vegetation area are presented after the table.

Table 4.1: Vegetation types identified, the applied classification and effective slope

All Vegetation Within 100 metres of Site			
Vegetation Area	**Identified Types (AS3959) or Description if 'Excluded'**	**Applied Classification**	**Effective Slope Under Classified Vegetation (degrees)**
1	Open Woodland B-06	Class B Woodland	1
2	Dense Sown Pasture G-25	Class G Grassland	1
3	Open Tussock G-23	Class G Grassland	1.6
4	Open Woodland B-06	Class B Woodland	0
5	Open Woodland B-06	Class B Woodland	0
6	Open Woodland B-06	Class B Woodland	8.8
7	Tussock Grassland G-22	Class G Grassland	1
8	Open Heath C-11	Class C Shrubland	0
9	Tussock Grassland G-22	Class G Grassland	0

Note: When more than one vegetation type is present each type is classified separately with the worst case scenario being applied. The predominant vegetation is not necessarily the worst case scenario.

Figure 4.1

Topography & Classified Vegetation

Lot 102, Mandurah Road
Baldivis

LEGEND

- Lot 102, 103
- Other Lots
- Photo Locations
- Development
- Area of Interest - 100m extent
- Existing Hydrant

Classified Vegetation

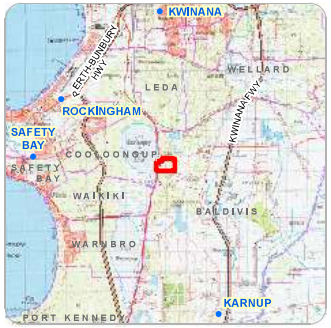
- (B) Woodland
- (C) Shrubland
- (G) Grassland
- Exclusion 2.2.3.2

SCALE (A3)

0 50 100 150

Metres

LOCALITY



Assesment Date: 21/06/2016 Image Date: Feb 2016
Prepared By : Alex Aitken

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator

BUSHFIRE PRONE PLANNING

Compiled by: Bruce Greentree
Created on: 14-Oct-16

Vegetation Area 1 **Classification Applied: Class B Woodland**

Assessment Comment: offsite Tuart woodlands/grassland understorey/zamia palms, avg tree height 20m

Photo 1a

Photo 1b

Vegetation Area 2 **Classification Applied: Class G Grassland**

Assessment Comment: offsite unmanaged grassland

Photo 2a

Vegetation Area 3 **Classification Applied: Class G Grassland**

Assessment Comment: offsite open tussock, old market gardens, to be developed in future

Photo 3a

Photo 3b

Vegetation Area 4 **Classification Applied: Class B Woodland**

Assessment Comment: onsite banksia woodland, avg height 9m

Photo 4a

Photo 4b

Vegetation Area 5 **Classification Applied: Class B Woodland**

Assessment Comment: offsite banksia woodland with Tuart trees, avg tree height 15m

Photo 5a

Photo 5b

Vegetation Area 6 **Classification Applied: Class B Woodland**

Assessment Comment: offsite Tuart woodland with grass understorey

Photo 6a

Photo 6b

Vegetation Area 7 **Classification Applied: Class G Grassland**

Assessment Comment: offsite closed tussock grassland adjacent ephemeral lake

Photo 7a

Vegetation Area **Classification Applied: Exclusion AS3959-2009 2.2.3.2 (f)**

Assessment Comment: onsite managed parklands, mulched managed garden areas

Photo 8

Photo 9

4.1.2 Vegetation Excluded from Classification

Certain areas and vegetation may be assessed as 'low threat or non-vegetated'. These are to be excluded from classification and are therefore rated BAL-LOW. They must be managed to maintain the specifications set out in AS3959-2009 s2.2.3.2 in perpetuity (refer to Appendix 3 'Vegetation Classification Exclusions').

Within the development there are areas of managed parklands that have been excluded as per AS3959-2009 s2.2.3.2(f). There are also areas offsite on the adjacent properties that have managed gardens and car park areas that have been excluded. As part of the previous development and establishment of the Tuart Lake Lifestyle Village there are areas of managed gardens with mulch beds and reticulated gardens that have been classified as low threat as per AS3959-2009 s2.2.3.2 (f), see photographs 8 & 9 above and locations indicated on Figure 4.1.

4.1.3 Expected On-site Vegetation Changes Due to Proposed Development

In assessing vegetation for bushfire threat, consideration must be given to possible future vegetation changes likely on the site that is being assessed and in particular those that would have the potential to increase the bushfire risk.

This may be due to growth of existing vegetation or growth of planned landscape plantings, including future roadside re-vegetation. In particular, there must be careful consideration of the creation of vegetation corridors where they join offsite vegetation and may provide a route for fire to enter an area of future development.

Looking forward and taking into account both the likely changes in vegetation management that will occur with the development and what is achievable within the lot boundary is included in the assessment with the entire development site to be managed as low threat vegetation with numerous trees to be retained within the development. These trees are a combination of old growth Tuart trees and large trees to be retained as part of the development approvals. Vegetation underneath these retained trees are to either managed as short cropped grass or mulch.

4.2 Bushfire Attack Level (BAL) - Analysis and Determination - Contour Map

A BAL CONTOUR MAP A Bushfire Attack Level (BAL) Contour Map is a scale map of a development site including the proposed lot layout, which identifies indicative BAL ratings across the development site and within the immediate surrounding area. A BAL Contour Map illustrates potential bushfire attack levels and radiant heat impacts in relation to any classified vegetation that will remain within 100 metres of the assessment area once development is completed. A BAL Contour Map identifies land suitable and unsuitable for development and guides the location of building envelopes within a development site (*WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*)

THE ASSESSMENT A BAL Contour Map is based on an assessment of the development site and surrounding area as they will be when the proposed development is constructed i.e. when the land has been cleared and all the works have been undertaken. It needs to take into account any vegetation that will remain or will be introduced when the works are complete (*WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*). Refer to Appendix 2 'Bushfire Risk Management – Understanding the Methodology', for a summary of the BAL assessment procedures.

INTERPRETATION The contour map will present different coloured contours constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels that exist as the distance increases away from the classified vegetation. If any part of a subject area or building is or will be within a particular contour, it will be subject to that BAL rating (the highest BAL rating will apply to the area or building being assessed).

The width of each shaded contour is a result of calculations involving vegetation type, fuel structure, ground slope, and climatic conditions. These calculations generate the expectations of fire behaviour for the given situation.

INDICATIVE BAL's If the assessed BAL for a lot is stated as being 'indicative', then it is only an indication (usually given as a range) of what BAL's are achievable. Determining the actual BAL of any existing, proposed or future lot or building will be dependent on the extent of any classified vegetation modification or removal and/or the location of the building on the lot.

As a result, a BAL Certificate cannot be produced for buildings on such lots until the location of any future building has been identified and an onsite BAL assessment conducted. A BAL Compliance Report and Certificate for the proposed building can then be issued to accompany a building permit application.

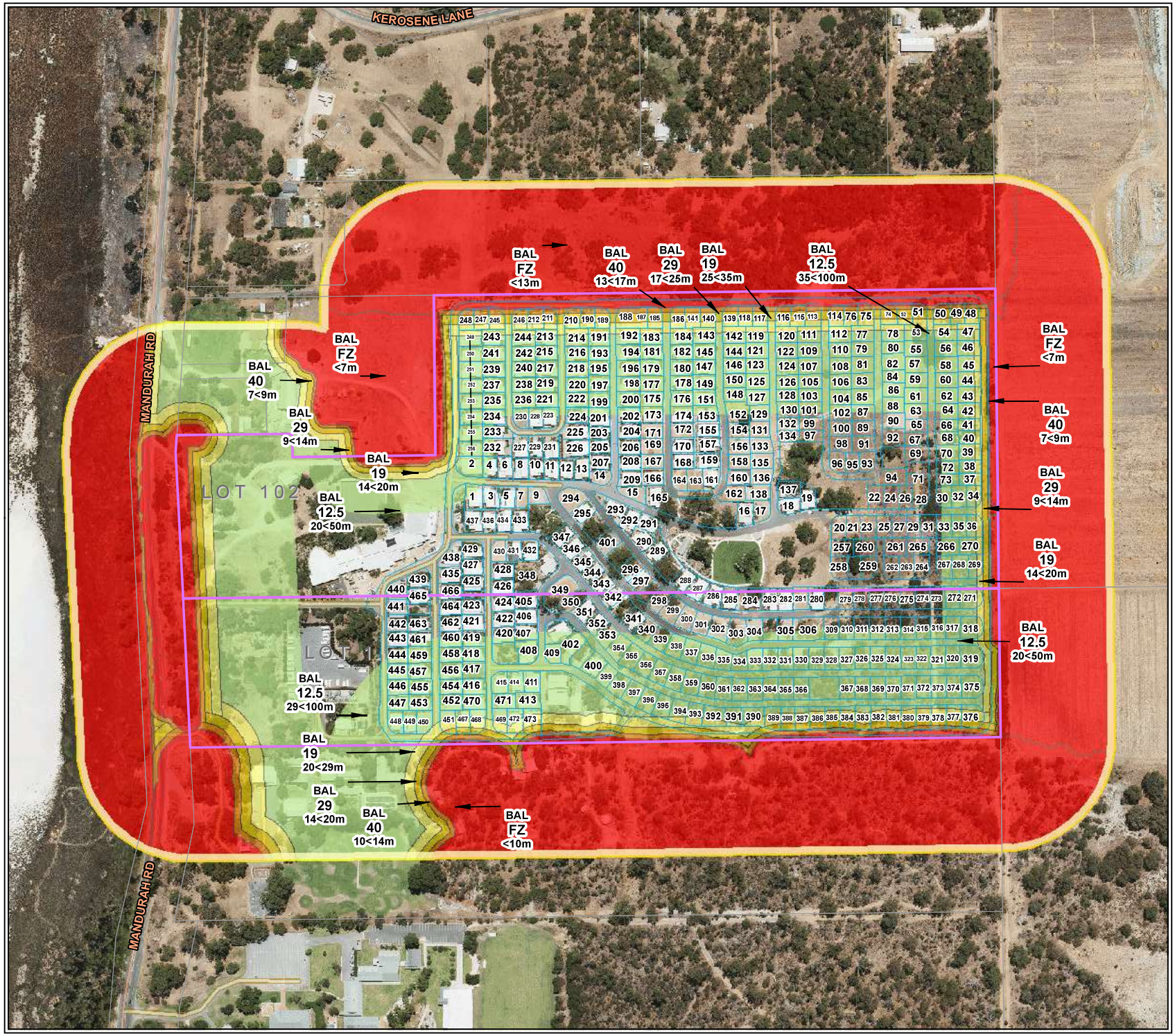
DETERMINED BAL's If the assessed BAL for a lot or building is stated as being 'determined' then no additional assessment is required. It implies that classified vegetation is not required to be modified or removed to achieve the stated BAL – either for an existing lot, an existing building or for a future building located anywhere on an existing lot. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the contours.

However, the issuing of a BAL Certificate (based on the BAL Contour Map assessment) confirming the BAL, may still be required in applying for a building permit. If significant time has passed since the assessment and the requirement for a BAL certificate a new BAL assessment may be required for any particular lot or building.

Figure 4.2

BAL Contour Map

Lot 102, Mandurah Road
Baldivis



LEGEND

- Lot 102, 103
- Other Lots
- Development
- Area of Interest - 100m extent

Bushfire Attack Levels (Method 1)

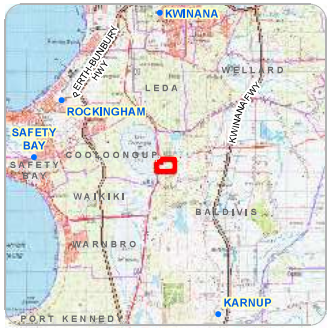
- BAL FZ (Indicative only)
- BAL 40 (Indicative only)
- BAL 29 (Indicative only)
- BAL 19 (Indicative only)
- BAL 12.5 (Indicative only)
- BAL LOW (Indicative only)

SCALE (A3)

0 50 100 150

Metres

LOCALITY



Assesment Date: 21/06/2016 Image Date: Feb 2016
Prepared By : Alex Aitken

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator

BUSHFIRE PRONE PLANNING

Compiled by: Bruce Greentree
Created on: 14/02/2017

4.2.1 BAL's as Indicated by the Contour Map

Figure 4.2 shows the proposed development with the vegetation managed within the development and based on the separation distance using the classified vegetation and Method 1 calculations based on the site visit.
The BAL Contour map indicates the required BAL ratings that each lot and future buildings are required to be constructed as per AS3959-2009.

Table 4.2.1: Indicative BAL for the Tuart Lakes Lifestyle Village

Indicative Bushfire Attack Level for Future Building on the Proposed Lots	
Relevant Fire Danger Index (AS3959-2009 Table 2.1)	80
BAL Determination Method	Method 1 as per AS 3959-2009 s2.2.6 and Table 2.4.3. Refer to Appendix 2 this Plan
Proposed Lots	**Indicative BAL**
20-29, 31, 65, 67, 69, 71, 89-100, 131-136, 154, 156, 158, 162, 258-265, 274-279, 298-301, 349-350	BAL-LOW
30, 32-33, 35, 55-64, 66, 68, 70, 72-73, 79-88, 101-110, 121-130, 144, 150, 148, 152, 266-268, 272, 302-340, 352-375, 396-400	BAL-12.5
34, 36-47, 53-54, 77-78, 111-112, 119-120, 142, 271, 269-270, 271, 390-395	BAL-19
376-377, 380-389	BAL-29
48-52, 74-76, 113-118, 139-141, 185-188, 378-379	BAL-40

4.2.2 Identification of Specific Issues Arising from BAL Contour Map

Onsite Vegetation
Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

There is a minor percentage of trees to be retained as part of the development onsite and these trees and areas surrounding them will be maintained as low threat vegetation.

Offsite Vegetation
Generally, vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced.

The classified vegetation to the north of the development is limiting the final development of buildings directly adjacent to the northern boundary. The requirement to construct to a higher standard could be undertaken for these lots or alternatively a delay in developing on these lots.

5 Bushfire Risk Management Measures

5.1 The Bushfire Protection Criteria – Assess and Demonstrate Compliance

State Planning Policy 3.7 Planning in Bushfire Prone Areas (Dept. of Planning and WAPC 2015) requires an assessment against the bushfire protection criteria requirements (contained in the 'Guidelines') to accompany any strategic planning proposal, subdivision application or development application.

Strategic planning proposals need to demonstrate that compliance can be achieved in subsequent planning stages. Subdivision and development applications must demonstrate compliance within the boundary of the subject site or provide justification for those criteria that are not able to be fully met.

The criteria are divided into four elements location, siting and design, vehicular access and water. Each element has an intent outlining the overall aim. The acceptable solutions provide examples of how that intent might be met. The performance principle allows for 'alternative solutions' to be developed where the acceptable solutions cannot be achieved". Source: *Guidelines for Planning in Bushfire Prone Areas WAPC 2015 (s4.5 and Appendix 4).*

Bushfire Prone Planning presents all components of the Bushfire Protection Criteria assessment as a separate table for each element. This includes the intent, the performance principle, a stated level of compliance with the acceptable solutions for each of the criteria and statements that demonstrate the compliance and provide justification for those that have not been fully met.

Summarised Outcome of the Assessment Against the Bushfire Protection Criteria

The Bushfire Protection Criteria Elements	The Planning Assessment – Proposed Basis of Assessment				The Proposal Satisfies All the Criteria and/or the Intent of the Element
	Acceptable Solutions	Performance Principle		Minor or Unavoidable Development	
		Variation on Acceptable Solution	Alternative Solution		
	Demonstrated compliance in following table	Presented and justified in following table and within this section of the Plan. Includes advice from the relevant referral authorities if applicable.		Required supporting statements presented in Section 5.	
Location	✓				Yes
Siting and Design of Development	✓				Yes
Vehicular Access	✓				Yes
Water	✓				Yes

Bushfire Protection Criteria - Element 1- Location			
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.			
Performance Principle P1 (used to develop alternative solutions): The intent may be achieved where the strategic planning proposal, subdivision or development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low **OR** a BAL-29 or below applies **AND** the risk can be managed. For minor or unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of DFES and the decision maker.			
Acceptable Solution	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A1.1 **Development Location** The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low **OR** The development is subject to BAL-29 or below.	**Fully Complies**	Land is most suitable for land use intensification where hazard levels are low. Where there is an extreme bushfire hazard level or requirements for use of BAL-40 or BAL-FZ construction standards, the land is not considered suitable for development unless it meets the definition of minor or unavoidable development (which requires WAPC, DFES and local planning approval).	The proposed development is located within a designated bushfire prone area. The proposed lots are compliant as they are subject to BAL-29 or below. There are 2 Lots on the southern boundary of the development and numerous lots on the northern boundary that are rated as BAL-40, these lots may not be developed/constructed on at this stage of development.

Bushfire Protection Criteria - Element 2 - Siting and Design of Development			
Intent: To ensure that the siting and design of development minimises the level of bushfire impact.			
Performance Principle P2 (used to develop alternative solutions): The intent may be achieved where the siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire risk that applies to the site. That it minimises the bushfire risk to people, property and infrastructure, including compliance with AS3959 if appropriate.			
Acceptable Solution (either or both solutions to be met to the extent that it satisfies Element 1)	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A2.1 **Asset Protection Zone (APZ)** Every building is surrounded by an Asset Protection Zone (minimum of twenty metres wide), depicted on submitted plans, which meets the defined requirements. **OR** Where a full 20 metre APZ is not possible the APZ should be sufficient enough to ensure the potential radiant heat impact of a fire does not exceed 29 kW/m^2.	**Will Fully Comply**	The APZ is a low fuel area immediately surrounding a habitable or specified building (refer to specifications in Appendix 4). All requirements in A2.1 are essential and must be achieved to ensure compliance. If the implementation of protection zones was to result in the loss of vegetation that is not acceptable or causes conflict with landscape and environmental objectives, then the development may need to be modified.	The proposed development meets the acceptable solution: • By establishing and maintaining an APZ that meets all specified requirements; • By incorporating an APZ, to the extent possible within the boundary of the lot, into the landscaping surrounding the any future building works and maintaining it to comply with specified requirements into the future; • The extent of the APZ will result in the potential radiant heat impact of a fire on the proposed buildings not exceeding 29kW/m^2; and • By maintaining firebreaks and fuel loads as per the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Bushfire Protection Criteria - Element 2 - Siting and Design of Development (continued)			
Acceptable Solution (either or both solutions to be met to the extent that it satisfies Element 1)	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A2.2 **Hazard Separation Zone (HSZ)** Every building and its contiguous APZ is surrounded by a Hazard Separation Zone (minimum of 80 metres wide), depicted on submitted plans, that meets the defined requirements. **OR** A HSZ may not be required if the proposed construction meets the standard appropriate to the BAL for that location and the determined BAL does not exceed BAL-29.	**Fully Complies**	Hazard separation should be provided between extreme bushfire hazards and buildings to create a combined separation distance of 100m (50m for unmanaged grassland) in order to protect them from burning embers, radiant heat and direct flame contact (refer to specifications in Appendix 4). The minimum hazard separation distance may be reduced by compliance with AS 3959 which requires that as the distance from the vegetation is reduced, the construction standard must be increased.	The proposed development meets the acceptable solution by: • The indicative BAL's do not exceed BAL-29 and any future buildings constructed will meet the construction standard corresponding to the determined BAL rating as per AS 3959-2009. • Maintaining firebreaks and fuel loads as per the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Bushfire Protection Criteria - Element 3 - Vehicular Access			
Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.			
Performance Principle P3 (used to develop alternative solutions): The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.			
Acceptable Solutions	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A3.1 **Two access routes**	**Fully Complies**	Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents and the public at all times and under all weather conditions. Two-way access should be provided as a public road, however, where a public road cannot be provided (this will need to be demonstrated by the proponent providing justification) an emergency access way may be considered.	Mandurah Road provides safe access and egress to two different destinations. As a sealed public road it is available to all residents and the public at all times and under all weather conditions.
A3.2 **Public Road**	**Fully Complies**	A public road is to meet the technical requirements for this acceptable solution (refer to Appendix 5).	All internal roads are designed and constructed to comply with the guidelines.
A3.3 **Cul-de-sacs** (including dead-end roads)	**Will Fully Comply**	Should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent) they must be constructed to meet the technical requirements for this acceptable solution - including a maximum length of 200m (600m if cul-de-sacs are joined by an emergency access way and certain conditions are met). Refer to Appendix 5.	All cul-de-sacs will be designed and constructed to comply with the guidelines.

Bushfire Protection Criteria - Element 3 - Vehicular Access - (continued)			
Acceptable Solutions	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A3.4 **Battle Axe**	**N/A**	Should be avoided in bushfire prone areas. If no alternative exists (this will need to be demonstrated by the proponent) they must meet the technical requirements for this acceptable solution (refer to Appendix 5).	
A3.5 **Private Driveways**	**Fully Complies**	Must be constructed to meet the technical requirements for this acceptable solution (refer to Appendix 5). Where a house site is further than 50m from a public road there are additional technical requirements 5.	The existing access to the development complies with the guidelines.
A3.6 **Emergency Access Way**	**N/A**	An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent) an emergency access way is to be provided as an alternative link to a public road during emergencies (maximum length of 600m) and be constructed to meet the technical requirements for this acceptable solution (refer to Appendix 5).	
A3.7 **Fire Service Access Routes** (perimeter roads)	**N/A**	Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. They must be constructed to meet the technical requirements for this acceptable solution (refer to Appendix 5).	
A3.8 **Firebreak Width**	**Fully Complies**	Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level prescribed in the local firebreak notice issued by the local government.	The proposed development will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Bushfire Protection Criteria - Element 4 – Water			
Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.			
Performance Principal P4 (used to develop alternative solutions): The intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.			
Acceptable Solutions	**Compliance**	**Explanation / Requirements**	**Demonstration of Compliance and/or Statements of Justification**
A4.1 **Reticulated Areas** The subdivision, development or land use is provided with a reticulated water supply, in accordance with the specifications of the relevant water supply authority and DFES.	**Will Fully Comply**	The Water Corporations 'No 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply. Construction must meet the technical requirements for this acceptable solution (refer to Appendix 6). Additionally, any local government variation must be met (s8.4).	A reticulated water supply is available in the area of the subject site with numerous onsite above ground hydrants installed to the existing development. The installation of several hydrants will be required within the proposed development to DFES standards.
A4.2 **Non-reticulated Areas** The specification of the requirements for the proposal being assessed will be set by the water supply authority and DFES.	**N/A**	A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity at all times, including home tanks on single lots. Construction must meet the technical requirements for this acceptable solution (refer to Appendix 6). Additionally, any local government variation must be met (s8.4). (Note: Acceptable solution A4.3 is only for use if creating one additional lot and cannot be applied cumulatively)	

5.2 Location and Siting of Buildings and Allowable BAL's

Future buildings on the lot are to be located in areas where an appropriate Bushfire Attack Level rating can be achieved and where minimal removal of valuable existing native vegetation is required to achieve this rating. The intent is to have the buildings located in an area where the bushfire hazard level is, or will on completion, be moderate or low or be subject to a maximum Bushfire Attack Level of BAL-29.

The proposed building work is unlikely to be approved if BAL rating is BAL-40 or BAL-FZ as it is unacceptable on planning grounds. The exception will be if it meets the definition of minor (for Class 1 buildings and associated Class 10a buildings or decks) or unavoidable development ('Guidelines' s5.4 and s5.7). If this applies the appropriate additional assessment and input from the relevant authorities, if required, is included in this Plan.

The proposed location of the proposed lots will result in them being subject to BAL-40 and below depending on the separation distance from the classified vegetation. As there are numerous lots currently rated as BAL-40 based on Figure 4.2 BAL Contour map these lots in the northern section of the development will not be constructed on until the vegetation offsite has been developed by an external party, resulting in a BAL of 29 or lower. The 2 lots (378-379) on the southern boundary are currently rated as BAL-40 and should be reassessed in the future once an actual building location is proposed as it may be achievable to get a BAL-29 or lower depending on the location of the building within the lot.

The remaining lots within the development of the Tuart Lakes Lifestyle Village can achieve a BAL-29 or lower as shown by Table 4.2.1.

5.3 Vegetation Management

It is the responsibility of the landowner to maintain the bushfire protection measures on their property. This includes maintaining:

- the required vegetation separation distance (see tables below);
- the areas of classified vegetation which they have control over;
- the asset protection and hazard separation zones; and
- compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Ongoing Maintenance of Assessed Vegetation

1. Where any existing or planned re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification, then this area will be managed to continue to meet those requirements (refer to Appendix 3) and enable the buildings to retain their determined BAL ratings;

2. Any classified vegetation that has directly contributed to the determined BAL rating for a given building, will be managed such as to not change that vegetation to a higher risk classification; and

Asset Protection Zone

Implementing an Asset Protection Zone (APZ) creates a low fuel area surrounding any current or future buildings. This will decrease the potential bushfire's intensity, minimise the likelihood of direct flame contact and reduce the exposure of the buildings to radiant heat. It will also be important for firefighter and occupant's safety during fire suppression activities.

The APZ must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm." Refer to Appendix 3 of this Plan for further detail with other technical requirements for an APZ set out in Appendix 4.

Hazard Separation Zone

Where possible a Hazard Separation Zone (HSZ) should also be established (refer to Appendix 4 for specifications).

The achievable BALs based on the BAL contour map indicate that BAL-29 or lower is achievable with vegetation management and the appropriate separation distances (into the future). Table 5.3.1 shows the required separation distances to maintain and achieve the applicable BALs.

Retaining the Determined BAL Rating

To retain the determined BAL rating stated in Section 4 'Assessment of Bushfire Risk', the area of land representing the minimum separation distances (refer to Table 5.3.1) must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm." Refer to Appendix 3 for further detail.

Table 5.3.1: Minimum separation distances to maintain

Minimum Separation Distances to be Maintained – Determined BAL				
Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method	Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)			
Vegetation Area	**Applied Vegetation Classification**	**Effective Slope (degrees)**	**Determined Bushfire Attack Level**	**Separation Distance Required (metres)**
1	Class B Woodland	1	**BAL-12.5**	35
2	Class G Grassland	1		20
3	Class G Grassland	1.6		20
4	Class B Woodland	0		29
5	Class B Woodland	0		29
6	Class B Woodland	8.8		43
7	Class G Grassland	1		20
1	Class B Woodland	1	**BAL-19**	25
2	Class G Grassland	1		14
3	Class G Grassland	1.6		14
4	Class B Woodland	0		20
5	Class B Woodland	0		20
6	Class B Woodland	8.8		31
7	Class G Grassland	1		14
1	Class B Woodland	1	**BAL-29**	17
2	Class G Grassland	1		9
3	Class G Grassland	1.6		9
4	Class B Woodland	0		14
5	Class B Woodland	0		14
6	Class B Woodland	8.8		22
7	Class G Grassland	1		9

Note: If the particular classified vegetation area is vegetation that is offsite, then the owner of the subject land has no control over that portion of the required minimum separation distance that is also offsite. However, the onsite portion must be maintained along with being aware of any changes to the off-site portion and advocating for its maintenance where possible.

5.4 Vehicular Access

It is the developer's responsibility to ensure that the development design allows for the bushfire protection criteria for vehicular access be met as per the 'Guidelines'. How this Proposal complies with the bushfire protection criteria is set out in s5.1, Element 3, with additional information and justification presented below if necessary.

There is adequate access for emergency service vehicles and public to move within the development area also provide access to and from the development.

5.5 Firefighting Water Supply

The intent is to ensure water is available to the development or land use to enable people, property and infrastructure to be defended from bushfire. This intent may be achieved where the development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes (refer to s5.1 Element 4). Additional information and justification is presented below if necessary.

There are numerous onsite hydrants available for emergency services to be utilised in the event of a bushfire. There will be numerous additional above ground hydrants to be installed within the proposed development. The inclusion of above ground hydrants is a higher standard of water source for a bushfire than is required by the Caravan Park & Camping Grounds Regulation 1997 Schedule 7.

The installation of the hydrants will not exceed the 200m spacing as per residential areas as per DS63 Water Corporation & DFES standards.

5.6 Building Construction Standards

5.6.1 Proposed Building Work

Any proposed residential building work (Class 1, 2, 3 and associated Class 10a buildings and decks) subject to a BAL rating above BAL-Low will be required to be constructed to the requirements corresponding to their determined BAL as set out in *AS 3959-2009 Construction of buildings in bushfire prone areas* or the *(NASH) Standard – Steel Framed Construction in Bushfire Prone* Areas (for Class 1a and 1b buildings only).

The exception will be if higher construction standards are to apply due to a local government requirement or as a part of an alternative solution that might be presented in this Plan to enable compliance with the Bushfire Protection Criteria.

Only residential buildings Class 1, 2 or 3 and associated Class 10a buildings and decks are required by the BCA to be constructed to the bushfire standards set out in *AS3959-2009* and as determined by their BAL rating. This standard is not applicable to Class 4 – Class 9 buildings unless imposed by the relevant local government.

However, determining the BAL ratings of proposed Class 4-9 buildings allows for them to be:

- Sited appropriately and have classified vegetation removed and /or managed such that their exposure to flames, radiant heat and embers is as low as is practically possible.
- Constructed to the standard corresponding to the BAL rating if the developer, owner or local government deem it is prudent and necessary.

All future buildings are to be constructed to the BAL rating as shown on Figure 4.2 BAL Contour map and as a minimum will be BAL-12.5.

5.6.2 Existing Buildings on Subject Site

Class 1, 2 and 3 buildings and Class 10a associated buildings and decks, constructed prior to the requirement to comply with bushfire performance requirements, do not need to meet these requirements.

Buildings of Class 4 to Class 9 are not required by the Building Code of Australia (BCA) to be constructed to comply with bushfire performance requirements.

The *Guidelines for Planning in Bushfire Prone Areas (WAPC 2015)* state, "The policy measures of *SPP 3.7* and these Guidelines are not to be applied retrospectively" (Guidelines s2.2). Further, the WA Building Commission 'Building in Bushfire Prone Areas' information note states "Building standards and regulations are generally not retrospective".

Therefore, retrospectively upgrading a building to comply with the bushfire performance requirements can only be a recommendation.

As the existing buildings exist in a bushfire prone area and may be subject to a bushfire attack, it is recommended that some degree of upgrading be considered in order to improve the protection for occupants and the building's survivability. At a minimum protection from ember attack should be considered (i.e. constructed to the standard required for BAL-12.5).

6 Environmental Considerations

"Many bushfire prone areas also have high biodiversity values. SPP 3.7 Policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values" ('Guidelines' s2.3).

6.1 Native Vegetation and Re-vegetation

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation of Asset Protection and Hazard Separation Zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available options to minimise the removal of native vegetation.

Options to Minimise Removal of Native Vegetation	Considered and Implemented in this Proposal
Reduce lot yield	No
Cluster development	Yes
Construct building to a higher standard as per BCA and AS 3959-2009	Yes
Modify the development location	No
Comments:	

Does this planning proposal satisfy bushfire protection requirements within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes

Where, as part of the Proposal, revegetation of waterway foreshore, wetland or coastal buffers is necessary for their protection or management, this bushfire management plan will need to assess the ability and practicality of maintaining vegetation separation distances corresponding to determined BAL's.

Re-vegetation of riparian and/or coastal areas is part of this Proposal. Can the required BAL separation distance be maintained into the future?	No
Have any other landscape plans applying to this Proposal been considered in assessing the potential change in bushfire risk into the future	Yes

If any of the above applies, further information is presented in Section 6 'Bushfire Risk Management Measures'.

7 Specific Land Uses

State Planning Policy 3.7 Planning in Bushfire Prone Areas (Department of Planning and WAPC 2015) sets out in policy measure 6.6 what is required for 'vulnerable' or 'high risk' land uses to be supported in bushfire prone areas subject to BAL-12.5 or higher.

7.1 Vulnerable Land-Use – Definition / Application / Requirements

Is this concise Bushfire Management Plan (BMP) to accompany a development application for building work associated with a land use that is considered a 'vulnerable' land use?	Yes
Is a Bushfire Evacuation (Response) Plan (BER Plan) for Proposed Occupants to be provided as a separate document and be considered as forming a part of this Bushfire Management Plan?	No
Is the required content of a Bushfire Evacuation (Response) Plan for Proposed Occupants to be provided as an addition to the proponents existing emergency evacuation plan?	Yes
In certain circumstances the required information to fully compile the BER Plan (e.g. position, names and contact numbers for responsible persons) is not available at the development application stage. In such a situation the responsibility to complete the required details prior to occupancy of the subject building will noted in the Landowner/Proponent Responsibilities section of this BMP. Does this situation apply to this application?	No

Information reference: SPP 3.7 *Planning in Bushfire Prone Areas* (Department of Planning and WAPC 2015 s6.6 and s7) and the *Guidelines for Planning in Bushfire Prone Areas* (WAPC 2015 s5.5):

Definition and Application

SPP 3.7 defines vulnerable land use as a land use where persons may be less able to respond in a bushfire emergency. The 'Guidelines expand this and state that vulnerable uses of land are typically those that are considered to have occupants with a lesser capacity to respond in the event of a bushfire and that may present evacuation challenges.

Examples of 'vulnerable' land uses include (but are not limited to) hospitals, nursing homes and retirement villages, tourist accommodation including camping grounds and ecotourism, childcare centres, educational establishments, places of worship and corrective institutions. The definition may also encompass places of assembly, retail and office premises, as well as subsidiary uses of residential development, such as family day care centres or home businesses, and essential infrastructure such as energy, transport, telecommunications and other utilities.

In general terms the following scenarios might need to be considered as vulnerable land uses:

a. Where persons are present that have a lesser physical/mental capacity to respond to emergencies;
b. Where occupancy might be transient in nature;
c. Where greater numbers of persons may be present at certain times;
d. Where occupants are typically not fully familiar with the building or area.

Required Information

1. In areas where BAL-12.5 to BAL-29 applies, a subdivision or development application will not be supported unless it is accompanied by a Bushfire Management Plan (BMP) jointly endorsed by the relevant local government and the State authority for emergency services;
2. The BMP is to include an assessment against the bushfire protection criteria requirements demonstrating compliance within the boundary of the development site.
3. Subdivision applications are to make provision for emergency evacuation;
4. Development applications should include an emergency evacuation plan for proposed occupants; and
5. Where BAL-40 or BAL-FZ applies, applications will not be supported unless they meet the definition of 'minor' or 'unavoidable' development.

The Tuart Lakes Lifestyle Village is currently in operation. A review of any existing Emergency Evacuation plan is to be carried out with respect to incorporating the required content of a Bushfire Evacuation (Response) Plan for Proposed Occupants.

8 Responsibilities for Implementation & Maintenance

This section sets out the responsibilities of landowners/proponents (including future landowners), builders and local government in relation to the implementation and maintenance of the requirements of SPP 3.7 and the 'Guidelines'.

8.1 Landowner / Proponent Responsibilities

Implementation

- Ensure anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information. This includes the landowners/proponents, local government and any other authorities or referral agencies ('Guidelines' s4.6.3).

- Construction of private driveways must comply with the standards (Appendix 5 'Vehicular Access').

- Implement the low fuel Asset Protection Zone (APZ) as per s5.3 'Vegetation Management' and Appendix 4 'APZ and HSZ'.

- Ensure all future buildings the landowner/proponent has responsibility for, are designed and constructed in full compliance with the requirements of the WA Building Act 2011 and the referenced Building Code of Australia (BCA), and with any identified additional requirements of the relevant local government. This should include due consideration of constructing any Class 4-9 buildings to the standard corresponding to their determined BAL even though not required by the BCA.

  For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks this will include compliance with AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* (2009 as amended) and/or the National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas,* whereby construction standards corresponding to the assessed BAL will be applied (Appendix 2 'Bushfire Risk Assessment – Understanding the Methodology').

- There is an outstanding requirement created by this bushfire management plan; a bushfire evacuation plan that addresses the circumstance of bushfire will be required. This may form part of an existing overall emergency evacuation plan.

Maintaining Compliance

- Current and future landowners/proponents must continue to apply the bushfire management measures set out in this Plan. They must inform any builders (of future structures on the lot) of the existence of the Plan and the responsibilities it contains.

- Respond to and comply with fire protection or hazard management notices issued by the local government. This includes compliance with the City of Rockingham Fire Control Notice (the current requirements can be found on the City of Rockingham website), issued under s33 of the Bush Fires Act 1954 as directed by the 'Guidelines' s6.1 and referenced in this Plan s5.1 'Bushfire Protection Criteria' and Appendix 4 'APZ and HSZ'.

- Maintain the low fuel Asset Protection Zone (APZ) within the Lot boundary as per s5.3 'Vegetation Management' and Appendix 4 'APZ and HSZ'.

- The stated minimum separation distance (refer to the table in s5.3) from any classified vegetation, that corresponds to a particular lot's assessed BAL, must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm." Refer to Appendix 3 of this Plan for further detail.

- Where any existing or planned re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements and enable the buildings to retain their determined BAL ratings.

- Any classified vegetation that has directly contributed to the determined BAL rating for a given Lot or building, must be managed such as to not change that vegetation to a higher risk classification.

8.2 Builder Responsibilities

The builder (generally named on the building permit) is responsible for ensuring that the building or incidental structure to which a building permit applies is, on completion, compliant with the Building Code of Australia (BCA).

For Classes 1a, 1b, 2, 3 and associated 10a buildings or decks located in a designated bushfire prone area, compliance with the BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

The construction standards for Class 1a and 1b buildings are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas; or*
- National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas*.

The construction standards for Classes 2, 3 and associated 10a buildings or decks are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas.*

The building/s must also comply with any additional local government requirements.

For any Class 4-9 buildings the builder must comply with any construction requirements that are additional to those contained in the BCA. Of particular issue is any requirement, made by the relevant local government or the owner, to construct to the standard corresponding to the determined BAL for proposed buildings.

8.3 Local Government Responsibilities

Implementation

- Provide advice where the clearing of locally significant vegetation is proposed.

- Register this Bushfire Management Plan and keep a record of the sites referred to for the purpose of identify servicing and infrastructure gaps. ('Guidelines' s4.6.4).

Maintaining Compliance

- Develop and maintain district bushfire fighting services and facilities.

- Any existing and planned revegetation areas that have been assessed in this Plan to have:

    1. Met the Australian Standard *AS 3959-2009 s2.2.3.2* requirements and has been excluded from classification (refer to Appendix 3 'Vegetation Classification Exclusions');

    2. Has directly resulted in the assessed BAL-LOW rating and/or forms part of the minimum required classified vegetation separation distance that that corresponds to a particular structure's assessed BAL; and

3. Is an area whose maintenance is the responsibility of the Local Government (i.e. the subject land is vested in the control of the local government - 'Guidelines s6.2);

   such areas of vegetation must be maintained to be low threat as specified in *AS 3959-2009 Section 2.2.3.2* (refer to Appendix 3 'Vegetation Classification Exclusions').

- Any classified vegetation areas that has directly contributed to the determined BAL rating and are areas whose maintenance is the responsibility of the Local Government, must be managed such as to not change that vegetation to a higher risk classification.

9 Appendices

Appendix 1
Bushfire Prone Areas – Overview of the Building versus Planning Requirements

Building Application (Building Permit) and the Requirement for a Bushfire Attack Level (BAL) Assessment

The majority of development in WA requires the submission of a building application in order to obtain a building permit before construction can commence. The proposed construction must comply with the Building Code of Australia (BCA).

In a designated bushfire prone area, construction, renovation, alteration, extension, improvement or repair of residential buildings (Classes 1, 2, 3 and associated Class 10a buildings or decks), must comply with the bushfire construction requirements of the BCA.

The BCA references AS 3959-2009 'Construction of buildings in bushfire prone areas' and the NASH Standard 'Steel Framed Construction in Bushfire Areas', as providing deemed to satisfy solutions that achieve compliance with the BCA bushfire performance requirements.

A Bushfire Attack Level (BAL) assessment (using the methodology set out in AS 3959-2009) is required to determine the BAL rating of the proposed building work. The corresponding design and construction requirements are then able to be determined.

Class 4 to Class 9 buildings will also require a BAL assessment but are not required to comply with the bushfire performance requirements. However, the requirement to comply may be established by the relevant local government, by their local planning scheme and/or establishment of a special control area. The requirements might also be voluntarily adopted.

Development Application (Planning Approval) and the Requirement for a Bushfire Management Plan (BMP)

In the situations described in Section 2 of this Plan, a development application and subsequent planning approval is required before progressing to the building application process. In these situations, a Bushfire Management Plan that includes the BAL assessment and addresses the bushfire protection criteria is required to be submitted.

Other assessments and supporting documents may also be required and these are provided in or with the BMP.

Appendix 2
Bushfire Risk Assessment – Understanding the Methodology

In SPP 3.7 'bushfire risk' is defined as "the chance of a bushfire igniting, spreading and causing damage to people, property and infrastructure."

"Before a strategic planning proposal, subdivision or development application can be considered, it is necessary to understand the extent of the bushfire hazard and its potential to affect people, property and infrastructure. An assessment of bushfire risk is a key component of deciding whether a strategic planning proposal, subdivision or development application should be approved in an area with a potential bushfire threat (from the 'Guidelines')."

Policy measures in *SPP 3.7* (and the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC 2015*) prescribe the various assessment tools to be used to assess bushfire risk in the planning context. These are:

- Bushfire Hazard Level assessment;
- Bushfire Attack Level (BAL) Contour Map;
- Bushfire Attack Level (BAL) assessment;
- Bushfire protection criteria; and
- Bushfire Management Plan

The intent of this Appendix 'Bushfire Risk Assessment – Understanding the Methodology' is to provide an overview of the methodology used in assessing the Bushfire Hazard Level and the Bushfire Attack Level.

Bushfire Hazard Level Assessment Methodology

"A Bushfire Hazard Level assessment provides a 'broad-brush' means of determining the potential intensity of a bushfire for a particular area. The Bushfire Hazard Level assessment assists in informing the suitability of land contained within strategic planning proposals for future subdivision and development The Bushfire Hazard Level assessment categorises land within a designated bushfire prone area as having a low, moderate or extreme bushfire hazard level. Different hazard levels may be assigned to different parts of individual lots ('Guidelines' s4.1)".

The hazard levels are assessed primarily based on defined fuel characteristics. These characteristics include:

- Prevailing climatic conditions
- Vegetation threat type and area
- Effective ground slope under the vegetation threat
- Existing land use on and around the area being assessed

Bushfire Attack Level Assessment Methodology

The Australian Standard *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas* defines a Bushfire Attack Level (BAL) as:

"A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire."

AS 3959-2009 defines six categories of Bushfire Attack Level (BAL) (*AS 3959 Appendix G*); provides the assessment methodology (*AS 3959 s2 and Appendix B);* and specifies constructions standards corresponding to each BAL (*AS 3959 s3 Table 3.1*). The BAL's and corresponding descriptions of the predicted levels of exposure and heat flux exposure thresholds are contained in the table on the following page.

AS 3959-2009 provides two methods to calculate Bushfire Attack Levels:

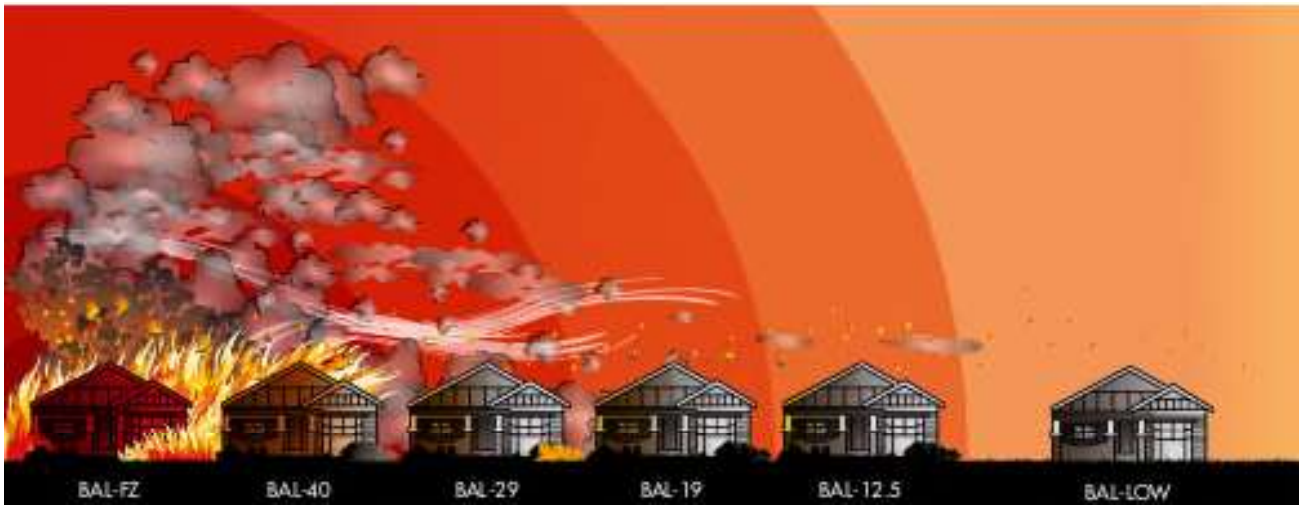
1. **Method 1 -** a simplified procedure that involves five procedural steps to determine the BAL. It is subject to some limitations of the circumstances in which it can be used.
2. **Method 2 -** a detailed procedure using calculations to determine BALs where a more specific result is sought or site conditions are outside the scope of Method 1.

Method 1 – Summarised Procedure

- Determination of the area to be assessed
- Determine predominant vegetation type(s) within 100 metres of the site and classify
- Determination of distance of the site, building or building envelop from the classified vegetation type(s)
- Determination of the effective slope under the classified vegetation type(s)
- Determination of BAL's - Forest Fire Danger Index (FFDI) of 80 is used for WA

Note: Separation Distance*: The distance from a subject site (or building) to a specific area of classified vegetation (i.e. the bushfire threat) is labelled in the tables of this Plan as a separation distance. This distance is measured to a point in the vegetation area represented by the "edge of the vegetation" as per AS 3959 -2009 s2.2.4 and the "base of the bushfire prone vegetation (not the canopy)" as per the BAL Assessment [Basic] Factsheet Version 1 December 2015 WAPC. The exact point of measurement is then decided by the assessor on the basis of the fuel structure and expected fire behaviour. If a precautionary approach is considered appropriate to a given situation the measurement will be taken at the canopy line.*

Bushfire Attack Level Definitions and Corresponding Sections Specifying Construction Requirements (Source: *AS 3959-2009, Appendix G and Table 3.1*)		
Bushfire Attack Level (BAL)	**Description of Predicted Bushfire Attack and Levels of Heat Flux Exposure**	**Construction Section of AS 3959**
BAL - LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk.	4
BAL - 12.5	There is risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2	3 and 5
BAL - 19	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2	3 and 6
BAL - 29	There is an increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2	3 and 7
BAL - 40	There is a much increased risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2	3 and 8
BAL - FZ	There is an extremely high risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to an extreme level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2	3 and 9



Appendix 3
Vegetation Classification Exclusions (AS 3959-2009 s2.2.3.2)

Certain vegetation can be excluded from being classified in which case the Bushfire Attack Level shall be rated as BAL-LOW and no bushfire specific construction requirements apply. Such vegetation is one or a combination of the following:

a) Vegetation of any type that is more than 100m from the site.

b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified.

c) Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site or each other.

d) Strips of vegetation less than 20m in width regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.

e) Non-vegetated areas, including waterways, roads, footpaths, buildings, and rocky outcrops.

f) Low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

Appendix 4
Technical Requirements – Bushfire Protection Criteria (APZ & HSZ)

A vital and effective component of managing the potential bushfire risk to people, property and infrastructure is creating bushfire protection zones in which fire fuel loads are reduced and maintained. They are an integral part of subdivision and development design and appropriately designed will greatly assist with bushfire prevention and suppression operations.

The *Guidelines for Planning in Bushfire Prone Areas (WAPC 2015, Appendix 4)* set out the requirements to create an Asset Protection Zone (APZ) and a Hazard Separation Zone (HSZ). The aim of these bushfire protection zones is to have a fire of diminishing intensity and flame length as it approaches development. These reduced fuel loads will reduce the intensity of radiant heat onto the buildings, thereby increasing their survivability.

The APZ is a low fuel area immediately surrounding a habitable or specified building and is designed to prevent direct flame contact with buildings and it improves safety for firefighters and occupants during fire suppression activities. Maintaining this zone in a minimal fuel condition is essential and firefighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

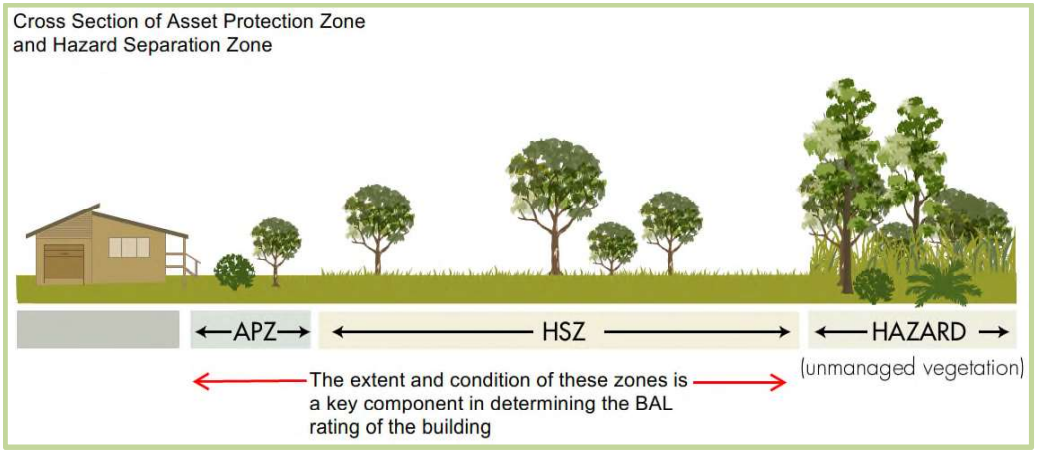
Note that individual local governments may vary their specifications of the APZ from those indicated below. These specifications will be contained in their Firebreak and Fuel load notices and are to be complied with.

Asset Protection Zone (APZ) Requirements (source: 'WAPC Guidelines')

- **Width:** 20 metres measured from any external wall of the building or building envelope. Where the slope increases above 10^0, the APZ should be increased to ensure the potential radiant heat impact of a fire does not exceed 29 kW/m^2 (i.e. a BAL-29 rating on the building).
- **Location:** the APZ should be accommodated within the boundaries of the lot on which the building is situated. Where a full 20 metre APZ is not possible the APZ should be sufficient enough to ensure the potential radiant heat impact of a fire does not exceed 29 kW/m^2 (i.e. a BAL-29 rating on the building).
- **Fine Fuel Load:** reduced to and maintained at 2 t/ha. (DFES guidance-keep grasses short, remove leaves, twigs, dead material within shrubs and trailing bark, and prune branches to 2 metres above the ground).
- **Trees:** crowns are a minimum distance of 10 metres apart (a small group of trees within close proximity to one another may be treated as one crown provided the combined crowns do not exceed the area of a large or mature crown size for that species) and no crowns overhang the building.
- **Shrubs/Trees:** no tall shrubs or tree foliage within two metres of a building
- **Sheds and Fences:** within the APZ are constructed using non-combustible materials (e.g. iron, brick, limestone, metal post and wire) and sheds do not contain flammable materials.

Additional DFES Guidance

a) Do not clump shrubs close to a building. Ensure there is a gap between shrubs and buildings of three times their mature height.
b) Store firewood at least 20 metres away from the building.
c) Keep gutters free of leaves and other combustible material.
d) Roof mounted evaporative coolers to be fitted with ember screens.
e) Gas cylinders to vent away from a building and be tethered to prevent falling over.
f) Driveways and access ways must allow for safe passage of a fire appliance to all buildings on the land.
g) Land owners/occupiers must maintain compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.
h) Barriers such as driveways, lawns, ovals, orchards and pathways surrounding dwellings can form part of a APZ. Locate them to maximise building protection.



Hazard Separation Zone (HSZ) Requirements (source: 'WAPC Guidelines')

The 'Guidelines' set out the requirement for a physical separation between extreme bushfire hazard areas and development in low and moderate hazard areas both around and within subdivisions.

- **Width:** a minimum of 80 metres measured from the outer edge of the APZ for any vegetation classified in AS3959 as forest, woodland, closed shrub, open shrub, mallee/mulga and rainforest OR 30 metres, measured from the outer edge of the APZ, for unmanaged grassland.
- **Location:** within the boundaries of the lot on which the building is situated or, where this is not possible or desirable, within the boundaries of the development precinct in which the building is proposed to be located.
- **Fine Fuel Load:** dead material <6mm diameter and live material <3mm is to be reduced to and maintained at 5 - 8 t/ha for jarrah/marri dominated forest and woodlands, below 12 -15 t/ha in mallee heath and below 15 t/ha in karri forest.
- **Exception -** a HSZ may not be required if the proposed construction meets the standard appropriate to the assessed BAL for that location/building and that BAL does not exceed BAL-29.

The intent is to create a combined minimum separation distance of 100 metres between the buildings and the hazard (50 metres if unmanaged grassland). This separation distance may be reduced if the development is compliant with AS 3959 (i.e. as the distance from classified vegetation is reduced, the construction standard must be increased) or by using a performance principle assessment.

Appendix 5
Technical Requirements - Bushfire Protection Criteria (Vehicular Access)

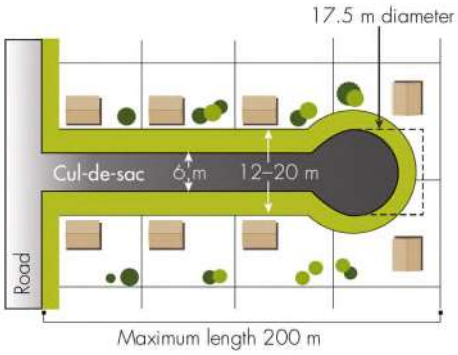
Vehicular Access – Technical Requirements of Acceptable Solutions - Part 1

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC 2015*

Acceptable Solution 3.3 Cul-de-sacs (including a dead-end road)

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

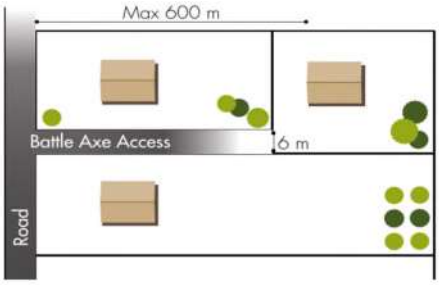
- Maximum length is 200m. If public emergency access is provided between cul-de-sac heads (as a right of way or public access easement in gross), the maximum length can be increased to 600m provided no more than 8 lots are serviced and the emergency access way is less than 600m in length;
- Turnaround area requirements, including a minimum 17.5m diameter head to allow type 3.4 fire appliances to turn around safely;
- The cul-de-sac connects to a public road that allows for travel in two directions; and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.4 Battle-axe

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length 600m and minimum width 6m; and
- Comply with minimum standards for private driveways.



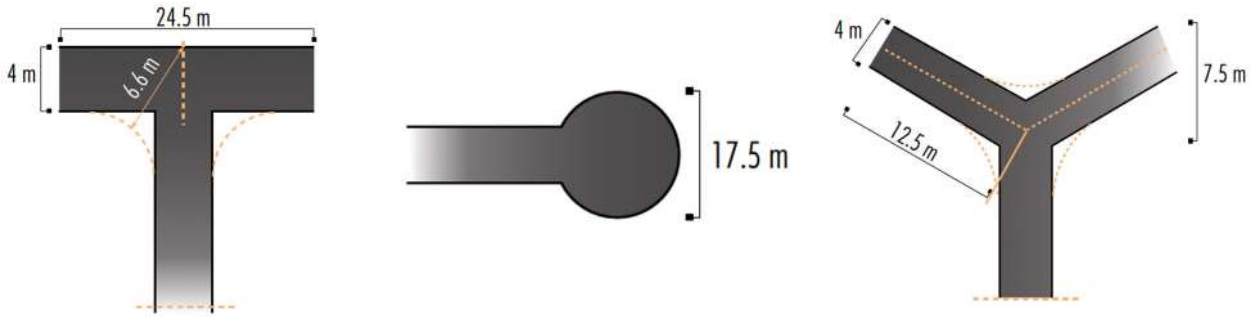
Acceptable Solution 3.5 Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



A3.8 Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

Vehicular Access - Technical Requirements of Acceptable Solutions - Part 2 Source: *Guidelines for Planning in Bushfire Prone Areas WAPC 2015*					
Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

Appendix 6
Technical Requirements - Bushfire Protection Criteria (Water)

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC 2015* and DFES website

Acceptable Solution 4.1 Reticulated Areas

The requirement is to supply a reticulated water supply, together with fire hydrants, in accordance with the specifications set by DFES and the relevant water supply authority (WA Water Corporation or Aqwest - Bunbury or Busselton Water). The Water Corporation's 'No 63 Water Reticulation Standard' is deemed to be the baseline criteria for developments and should be applied unless local water supply authority's conditions apply. Key specifications in the most recent version/revision of the design standard include:

- ***Residential Standard*** – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.

- ***Commercial Standard*** – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.

- ***Rural Residential Standard*** – where minimum site areas per dwelling is 10,000 m^2 (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

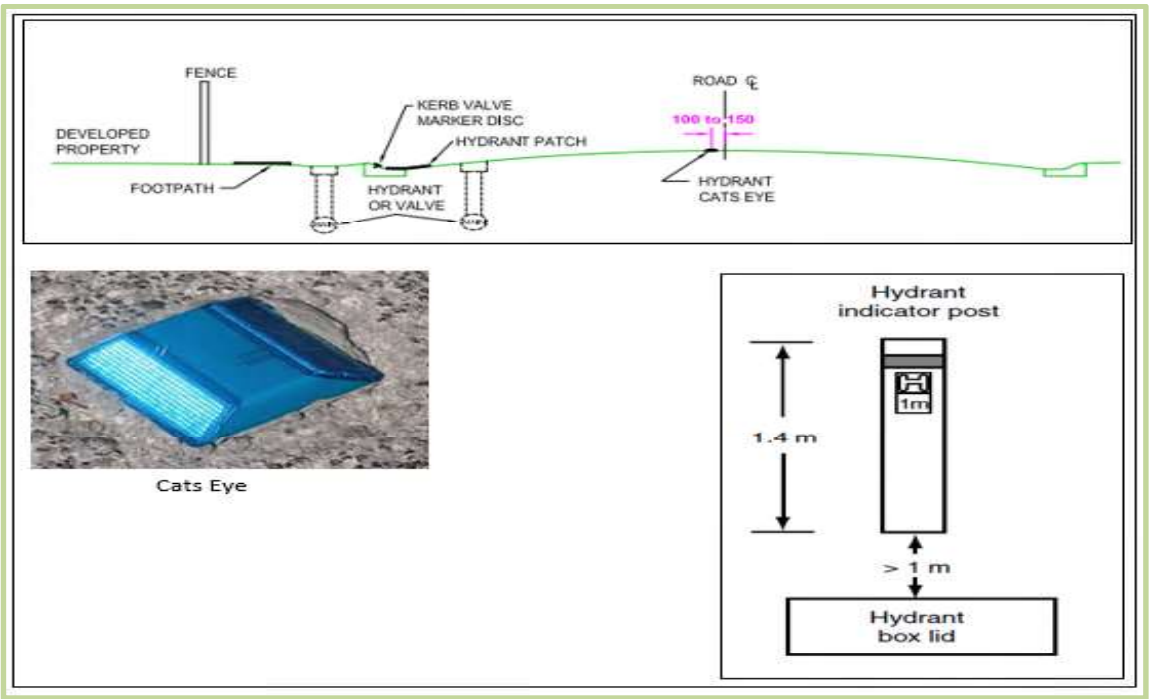


Figure A4.1: Hydrant Location and Identification Specifications

Acceptable Solution 4.2 Non-Reticulated Areas

Static water supplies are used by firefighters in areas where there is no reticulated water supply. Water tanks are the only acceptable static water source acceptable to meet Element 4 (Water) of the Bushfire Protection Criteria as per the *Guidelines for Planning in Bushfire Prone Areas (WAPC 2015) Appendix 4*.

The requirements for the development being assessed can be increased by the relevant local government. If a variation applies it will be noted in the Plan.

Volume:	50,000 litres per tank
Ratio of tanks to lots:	1 tank per 25 lots (or part thereof)
Location:	No more than two kilometres to the furthermost house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds.
Tank Construction:	Above ground tanks constructed using concrete or metal. Stands of raised tanks are constructed using non-combustible materials and heat shielding where applicable (required for metal stands).
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround areas suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) are provided within three metres of each tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 100mm cam-lock coupling of metal/alloy construction (source: DFES). Examples below:
	 
Ownership and Responsibility:	Water tanks and associated facilities are vested in the relevant local government. A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times. This could be in the form of an agreement with the local government and the fire service.

Acceptable Solution 4.3 Non-Reticulated Areas - Individual Lots

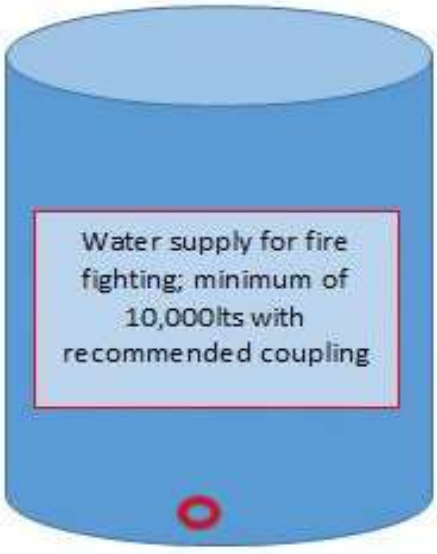
This solution is only for use if creating one additional lot and cannot be applied cumulatively (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015 Appendix 4)*.

Single lots above 500 m^2 need a dedicated static water supply on the lot that has an effective capacity of 10,000 litres (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015)*.

An Example Local Government Requirement:

Volume:	Minimum 10,000 litres (effective) per tank dedicated to firefighting purposes. The storage tank must not facilitate sharing the water for domestic use (danger of contamination).
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 50mm or 100mm cam-lock coupling of metal/alloy construction. Examples below:
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times. This could be in the form of an agreement with the local government and the fire service.

Recommended coupling 50mm



Appendix 4

Current Vegetation Classification Table and BAL Contour Map

BUSHFIRE ATTACK LEVEL (BAL) MAP AND TABLE

TUART LAKES LIFESTYLE VILLAGE

LOTS 102 & 1 (NOS. 831 & 851) MANDURAH ROAD, BALDIVIS

CITY OF ROCKINGHAM

PREPARED FOR:

Serenitas Communities Holdings Pty Ltd

PREPARED BY:

Allerding & Associates

DECEMBER 2024

TABLE 1 – ASSESSED BAL FOR NEW DWELLINGS

APPENDIX 1 – VEGETATION CLASSIFICATION TABLE
APPENDIX 2 – VEGETATION CLASSIFICATION MAP
APPENDIX 3 – BAL CONTOUR MAP

Document ID: NLV TRT ZB/2306						
Issue	Date	Status	Prepared by		Approved by	
			Name	Initials	Name	Initials
1	09.12.24	Final	Tom Hockley BPAD39692 Level 3	TH	Tom Hockley BPAD39692 Level 3	TH
Site Inspection:		Undertaken on 28 November 2024				

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This BAL Assessment was undertaken in accordance with Australian Standard AS3959:2018 *Construction of buildings in bushfire prone areas* (**AS3959**) Methodology 1 to determine the potential worst case scenario radiant heat impact on the new dwellings. Each distinguishable vegetation plot with the potential to determine the BAL is identified in **Appendix 1** with the plots mapped in **Appendix 2. Table 1** below provides the BAL for each of the new dwellings based on separation distance from vegetation plots to the building.

Table 2.1 of AS3959 identifies a Fire Danger Index (FDI) of 80 for Western Australia. Therefore, Table 2.4.3 of AS3959 has been used to develop the BAL Contour Map (refer **Appendix 3**) to calculate the BAL for each new building and inform the standard of building construction required for those buildings to withstand such impacts.

Table 1: Assessed BAL for New Dwellings

Lot Number	Bushfire Attack Level
–	Low
30, 32, 33, 35, 49, 50, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 266, 267, 268, 272, 273, 315, 316, 319, 320, 372, 373.	12.5
34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 269, 270, 271, 317, 318, 374.	19
–	29
375, 376, 377.	40/FZ

APPENDIX 1 – VEGETATION CLASSIFICATION TABLE

Vegetation Classification Table – Lots 102 & 1 (Nos. 831 & 851) Mandurah Road, Baldivis

Photo ID	1	**Plot**	1
Vegetation Classification or Exclusion Clause			
Class A Forest			
Description / Justification for Classification			
Plot 1 to the south of the subject site contains existing mature canopy trees with heights ranging from 10m to 30m and a foliage cover of around 70%. Understorey contains low trees and grasses in an unmanaged state.			

Photo ID	2	**Plot**	1
Vegetation Classification or Exclusion Clause			
Class A Forest			
Description / Justification for Classification			
Plot 1 to the south of the subject site contains existing mature canopy trees with heights ranging from 10m to 20m and a foliage cover of around 70%. Understorey contains low trees and grasses in an unmanaged state.			

Photo ID	3	Plot	3
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 3 within the existing lifestyle village to the west of the development site contains recently established lifestyle village residences within the National Lifestyle Village facility.			

Photo ID	4	Plot	4
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(f) Low Threat Veg			
Description / Justification for Classification			
Plot 3 within the existing lifestyle village to the west of the development site contains managed parkland including grass and trees maintained in a minimal fuel condition.			

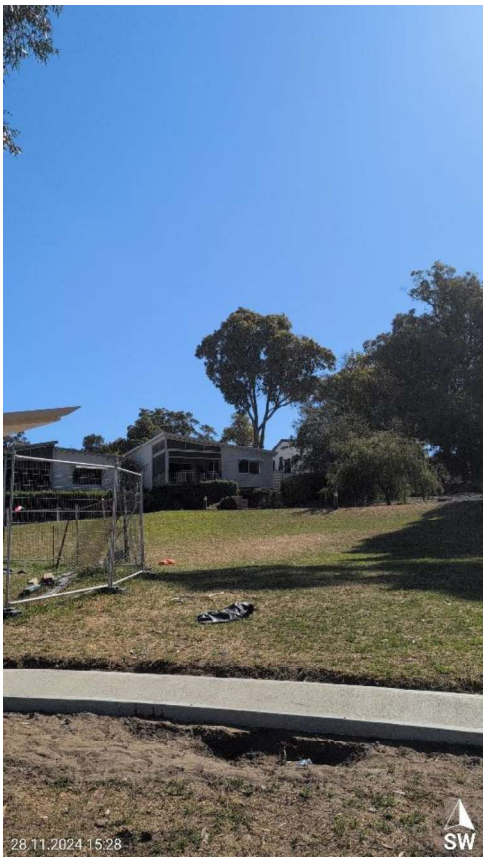


Photo ID	5	Plot	2
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 2 the immediate south west of the development site contains recently cleared areas in a minimal fuel condition. The cleared land will be developed as part of the lifestyle village facility, as the staging is completed.			

Photo ID	6	Plot	2
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 2 the immediate south west of the development site contains recently cleared areas in a minimal fuel condition. The cleared land will be developed as part of the lifestyle village facility, as the staging is completed.			

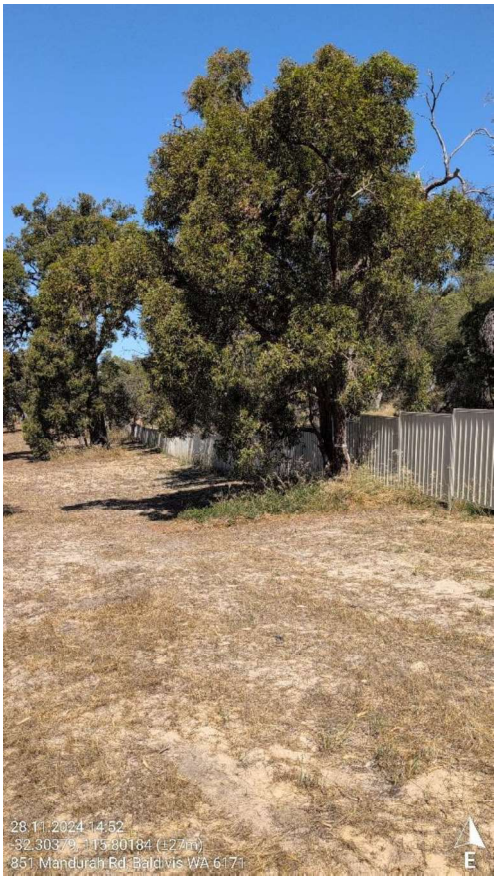


Photo ID	7	Plot	9
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 9 within the development site contains site contains recently cleared land, and recently established lifestyle village residences within the National Lifestyle Village facility.			

Photo ID	8	Plot	9
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 9 within the development site contains site contains recently cleared land, and recently established lifestyle village residences within the National Lifestyle Village facility.			

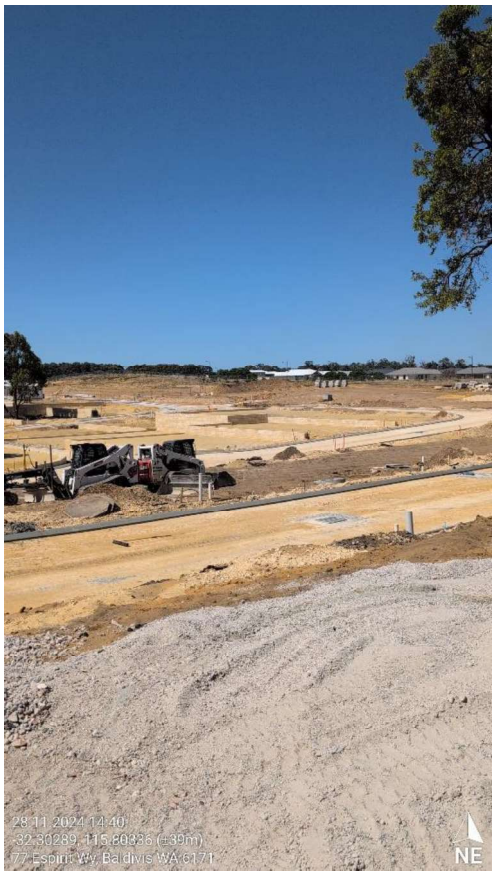


Photo ID	9	Plot	8
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 8 within the existing lifestyle village, representing the area subject to the Structure Plan Amendment, contains recently cleared areas in a minimal fuel condition. The cleared land will be developed as part of the lifestyle village facility, as the staging is completed.			

Photo ID	10	Plot	8
Vegetation Classification or Exclusion Clause			
Excludable 2.2.3.2(e) Non Vegetated Areas			
Description / Justification for Classification			
Plot 8 within the existing lifestyle village, representing the area subject to the Structure Plan Amendment, contains recently cleared areas in a minimal fuel condition. The cleared land will be developed as part of the lifestyle village facility, as the staging is completed.			

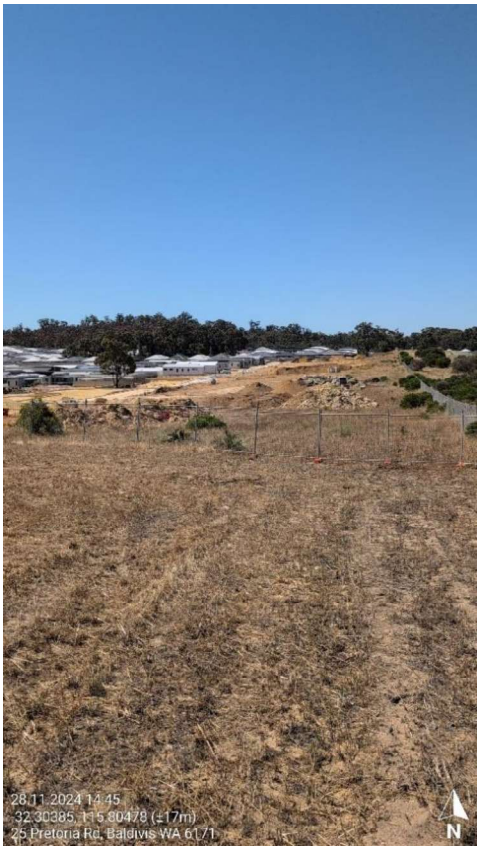


Photo ID	11	Plot	7

Vegetation Classification or Exclusion Clause

Class G Grassland

Description / Justification for Classification

Plot 7 along the eastern boundary of the existing lifestyle village and to the east of the development site contains a strip of unmanaged grassland vegetation. Low shrubs exist within the plot but represent less than 10% of the total area.

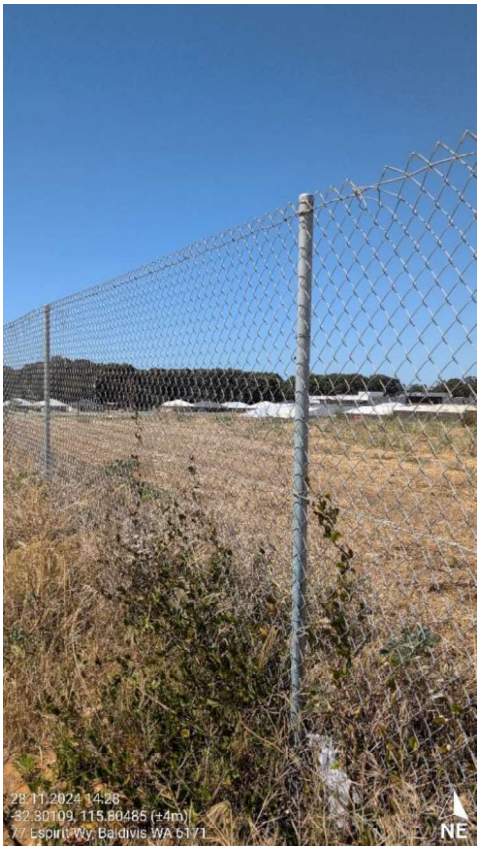


Photo ID	12	Plot	7

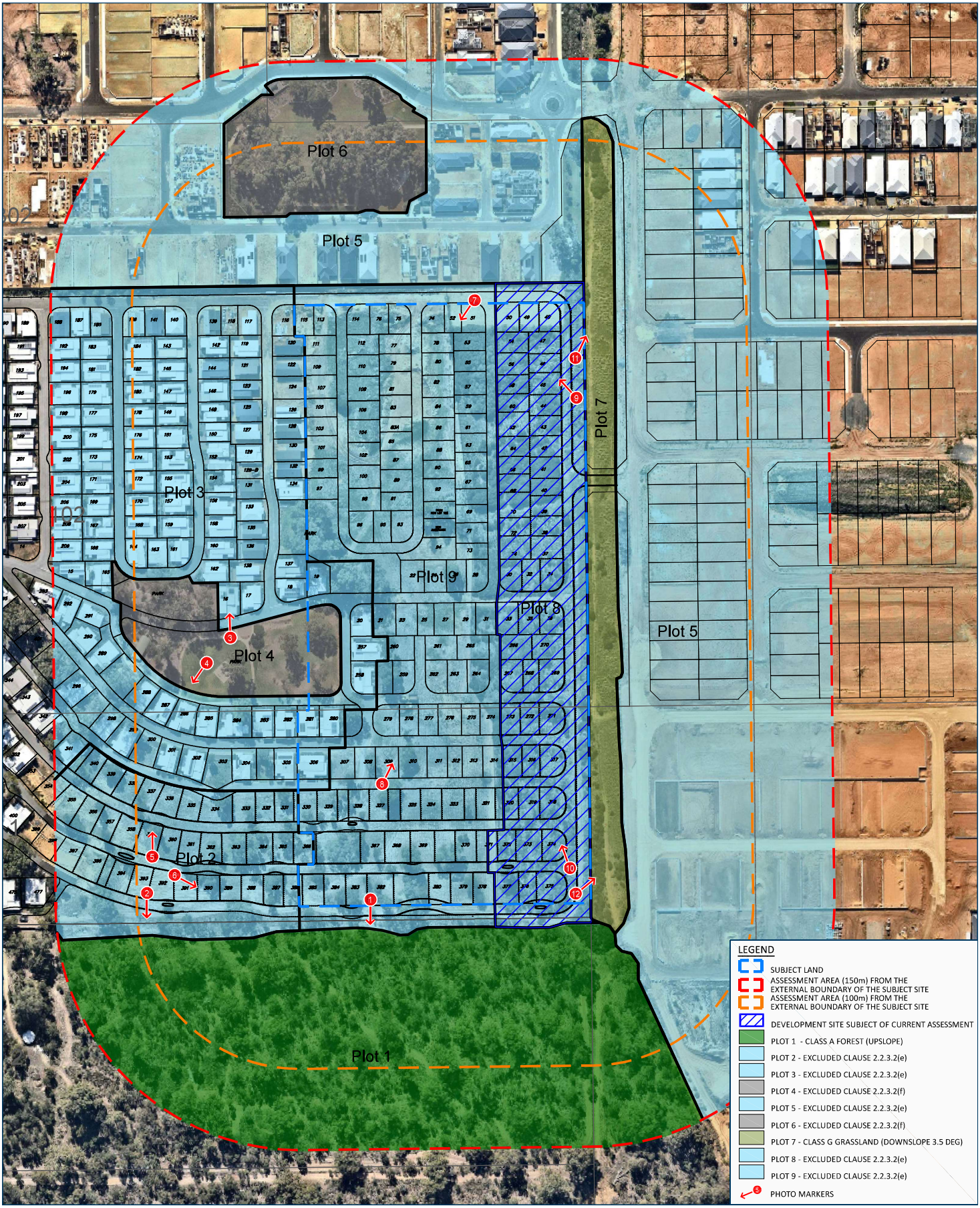
Vegetation Classification or Exclusion Clause

Class G Grassland

Description / Justification for Classification

Plot 7 along the eastern boundary of the existing lifestyle village and to the east of the development site contains a strip of unmanaged grassland vegetation. Low shrubs exist within the plot but represent less than 10% of the total area.

APPENDIX 2 – VEGETATION CLASSIFICATION MAP



AS3959 VEGETATION CLASSIFICATION

LOT 102 (No. 831) MANDURAH ROAD
BALDIVIS

for Serenitas Communities Holdings Pty Ltd

0 20 40 60 80 100 120 140m

SCALE: 1:2200
ORIGINAL PLAN SIZE: A3

JOB CODE:
NLV TRT ZB

DATE:
09.12.2024

Allerding & Associates
Town Planners, Advocates and Subdivision Designers

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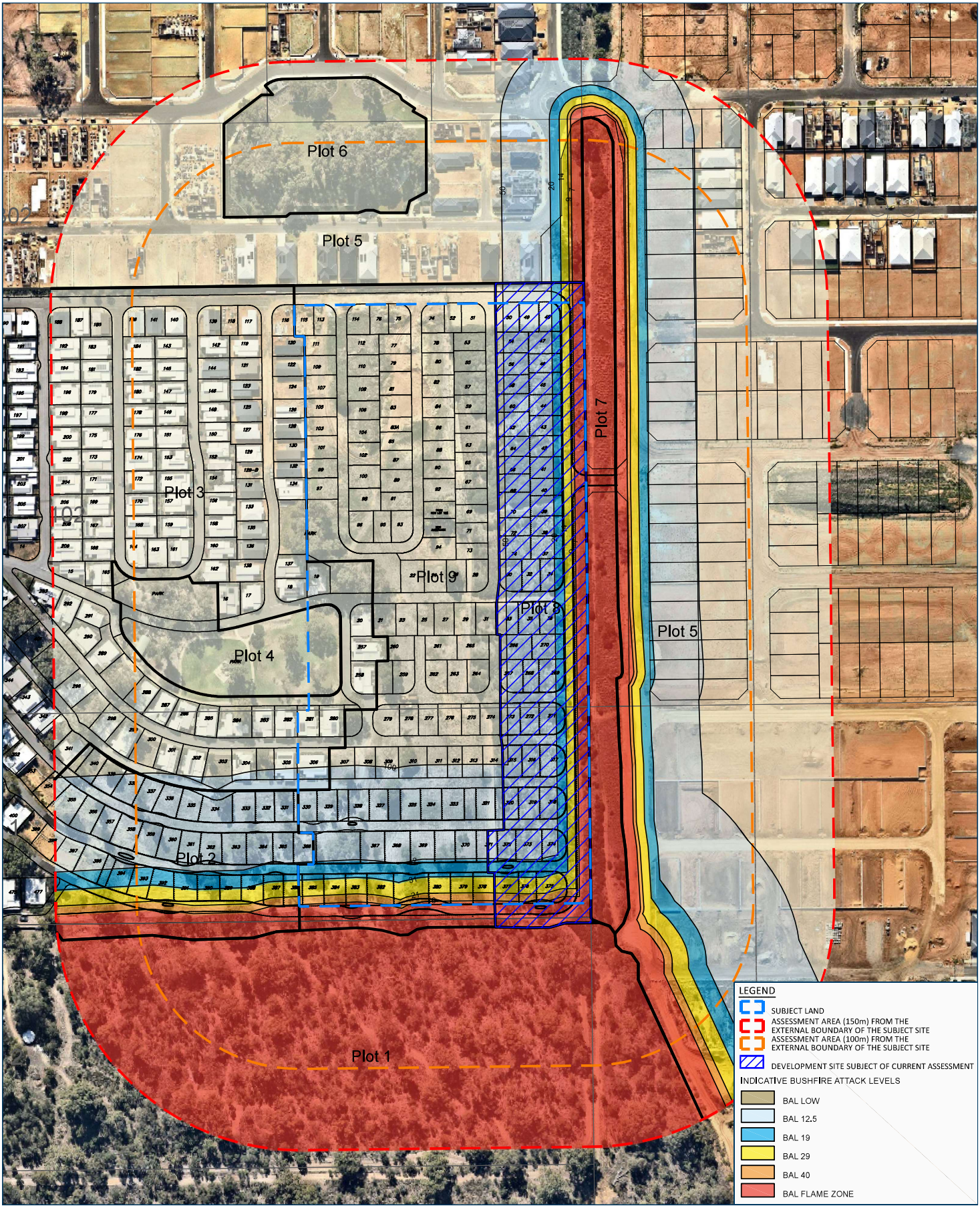
T: (08) 9382 3000 |F: (08) 9382 3005 |W: allerdingassoc.com

APPENDIX 3 –
BAL CONTOUR MAP



BAL CONTOUR MAP

LOT 102 (No. 831) MANDURAH ROAD
BALDIVIS

for Serenitas Communities Holdings Pty Ltd

0 20 40 60 80 100 120 140m

SCALE: 1:2200
ORIGINAL PLAN SIZE: A3

JOB CODE:
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Appendix 5

AS 2885 Risk Assessment Technical Note, APA correspondence and 2007 AS 2885 Risk Assessment

Advisian
Worley Group

Technical Note

Subject	Tuart Lakes Pipeline Risk Assessment Review and Update		
Date	30 March 2020	Pages	10
To	Amanda Butterworth (Allerding & Associates)	From	Malcolm Pritchard Malcolm Pritchard Mar 30 2020 3:11 PM
CC	Andrew Watkins (National Lifestyle Villages)		
Project no.	311012-00116	Doc no.	00-SR-REP-0001
Project	Pipeline Risk Assessment – Tuart Lakes Lifestyle Village		

1 Summary

A pipeline risk assessment [Ref. 2] was conducted in 2007 in accordance with AS 2885-1997 [Ref. 1] for the location now referred to as Tuart Lakes Lifestyle Village (TLLV). This document details the findings of a review of the 2007 risk assessment updated for the proposed extension of residential accommodation. The scope of the review was limited to the assessment of the proposed changes to the development and current status of the actions from the original risk assessment. It should not be viewed as a safety management study (SMS) in accordance with AS 2885.6 -2018 (the latest revision of the standard for high pressure gas pipelines).

As the construction of the proposed development is to be adjacent to the pipeline easement (previous assessment assumed at least 28m separation to the pipeline), it is important to manage the construction threats to the pipeline. The AS 2885 risk assessment carried out in 2007 [Ref. 2] proposed a fence, signs and site induction to ensure work does not occur on the easement. These actions remain relevant to the proposed TLLV modification. The construction contractor should be engaged to provide effective controls, such as a fence, to keep equipment off the easement. If this is not practical, then APA will have to provide written approval and supervision for any work on the easement.

A permanent fence was recommended to separate the residential development from the pipeline easement to protect against future construction risks. TLLV should review and agree with APA whether a fence on one side of the easement is required to control construction access, which can cause excessive loads over the pipeline, particularly if the cover is eroded.

It is recommended that a Safety Management Study in accordance with AS 2885.6-2018 is conducted involving APA, the developer and the construction contractor.

1.1 Assumptions

The AS 2885 risk assessment on the future development of the adjacent Lot 9006, which includes the pipeline easement, will determine satisfactory risk mitigation for all threats that are identified at that

time. This particularly includes construction risk as the current plans indicate road crossings of the pipeline easement and there may be underground service crossings.

This review of the proposed TLLV development and actions has not been conducted in a workshop as defined in safety management study validation [Ref. 1] and APA will incorporate the proposed development through a periodic operational review workshop, or similar.

The effectiveness of EIP controls assumes that a 20 t excavator with a 'tiger' tooth is the largest excavator the pipeline can resist.

Detailed construction methodology is not known. It is assumed that all grading / excavation and other activities that may involve removal and repositioning of soil and occur within the Lot 102 boundary.

1.2 Background

The proposed TLLV development is located at Lot 102 (831) Mandurah Road, Baldivis. Serenitas Development Pty Ltd (Serenitas) operates the lifestyle village. The location was known as National Lifestyle Villages at the time the original risk assessment [Ref. 2] was prepared.

To the east of the site is an easement for the Parmelia gas pipeline operated by the APA Group. The Parmelia pipeline easement and the parallel Alcoa of Australia easement are located on the adjoining Lot 9006. The site overview is shown in Figure 1. The Alcoa easement is outside the scope of this Technical Note.

1.3 Proposed Development for Review

Tuart Lakes Lifestyle Village has approval for a lifestyle village, with the rear portion of the site identified as Residential under a Structure Plan applicable to the Site. It is proposed to lodge a structure plan amendment with the City of Rockingham to allow the lifestyle village to extend up to the rear boundary of the site.

The original AS 2885 risk assessment [Ref. 2] was completed in 2007 for the development with at least a 28 m separation from the pipeline.

The indicative layout of the development extension up to the pipeline easement, subject to the structure plan amendment, is highlighted as Zone C in Figure 2.

APA has provided a response [Ref. 3] in relation to the proposed extension of the Lifestyle Village:

> *APA has revised the actions contained within the Risk Assessment and do not require an entirely new risk assessment to be undertaken. Given the extent of time that has passed since the preparation of the risk assessment, APA will require the preparation of a technical note that documents the modifications of the proposal and the current status of actions arising from the original risk assessment.*

This Technical Note is prepared to document the modification and the current status of the actions from the original risk assessment.

1.4 AS 2885 Risk Assessment (2007)

The 2007 AS 2885 risk assessment [Ref. 2] has been reviewed as the basis for this technical note. A selection of relevant items from this risk assessment is provided here:

> *The pipeline runs 7 m from the eastern border of the property, and the proposed subdivision will introduce residential housing adjacent to the pipeline.*
>
> *In addition, future construction of residential lots is planned some 28 m from the pipeline easement [the proposed development Zone C highlighted in Figure 2 will develop within 28 m of the easement].*
>
> *It is understood that the Parmelia pipeline is designed for a R1/R2 rural [residential[location classification, and the proposed development will require it to be reclassified to [residential] T1.*

The pipeline parameters were identified as shown in Table 1.

Table 1: Pipeline Parameters

Description	Parmelia
Pipe material	API 5L X52. (52000 psi -359 MPa yield)
Pipe Outside Diameter	355.6 mm (14")
Pipe Wall Thickness	5.56 mm
Pipe Max. Allowable Operating Pressure	7.5 MPag
Depth of Burial	~1.20 m indicative only
Coating	Yellow Jacket 1 – 3 mm thick HDPE
Pipe length passing by sub division	~170 m
Design Factor	50%
Design location classification	Residential T1 (due to development)
Isolation – Main Line Valves (MLV)	Pipe length between MLVs - ~9km. 3.5 km north to MLV 17 Kwinana 5.5 km south to MLV 18 Baldivis.
AS 2885.1 Resistance to penetration calculations	The largest excavator the pipeline can resist is a 20 tonne 'tiger' tooth excavator.

2 Review of Proposed Development

2.1 Revision of AS 2885 Standard

The AS 2885 standard has been revised since the 2007 assessment was undertaken. The standard has been restructured with the creation of AS/NZS 2885.6:2018, Part 6: Pipeline safety management [Ref. 1]. This Technical Note is prepared with reference to the current issue of the standard, AS/NZS 2885.6:2018.

The current revision of AS/NZS 2885 has a number of requirements for pipelines in high consequence areas (T1 location is a high consequence area) that were introduced since the 2007 assessment was undertaken using the 1997 revision of the standard, e.g. requirements outlined in AS/NZS 2885.1, Clause 4.9.

Planning Bulletin 87 (PB 87) [Ref 5] for high pressure gas pipelines in the Perth metropolitan region was issued in October 2007, after the March 2007 risk assessment [Ref. 2] was completed. The bulletin provides risk based setback distances from the edge of pipeline easement for different land uses. Residential setback (PB 87 Table 1) is shown as 65 m for the Parmelia Pipeline south of Caversham. Clause 3.1a (which may apply to the TLLV development) indicates that the following proposals are exempt from the setback distance:

> *Small-scale infill land uses, subdivisions or development which completes or rounds-off existing land use, subdivision or development that is already at a lesser setback distances from that defined in Table 1 other than sensitive developments as defined in part 5 of appendix 1.*

2.2 Location Class

A Residential (T1) primary location class was assigned in the 2007 assessment and remains appropriate. No sensitive land use is proposed in the village [Ref. 4]. No land use is proposed that would require a secondary location class.

2.3 AS 2885 Threat Identification

The 2007 risk assessment reviewed a range of threat categories. These threat categories are directly comparable with those listed in AS/NZS 2885.6:2018, namely:

(a) External interference.

(b) Corrosion.

(c) Natural events.

(d) Faults in design, materials or construction.

(e) Faults in operations, maintenance and management systems.

(f) Intentional damage.

The external interference protection (EIP), which is the controls to prevent potential pipeline puncture or rupture, has been reviewed to clearly identify separation and resistance to penetration is compliant with the current revision of AS/NZS 2885.6-2018:

> *In T1 and T2 LOCATION CLASSES, PHYSICAL CONTROLS should include methods that provide both separation and resistance to penetration. Where the THREAT is such that only one of separation or resistance to penetration is practicable, failure analysis shall be done and the risk shall be assessed and managed in accordance with the SAFETY MANAGEMENT PROCESS.*

The 2007 risk assessment identified the key threats as construction machinery and the neighbouring development.

The effectiveness of EIP controls assumes that a 20 t excavator with a 'tiger' tooth is the largest excavator the pipeline can resist. However, if the pipeline penetration resistance calculations (refer Table 1) were repeated using the current revision of the standard, it is anticipated that the maximum excavator size/ tooth combination would be smaller than indicated in Table 1.

Construction Machinery Threat

The 2007 risk assessment identified the main threat to the pipeline was construction machinery traversing over the pipeline and extra precautions should be put in place to prevent construction machinery accessing the pipeline easement. The threat was construction 28 m from the edge of the easement. Construction work on the easement is not included in the scope of the risk assessment. In the event that works or laydown extend onto the easement, APA has to approve all works within the easement. APA written approval may include conditions which ensure the protection of the pipeline.

The proposed construction is now adjacent to the pipeline easement.

Neighbouring Development Threat

The 2007 risk assessment noted that an AS 2885 Risk Assessment and appropriate risk reduction measures must be applied by the neighbouring developer to ensure that the risks are identified and mitigated both during and after any development on Lot 9006.

2.4 Action Status and Update

The status of the actions from the 2007 risk assessment is presented in Table 2.

Table 2: Action Status

Actions (2007 Risk Assessment)			2020 Action Status
Action	Action by	Action Due Date	
1 Road impact to be included in AS 2885 risk assessments conducted by developer of block to the east of the pipeline who will be constructing the road.	Developer of Lot 9006	Prior to road being constructed	No change due to TLLV proposed development

Actions (2007 Risk Assessment)			2020 Action Status
Action	Action by	Action Due Date	
2a Impact from any services to be installed across the pipeline to be included in AS 2885 risk assessments conducted by developer of block to the east of the pipeline.	Developer of Lot 9006	Prior to services being installed	No change due to TLLV proposed development . Appropriate controls may include APA attendance, limits on vibrating equipment, pot holing, hand digging.
2b APA will apply appropriate controls on this activity (also refer 2020 actions status).	APA		
3a Developer to provide induction to his contractors identifying risks impacting on Operators (e.g. access to easement) 3b Management plan to be submitted by Developer to operators for approval. 3c Erect additional barrier plus signage on the village boundary	TLLV	Prior to commencement of construction.	The fence and signage are not specified, but as per AS 2885, procedural controls shall be effective. TLLV shall ensure the construction contractor does not work on the easement. APA has to approve all works within the easement. APA to be approached for appropriate material for site inductions.
4a Erect (permanent) fence and signage on the village boundary.	TLLV	Prior to and during residential occupation of lots within conditional approval zone.	APA ongoing responsibilities include HP Gas Pipeline signs and monitoring depth of cover. TLLV to review with APA the necessity to provide a permanent fence on one side of the easement.
4b Monitor and Maintain depth of cover in compliance with AS 2885	APA		
5 Investigate re-sleeving if corrosion is indicated at field joints.	APA	Ongoing	No change due to TLLV proposed development
6 Coating inspection in compliance with AS 2885.	APA	Ongoing	No change due to TLLV proposed development

In reviewing the actions from the 2007 risk assessment, the proposed development does not change Actions 1 and 2, which will occur when Lot 9006 is developed, nor Action 5 and 6 which are ongoing responsibilities for APA.

Action 3a, 3b and 3c address the construction threats. The action requires a fence and signage to ensure construction and laydown would not occur on the pipeline easement. As the proposed development is now adjacent the pipeline easement, the construction contractor will have to be engaged to keep off the easement. Whatever combination of barriers, signs and inductions are

provided, the control must be effective. If construction does require access onto the easement, APA will have to provide written approval and supervision.

Action 4a and 4b address the threat from residential development adjacent to the pipeline. As there is no evidence of a permanent fence and in the expectation of future development of Lot 9006, TLLV should review and agree with APA the need for a permanent fence on one side of the easement. It is noted that as T1 pipeline, APA has the responsibility to provide HP Gas Pipeline warning signs for residential T1 location visible in either direction and at a maximum sign spacing of 100 m. For the construction threats it recommended that TLLV, communicate with APA whenever pipeline easement construction work is being undertaken to ensure that it is being supervised by APA.

3 Conclusions and Recommendations

A pipeline risk assessment of the TLLV was conducted in 2007 in accordance with the 1997 revision of the AS 2885.1. The developer now proposes changes to the development assessed in reference 2.

The key threats identified were:

- Construction machinery, where the control is to prevent access to the pipeline easement. If this is not practical for the proposed development, which is now immediately adjacent to the pipeline easement, APA written approval and supervision will be required for any work on the easement.
- Threats from the adjacent development (Lot 9006). No development plan has been approved for this adjacent lot and the threats of road and service crossings are unable to be assessed in any more detail than in the 2007 AS 2885 risk assessment.

It is expected that risk to public will increase as there will be more residences overall and residences will be built up to the pipeline easement. Compared with the 2007 review, the potential for construction activity on the easement is increased. The TLLV development does not currently anticipate excavation of the easement for installation of roads, utility services or drains. Any activity on the easement, which may include soil stockpiles and traversing construction machinery has to be approved by APA.

It is recommended that a Safety Management Study in accordance with AS 2885.6-2018 is conducted involving APA, the developer and the construction contractor.

4 References

1. Australian / New Zealand Standard, Pipelines – Gas and liquid petroleum, Part 6: Pipeline safety management. AS/NZS 25885.6-2018.
2. Proposed Rockingham Lifestyle Village AS 2885 Risk Assessment, WorleyParsons, Doc. ID. 450-13522-SR-RP-001, Rev 0, March 2007.
3. 'Lot 102 (831) and Lot 1 (851) Mandurah Road, Baldivis'. Letter from Glenn Skoien (APA) to Amanda Butterworth (Allerding & Associates), 8 November 2017.

4. 'Technical note to accompany AS 2885 Risk Assessment for Tuart Lakes Lifestyle Village', Email from Amanda Butterworth (Allerding and Associates) to Malcom Pritchard (Worley Advisian). 13 March 2020.

5. Planning Bulletin 87, High Pressure Gas Transmission Pipelines in the Perth Metropolitan Region', Western Australian Planning Commissions, October 2007.

Attachment 1: Project Layouts

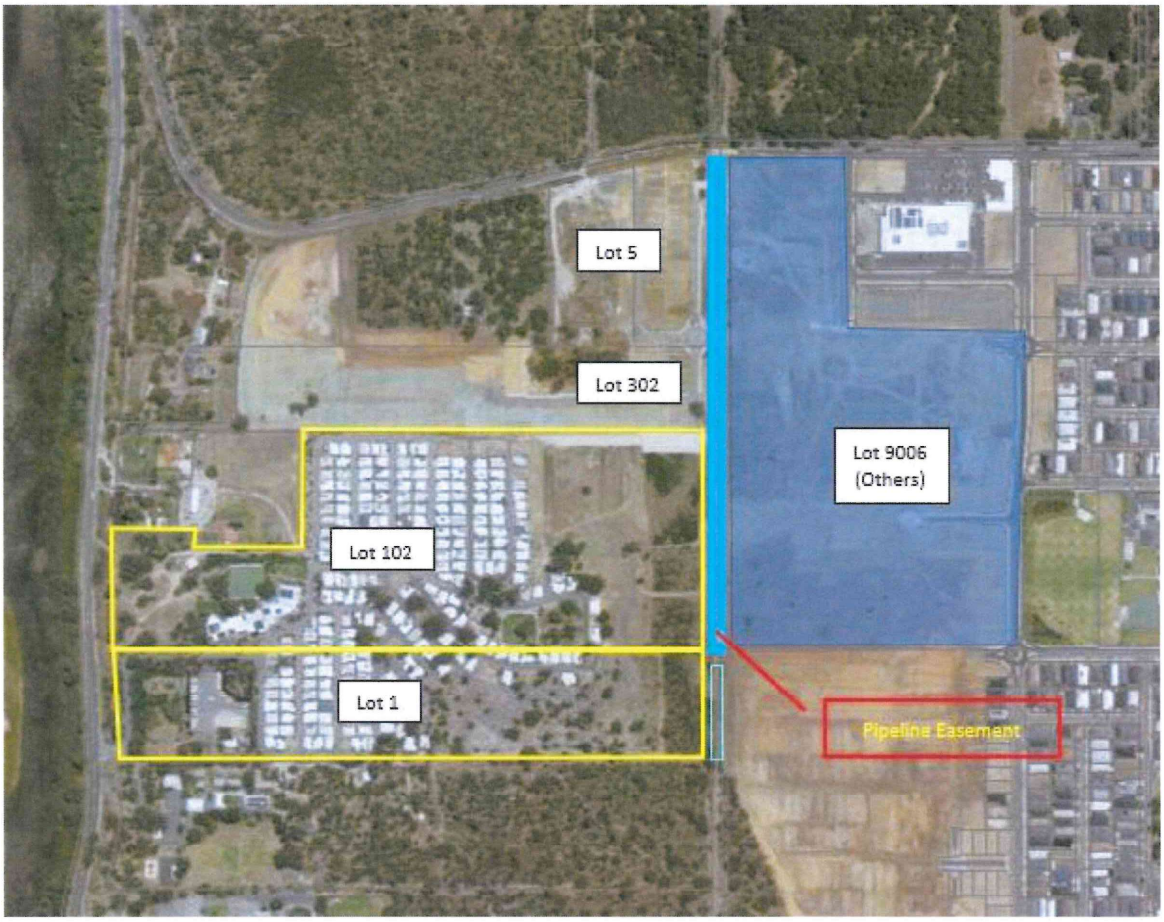

Figure 1: Site Overview

Figure 2: Proposed Extension to Lifestyle Village (Zone C)

APT Parmelia Pty Ltd ACN 078 902 397
Eastpoint Plaza, Level 5 233 Adelaide Terrace, Perth WA 6000
-
P: +61 8 6189 4300 | F: +61 8 6189 4349
APA Group | apa.com.au

8 November 2017

APA Reference: 439041
Your Reference: -

Amanda Butterworth
Senior Associate
Allerding & Associates
125 Hamersley Road
SUBIACO WA 6008

EMAIL OUT: amanda@allerdingassoc.com

Dear Amanda

RE: Lot 102 (831) & Lot 1 (851) Mandurah Road, Baldivis

APA Group (APA) is Australia's largest natural gas infrastructure business and has direct management and operational control over its assets and investments. APA's gas transmission pipelines span across Australia, delivering approximately half of the nation's gas usage. APA owns and operates over 15,000 km's of high pressure gas transmission pipelines across Australia.

APA is the Pipeline Licensee for the Parmelia Gas Pipeline. The Parmelia Gas Pipeline is located on the adjoining lot to the east, immediately abutting the subject site (shown in Attachment 1).

The Proposal

National Lifestyle Villages and Allerding & Associates have engaged with APA to discuss the potential of extending the existing development at Lot 102 (831) & Lot 1 (851) Mandurah Road, Baldivis.

It is understood that National Lifestyle Villages are seeking to alter existing development approvals to facilitate an extension of the Park Home Village. The proposal would extend the development further east. This will essentially replace the land within PD-DA30(a) Tuart Lakes Lifestyle Village Structure Plan currently shown as "Residential – R20" with Park Home Village.

APA's Role

As a Licensee under the Petroleum Pipelines Act 1969 (WA), APA is required to operate high pressure gas transmission pipelines (**HPGTP**) in a manner that minimises adverse environmental impacts and protects the public and property from health and safety risks. Once a HPGTP is in place, APA is required to constantly monitor both the pipeline easement and also a broader area within which we are required to consider land use changes and development and to assess what such changes means to the risk profile of the HPGTP.

APA has a number of responsibilities and duties to perform under a complex framework of legislation, standards and controls across Federal, State and Local Government landscapes. In particular, our HPGTPs are required to be operated in accordance with Australian Standard 2885 (Pipelines – Gas and Liquid Petroleum) (AS2885). In discharging our regulatory responsibilities, APA needs to

continuously review what is happening around its assets, what land use changes are occurring and what development is taking place to ensure it remains in a positon to comply with applicable operational and safety standards and legislation whilst meeting its commercial obligations and imperatives.

Safety Management Study

AS2885 requires a Safety Management Study (**SMS**) to be undertaken whenever the land use classification of land within the ML. The purpose of an SMS is to assess the risk associated with a change in land use, including both construction risks and ongoing land use risks. The SMS will also develop appropriate controls to reduce risks to 'as low as reasonably practicable' (**ALARP**). SMS's are also known as Qualitative Risk Assessments.

An AS2885 Risk Assessment was undertaken for the proposed development by WorleyParsons in March, 2007 (Document Number: 450/13522/001). APA has revised the actions contained within the Risk Assessment and do not require an entirely new risk assessment to be undertaken. Given the extent of time that has passed since the preparation of the risk assessment, APA will require the preparation of a technical note that documents the modifications of the proposal and the current status of actions arising from the original risk assessment. This should be undertaken prior to the commencement of any newly approved development.

Conclusion

APA does not object to the proposed extension to the existing lifestyle village, subject to the preparation of a Technical Note to refresh the existing AS2885 Risk Assessment. It is requested that an ongoing dialogue between NLV and APA be maintained during this process, and that APA be engaged with through any formal planning processes moving forward.

For any further enquiries relating to this correspondence, please feel free to contact myself on (03) 8626 8459 or the Infrastructure Planning & Protection team at PlanningWA@apa.com.au.

Yours faithfully,

Glenn Skoien
Urban Planner
APA Group

Encl: 1x Location of Parmelia Gas Pipeline

Attachment 1: Location of Parmelia Gas Pipeline

WorleyParsons

resources & energy

NATIONAL LIFESTYLE VILLAGES LTD

Proposed Rockingham Lifestyle Village

AS 2885 Risk Assessment

450/13522/001

1-Mar-07

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Insert a Disclaimer

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PROJECT 450/13522/001 - PROPOSED ROCKINGHAM LIFESTYLE VILLAGE

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	M Lozyk	P Sartory	N/A	7-Feb-07	N/A	
B	Issued for Client Review	M Lozyk	P Sartory	P Sartory	9-Feb-07	N/A	
0	Issued as Final	M Lozyk	P Sartory	P Sartory	1-Mar-07		

CONTENTS

Appendices

1. INTRODUCTION

1.1 General

An AS2885 pipeline risk assessment was conducted on 7 February 2007 for the section of the Parmelia Natural Gas Pipeline passing adjacent to the proposed Rockingham Lifestyle Village development.

This report details the findings of the assessment and provides a list of identified action items which require close out.

1.2 Background

The proposed Rockingham Lifestyle Village development encompasses Lots 3 and 703 Mandurah Rd in Baldivis.

National Lifestyle Villages (NLV) LTD has proposed to develop the existing rural land, which borders Mandurah Rd, in to a residential village. A section of the Parmelia Natural Gas Pipeline runs parallel to the western border of the property. The pipeline runs 7m from the eastern border of the property, and the proposed subdivision will introduce residential housing adjacent to the pipeline. The land to the east of the lots contains the pipeline easement and is owned by Galati. This land will be developed in the future and is outside the scope of this report, however the activities associated with that development does have the potential to impact the risks to the residents of lots 3 and 703.

In addition, future construction (2009) of residential lots are planned some 28m from the pipeline easement and are within conditional development zone defined in WA Planning Commission, 2005, Planning and Development in The Vicinity of High Pressure Gas Pipelines, Draft Planning Bulletin, February 2006.

It is understood that the Parmelia pipeline is designed for a R1/R2 rural location classification, and the proposed development will require it to be reclassified to T1.

The existing structures on the lots, which are proposed to be demolished, are located on the eastern side of the property approximately 500m away and therefore not considered to be in close proximity to the pipeline.

The construction phase of the development will consist of civil works involving land clearing, earthworks, road construction, drainage construction and the installation of various services.

1.3 Study Scope and Objectives

The scope of work for this AS2885 Risk Assessment includes:

- The buried Parmelia Natural Gas Pipeline adjacent to subdivision
- Road and services (electricity, water, gas sewerage, drainage).

- Demolition
- Civil construction works
- Future maintenance
- Other miscellaneous features of the subdivision

The intent of this Pipeline Risk Assessment is to identify and assess the possible threats to the pipelines and future residents of the proposed subdivision.

1.4 Acronyms and Abbreviations

The following acronyms and abbreviations have been used in this report.

ALARP	As Low as Reasonably Practicable {risk level}
AS2885	Australian Standard AS2885 Pipelines – Gas and Liquid Petroleum
CP	Cathodic Protection
DOC	Depth of Cover
DoIR	Department of Industry and Resources
DOCEP	Department of Consumer and Employment Protection
HAZOP	Hazard and Operability Study
HDPE	High Density Polyethylene
KP	Kilometre Point {distance in kilometres along the pipeline from the start}
MAOP	Maximum Allowable Operating Pressure {of the pipeline as in AS2885}
MLV	Main Line Valve
OD	Outside Diameter
OP	Operating Pressure
QRA	Quantitative Risk Assessment
R1, R2, T1	Classification of pipeline location (AS2885.1 Clause 4.2.4.4)
Rev.	Revision
SCC	Stress Corrosion Cracking
SDV	Shut Down Valve
WAPC	Western Australian Planning Commission
WS&RM	WorleyParsons Safety and Risk Management
WT	Wall Thickness

2. AS2885 DESIGN RISK ASSESSMENT METHODOLOGY

2.1 General

The methodology for this risk assessment is outlined in AS2885 Part 1. AS2885 is the only international pipeline code for cross-country pipelines that is risk based and aimed at managing the specific threats to a pipeline. The standard focuses on the identification of all possible threats to the pipeline and the management of these threats, either by:

- physical and procedural external protection measures; or
- design and procedural measures to prevent the occurrence of loss of containment incidents.

2.2 Pipeline Specifications

	Parmelia
Pipe Material	API 5L X52. (52000 psi -359 MPa yield)
Pipe O/D	355.6 mm (14")
Pipe WT	5.56 mm (0.219")
Pipe MAOP	7.5 MPag (813 psig)
Pipe OP	Varies
Depth of Burial	~1.20 m indicative only
Coating	Yellow Jacket No. 1 – 3 mm. thick HDPE
Pipe length passing by sub division	~170 m
Design Factor	50%
Design location classification	Currently R2, proposed T1
Isolation	Pipe length between MLVs - ~9km. North to MLV 17 Kwinana & 5.5km south to MLV 18 Baldivis.
AS2885.1 Resistance to penetration calculations	The largest excavator the pipeline can resist is a 20 tonne 'tiger' tooth excavator.

2.3 Risk Identification

The AS2885 risk assessment methodology requires that a location and threats analysis be performed for the pipeline route. The intention of this phase of the work was to identify all the possible causes of failure of the pipeline and the mitigation measures which are in place.

The AS2885 risk identification process (see Figure 1) can be broadly defined into the following activities:

- Location analysis
- Threat analysis
- Mitigation by design and procedures
- Failure analysis
- Risk evaluation
- Risk management

2.3.1 Location Analysis

This process is the identification of the land use and activities, which take place adjacent to the pipeline route.

2.3.2 Threat analysis

This process is the identification of all possible threats, which may impact the pipeline. The analysis includes both location specific and non-location specific threats. Location specific threats could be external interference activities, such as deep furrow ploughing or excavation of adjacent services, or effects on corrosion protection from high voltage transmission lines. Non-location specific threats could be internal/external corrosion, pressures in excess of design pressure or natural disasters such as earthquakes or cyclones.

2.3.3 Mitigation by Design and Procedures

This process consists of the identification of the mitigation measures, which are required to reduce the risk of the identified threats to ALARP. The AS2885 code stipulates the number of mitigation measures, which should be in place for external interference protection and procedural/design prevention measures. There are also design requirements for corrosion, electrical protection and natural events.

2.3.4 Failure Analysis

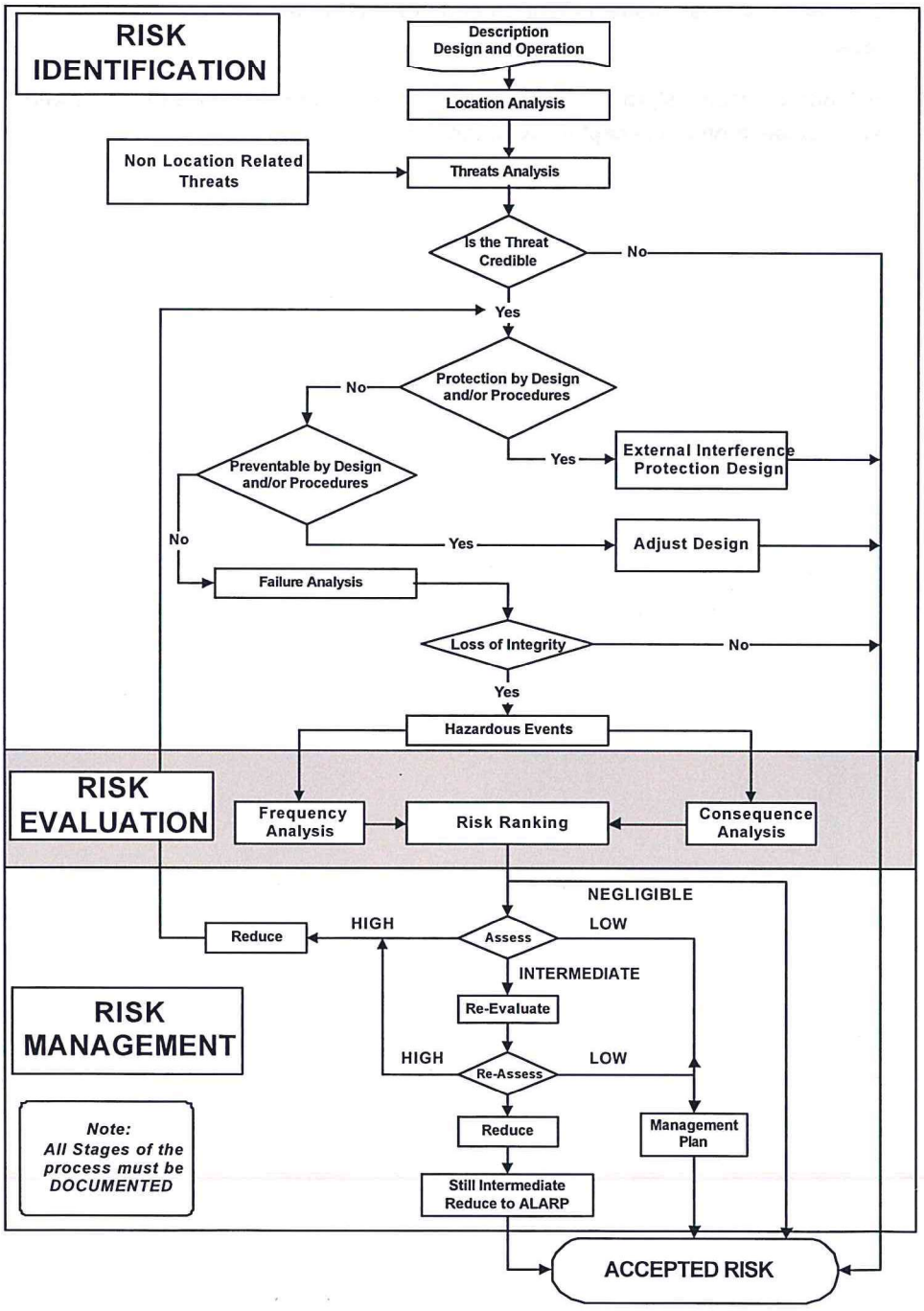
Failure analysis combines the design features of the pipeline with the identified threats to determine the failure mode. Threats that have not been eliminated or reduced to acceptable levels must be subject to failure analysis.

2.3.5 Risk Evaluation and Risk Management

Where the design and procedures are unable to reduce the risks to an acceptable level, a risk evaluation and risk management procedures can be put in place to reduce the risks to an acceptable level.

AS2885 contains risk ranking frequency and consequence tables to assist with assessment of the risk and guidance on the acceptability of the risk.

Figure 1 - The Pipeline Risk Assessment Process



2.4 Risk Assessment Workshop

Contribution by the participants is critical to the success of the risk assessment study, and this was achieved as each participant brought specific knowledge, skill, experience and judgements to the workshop.

The assessment of threats to the pipeline was undertaken in consultation with the study group and projected onto a screen during the workshop. This provided an opportunity for the participant's to debate and agree on the decisions being made prior to recording in the assessment minutes.

3. PIPELINE RISK ASSESSMENT RESULTS

3.1 General

The methodology of the Risk Assessment was undertaken in accordance with the AS2885 process. The risk assessment workshop systematically assessed the threats to the pipeline within the proposed Rockingham Lifestyle Village subdivision. The threat list contained in AS2885 was used as a guide to assess location and non-location specific threats. The possible threats to the residential occupants were also assessed as part of the process.

The documentation available during the workshop included;

- Drawings of the proposed sub-division
- Aerial photographs
- Pipeline design information

3.2 Risk Assessment Study Team

The Pipeline Risk Assessment team was comprised of the following members. A signed attendance sheet is presented in Appendix 1.

Table 1 – Risk Assessment Team

Name	Company
Paul Sartory	WorleyParsons
Luke Badock	WorleyParsons
Myk Lozyk	WorleyParsons
Gerry Connell	Agility
Aidan Trend	Agility
Ian Nichol	NLV
David Wo	NLV
Ben Doyle	Planning Solutions

3.3 Safeguards

AS2885 specifies that areas with a T1 location class should have the minimum external protection of two physical and two procedural measures. In comparison, a R1 or R2 location requires a minimum of one physical and two procedural measures.

For each of the pipeline threats, the design and procedural measures present were identified and assessed to determine if they were considered adequate or if additional mitigation measures were required.

3.4 Actions

There were 6 actions identified in the workshop which are shown in Table 2 below

ID	Location	Location description	Threat	Threat analysis	Actions	Action by	Action due date
	Location Specific						
1	Sealed road identified on the plans parallel to the pipeline along the east side of the development on neighbouring land.	Not within control of RLV but actions identified for neighbouring developer (Galati)	Excavation for services traversing pipe	Excessive loads on pipe and erosion of pipeline cover	1. Road impact to be included inAS2885 risk assessments conducted by developer of block to the east of the pipeline who will be constructing the road.	1. Galati	Prior to road being constructed
2	Possibility of provision of services to the development from future development to east of pipeline across the pipeline.	Not within control of RLV but actions identified for neighbouring developer (Galati)	Excavation for services traversing pipe	Interaction with pipe and potential for penetration	1. Impact from any services to be installed across the pipeline to be included in AS2885 risk assessments conducted by developer of block to the east of the pipeline. 2. Agility will apply appropriate controls on this activity.	1. RLV 2. Galati 3. Agility	Prior to services being installed
5	Construction	All village construction activities are within the lot and approx 65m from pipeline However potential for construction vehicles to access the easement	Construction vehicles traversing pipeline easement	Excessive loads on pipe and erosion of pipeline cover	1. Developer to provide induction to his contractors identifying risks impacting on Operators (eg access to easement) 2. Management plan to be submitted by Developer to operators for approval 3. Erect additional barrier plus signage on the village boundary	1,2,3 RLV	Prior to commencement of construction

ID	Location	Location description	Threat	Threat analysis	Actions	Action by	Action due date
	Location Specific						
7	Future construction (2009) of residential lots within conditional development zone	Proposed additional lots within the conditional approval zone, 28m from edge of the easement.	Proximity of additional residential lots may	Exposure of residents to higher risk	1. Erect fence and signage on the village boundary 2. Monitor and Maintain depth of cover in compliance with AS2885	1. RLV 2. Agility	Prior to and during residential occupation of lots within conditional approval zone,
10	Non-location specific	Pipe wall	External Corrosion	Loss of thickness at field joints.	1. Investigate re-sleeving if corrosion is indicated at field joints	1. Agility	
27	Non-location specific	Non-location specific	Existing defect from unreported impact.	Unreported defect deteriorates over time.	1. Coating inspection in compliance with AS2885	1. Agility	

4. CONCLUSION

The AS2885 Risk Assessment workshop was conducted effectively to a professional standard using an accepted methodology. The participants from various disciplines possessed the appropriate skills, experience and knowledge required for an effective study.

The output of the Risk Assessment is presented in Appendix 2.

The key outcomes of the risk assessment are:

- As the main threats to the pipeline are construction machinery, extra precautions shall be put in place to prevent construction machinery accessing the pipeline easement. This must include the erection of additional barriers and warning signs on the village boundary, and a general induction to all construction personnel to raise awareness of the pipeline.
- An AS2885 Risk assessment and appropriate risk reduction measures must be applied by neighbouring developer (Galati) to ensure that the risks to the residential lots within conditional development zone remain ALARP during, and following, any development on their land adjacent to lots 3 and 703.
- All actions/recommendations from this report require monitoring to close out.

5. REFERENCES

1. Standards Australia, 1997, "Pipelines – Gas and Liquid Petroleum, Part 1: Design and Construction" Standards Australia.
2. SAA HB105-1998 "Guide to pipeline risk assessment in accordance with AS 2885.1"
3. *Guidance for the Assessment of Environmental Factors* (in accordance with the Environmental Protection Act 1986) Guidance for Risk Assessment and Management: Off-site individual risk from Hazardous Industrial Plant No.2, WA EPA, July 2000.
4. WA Planning Commission, 2005, *Planning and Development in The Vicinity of High Pressure Gas Pipelines*, Draft Planning Bulletin, February 2006.

Appendix 1 – Attendance List

Meeting Attendance Record

WorleyParsons

Date 7/2/07
Meeting topic AS2885 PRA ROCKINGHAM LIFESTYLE VILLAGE
Held by WSRM
Venue QV1 LEVEL 6

NAME	SIGNATURE	POSITION	COMPANY
LUKE BADOCK		SCRIBE	WP
Paul SARTORY		FACILITATOR	WP
Ian Nichol		PM	NLV.
GERRY CONNELL		LANDS OFFICER	AGILITY
AIDAN TREND		ENGINEER	AGILITY
David Wo		Planning Manager	NLV
Ben Doyle		Senior Planner	Planning Solutions.
Myk Lozyk		Engineer	WP

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☐ Other (please specify)

Appendix 2 – Risk Assessment Worksheet

	AS 2885 Risk Assessment		Project:	Rockingham Lifestyle Village, Baldivis												
	Project No.	450-13522		Facilitator	Paul Sartory											
	Date	7/02/2007		Scribe	Luke Badock											
ID	Location	Location Class	Location description	Threat	Threat analysis	Is threat credible?	Safeguards - External Interference Protection	Safeguards - Procedural/ Design -Safeguards	Reduced to ALARP	Actions	Action by	Action due cate	Risk Assessment Frequency	Severity	Risk	Comments
	Location Specific															
1	Sealed road identified on the plans parallel to the pipeline along the east side of the development on neighbouring land.	T1	Not within control of RLV but actions identified for neighbouring developer (Galati)	Excavation for services traversing pipe	Excessive loads on pipe and erosion of pipeline cover	No				1. Road impact to be included inAS2885 risk assessments conducted by developer of block to the east of the pipeline who will be constructing the road.	Galati	Prior to road being constructed				
2	Possibility of provision of services to the development from future development to east of pipeline across the pipeline.	T1	Not within control of RLV but actions identified for neighbouring developer (Galati)	Excavation for services traversing pipe	Interaction with pipe and potential for penetration	No				1.Impact from any services to be installed across the pipeline to be included in AS2885 risk assessments conducted by developer of block to the east of the pipeline. 2. Agilitywill apply appropriate controls on this activity.	RLV Galati Agility	Prior to services being installed				
3	Public Open Space	T1	No public open spaces currently proposed in vicinity of pipeline			No										
4	Demolition/earthworks etc	T1	Demolition confined to western side of lot (approximately 500m from pipeline)			No										
5	Construction	T1	All village construction activities are within the lot and approx 65m from pipeline However potential for construction vehicles to access the easement	Construction vehicles traversing pipeline easement	Excessive loads on pipe and erosion of pipeline cover	Yes	1. Permanent Fencing 2. Depth of cover is 1.2 m 3. Mechanical integrity of pipe wall thickness 5.56mm. (based on pipeline design compliance with AS2885)	1. Access to easement will be prohibited by developer/ Signage will be provided 2. Induction to every workman going onsite.		1. Developer to provide induction to his contractors identifying risks impacting on Operators (eg access to easement) 2. Management plan to be submitted by Developer to operators for approval 3. Erect additional barrier plus signage on the village boundary	RLV RLV RLV					
6	Water bores	T1	None planned			No										
7	Future construction (2009) of residential lots within conditional development zone	T1	Proposed additional lots within the buffer zone, 28m from edge of the easement.	Proximity of additional residential lots may	Exposure of residents to higher risk	Yes	1. Permanent Fencing 2. Depth of cover is 1.2 m 3. Mechanical integrity of pipe wall thickness 5.56mm. (based on pipeline design compliance with AS2885)	1. Access will be prevented prohibited by permanent fence and signage installed and maintained by developer.		1. Erect fence and signage on the village boundary 2. Monitor and Maintain depth of cover	RLV Agility					increased dept of cover and wall thickness d generic reduces the risk.Ref Draft DPB Feb 2006 section 3.3.1 Reduction of access ensures that pipeline rupture is not credible and risk is negligible. Ref Draft DPB Feb 2006 section 3.3.3
	Non Location Specific															
8	Non-location specific	T1	Pipe wall	Bacterial Corrosion	Thinning of pipe wall. Dry gas no internal bacterial corrosion expected or known historically. Local soil type Bassendean/yellow sand. Water table in contact with pipe externals. No external bacterial corrosion.	No										Corrosion is not considered to be external interference threat to pipelines, therefore there is no specified number of safeguards required by AS2885.
9	Non-location specific	T1	Pipe wall	External Corrosion	No acid soils . No external corrosion identified.	No										
10	Non-location specific	T1	Pipe wall	External Corrosion	Loss of thickness at field joints.	Yes	1. Coating	1.Intellignet pigging 2. DCVG	Yes	1. Investigate resleeving	1. Agility					Corrosion is not considered to be external interference threat to pipelines, therefore there is no specified number of safeguards required by AS2885.
11	Non-location specific	T1	Pipe wall	Stray current corrosion	Thinning of pipe wall caused by electrolysis. No stray currents and no sources of stray currents at this location.	No										Corrosion is not considered to be external interference threat to pipelines, therefore there is no specified number of safeguards required by AS2885.
12	Non-location specific	T1	Pipe wall	Thermocycles	Not credible at this location Stress corrosion cracking	No										Corrosion is not considered to be external interference threat to pipelines, therefore there is no specified number of safeguards required by AS2885.
13	Non-location specific	T1	Pipe wall	Corrosion	From hydro testing water	No										Corrosion is not considered to be external interference threat to pipelines, therefore there is no specified number of safeguards required by AS2885.
				Design Defect												
15	Non-location specific	T1	Pipe wall	Design Pressure Incorrect	Potential loss of containment	No										

ID	Location	Location Class	Location description	Threat	Threat analysis	Is threat credible?	Safeguards - External Interference Protection	Safeguards - Procedural/ Design -Safeguards	Reduced to ALARP	Actions	Action by	Action due date	Risk Assessment Frequency	Severity	Risk	Comments
16	Non-location specific	T1	Pipe wall	Failure to define correct range of operating conditions	Potential loss of containment	No										
17	Non-location specific	T1	Pipe wall	Failure to specify required material characteristics	Potential loss of containment	No										
18	Non-location specific	T1	Pipe wall	Inadequate ITP plan to confirm acceptability of material	Potential loss of containment	No										
19	Non-location specific	T1	Pipe wall	Incorrect diameter	No loss of containment impact	No										
20	Non-location specific	T1	Pipe wall	Specify incorrect test procedures	Potential for incorrect test results	No										
21	Non-location specific	T1	Pipe wall	Stresses Exceed Allowable	Potential loss of containment	No										
22	Non-location specific	T1	Pipe wall	Temperature Exceeds Design	Potential loss of containment	No										
23	Non-location specific	T1	Pipe wall	Temperature Less Than Design	Potential brittle fracture	No										
				External Interference												
24	Non-location specific	T1	Non-location specific	Blasting	Potential for loss of containment	No										
25	Non-location specific	T1	Non-location specific	Bogged Vehicles	External interference Bollarding provided to exclude recreational vehicles. Sand soils vs clay	Yes	1. Bollards 2. Depth of cover 3. Mechanical integrity of pipe wall thickness (based on pipeline design compliance with AS2885)	1. Pipeline warning signs (i.e., dial before you dig)	Yes							
26	Non-location specific	T1	Non-location specific	Ploughing to 900mm depth	Impact on pipeline	No										
27	Non-location specific	T1	Non-location specific	Existing defect from unreported impact.	Unreported defect deteriorates over time.	Yes	1. Depth of cover 2. Pipe wall thickness (safeguards protect pipeline from unreported incident)	1. Regular surveillance 2. Intelligent pigging 3. Signage. 4. Public awareness procedures leading to landowner reporting.	Yes	1. Coating inspection	1. Agility					Reporting of defects by landowner if aware (Galal)
				Intentional Damage												
28	Non-location specific	T1	Non-location specific	Malicious Damage	Potential to cause loss of containment. Not considered credible for buried pipeline in a residential area.	No										
29	Non-location specific	T1	Non-location specific	Sabotage	Potential to cause loss of containment. Not considered credible for buried pipeline in a residential area.	No										
30	Non-location specific	T1	Non-location specific	Terrorism	Potential to cause loss of containment. Not considered credible for buried pipeline.	No										
				Natural Events												
31	Non-location specific	T1	Non-location specific	Cyclone - Flooding and Storm Surges	Potential for pipeline to float if ground is water saturated overstressing pipe material.	No										
32	Non-location specific	T1	Non-location specific	Cyclone - Flooding and Storm Surges	Potential for storm surges to expose buried pipeline.	No										
33	Non-location specific	T1	Non-location specific	Earthquake	Potential for ground movement overstressing pipe material.	No										earthquake risk contours referenced for AS2885 indicate this section of line designed to risk level.
34	Non-location specific	T1	Non-location specific	Ground Movement	Potential for ground movement overstressing pipe material.	No										
35	Non-location specific	T1	Non-location specific	Lightning	Induced voltages and step & touch potentials possibly causing fatality.	No										
36	Non-location specific	T1	Non-location specific	Bushfires/ intentional burning	No bush.	No										
				Operation/Maintenance												
37	Non-location specific	T1	Non-location specific	Exceeding MAOP	Potential for loss of containment	No										
38	Non-location specific	T1	Non-location specific	Inaccurate Test Equipment	Potential for loss of containment	No										as concerns pigging
39	Non-location specific	T1	Non-location specific	Inadequate Servicing of Equipment	Potential for loss of containment	No										
40	Non-location specific	T1	Non-location specific	Inadequate / Incomplete Maintenance Procedures	Potential for loss of containment	No										
41	Non-location specific	T1	Non-location specific	Incorrect Operation of Control and Protective Equipment	Potential for loss of containment	No										
42	Non-location specific	T1	Non-location specific	Incorrect Pigging Operation	Potential for loss of containment	No										

Notes:

1. This risk assessment is based on the pipelines being compliant with to AS2885
2. Any work occurring in the pipeline easement will require a Section 41 and Section 56 application.
3. "Pipeline easement" and "easement" refers to the currently proposed easement, which is 12m wide.
4. "OPS" and "operator" refer to pipeline operator Agility
5. TBD - To Be Determined

Appendix 3 – Project Information

Figure A 1 – Parmelia Pipeline location (Agility LTD)

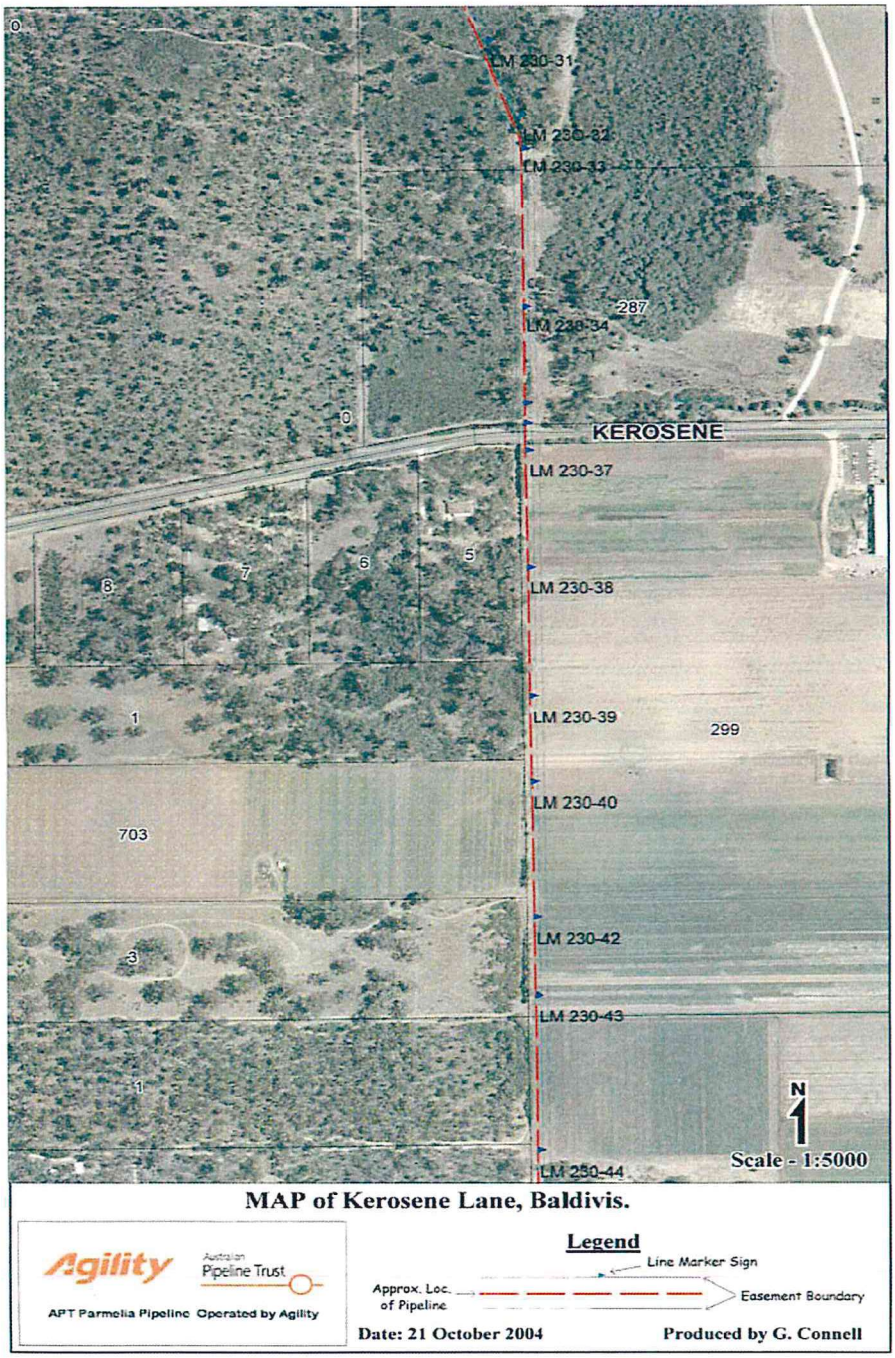


Figure A 2 – Proposed Rockingham Lifestyle Village Subdivision Layout

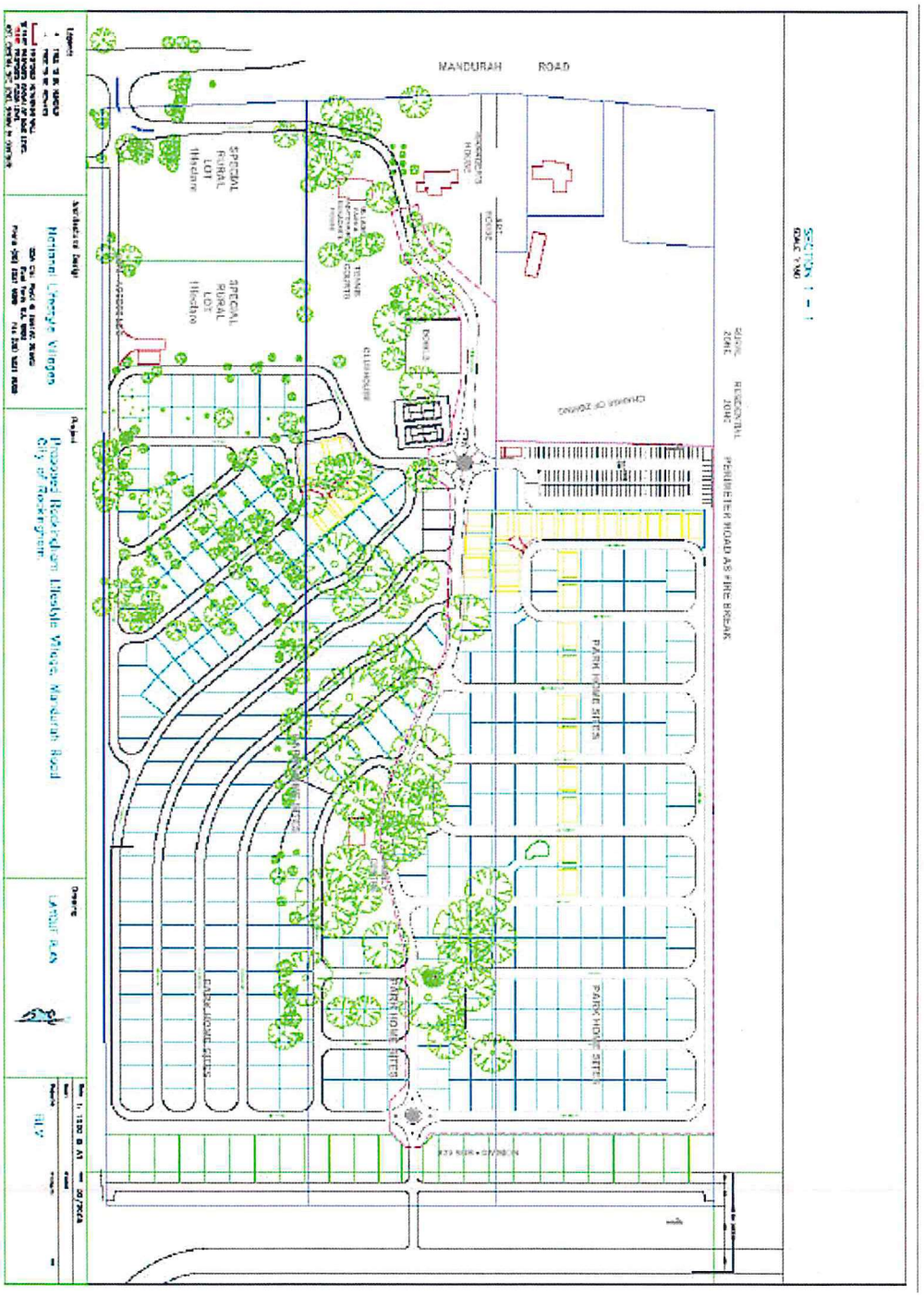
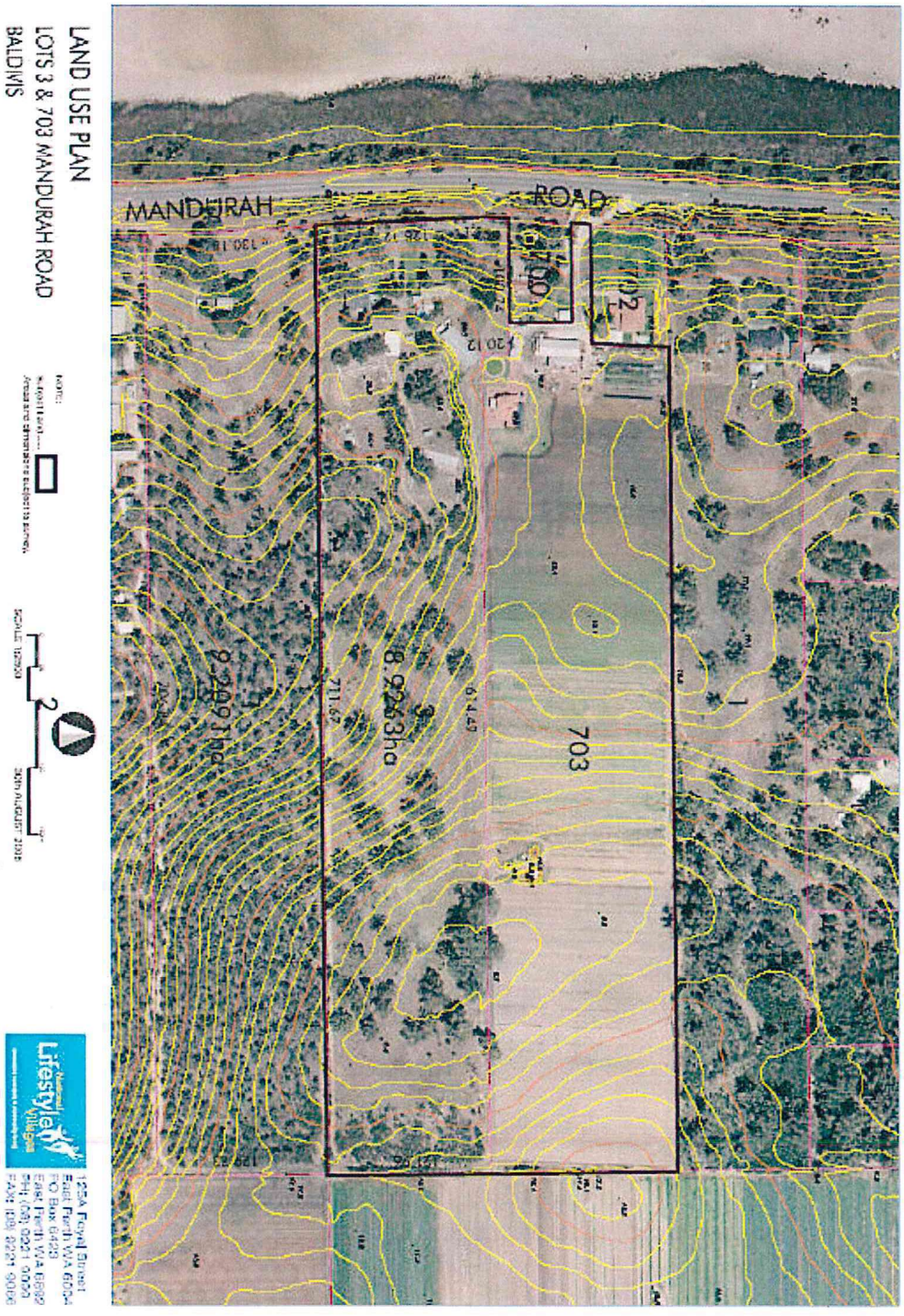
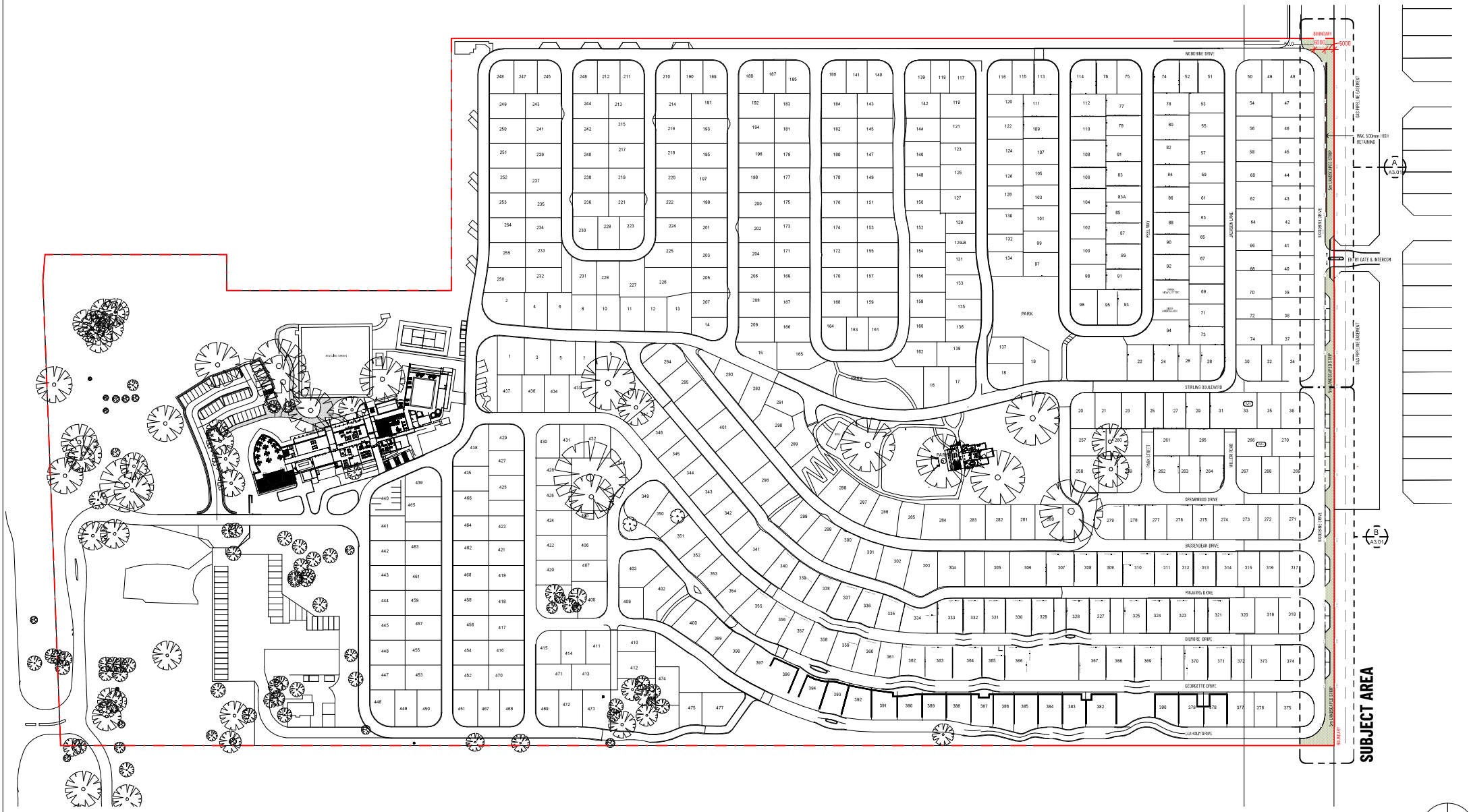


Figure A 3- Land Use Plan



Appendix 6

Landscaping and Fencing Concept Plan



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No.	Description	Date
A	PRELIMINARY ISSUE	26.03.2025
B	FINAL ISSUE	08.04.2025

TUART LAKES LIFESTLYE VILLAGE

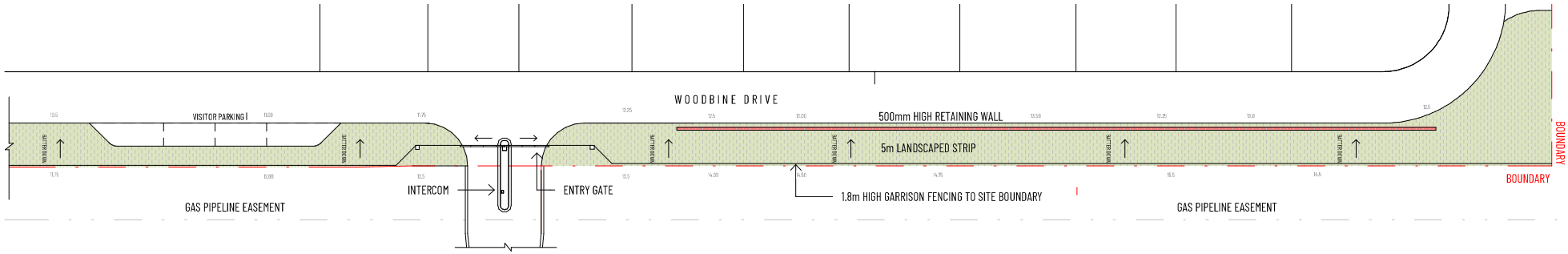
831 Mandurah RD, Baldivis, WA 6171

TUART LAKES - OVERALL MASTERPLAN

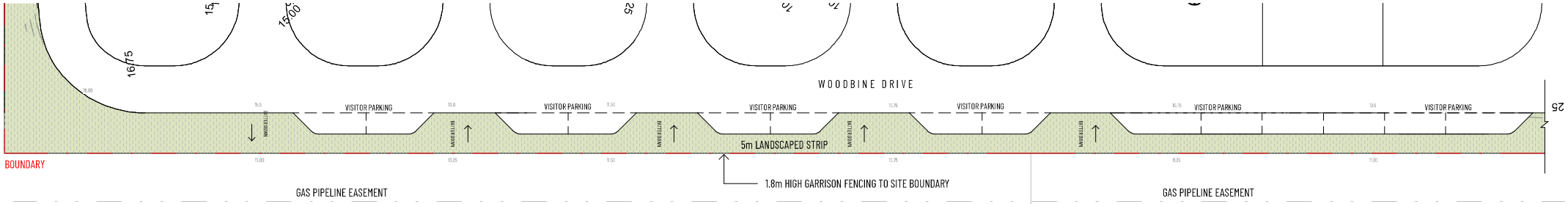
Project number	0001
Date	08.04.2025
Drawn by	RHA
Checked by	RHA

A1.01

Scale @ A1 1 : 1000



TUART LAKES EASTERN BOUNDARY PART PLAN A | 1:500



TUART LAKES EASTERN BOUNDARY PART PLAN B | 1:500

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No.	Description	Date
A	PRELIMINARY ISSUE	26.03.2025
B	FINAL ISSUE	08.04.2025

TUART LAKES LIFESTLYE VILLAGE

831 Mandurah RD, Baldivis, WA 6171

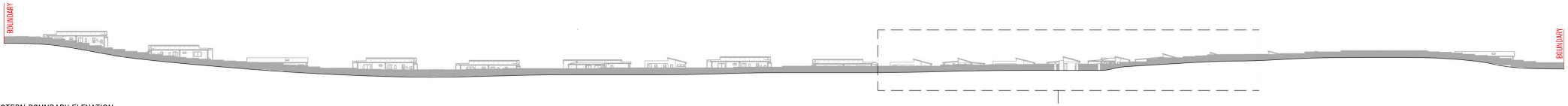
EASTERN BOUNDARY PART PLANS

Project number	0001
Date	08.04.2025
Drawn by	RHA
Checked by	RHA

A3.01

Scale@A3 1 : 500

10/04/2025 1:24:44 PM



EASTERN BOUNDARY ELEVATION

1:1000

EASTERN BOUNDARY ELEVATION - CALLOUT 1

1:200

EASTERN BOUNDARY STREETSCAPE - ARTISTS IMPRESSION

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No.	Description	Date
A	ISSUE FOR INFORMATION	31.03.2025
B	FINAL ISSUE	08.04.2025

TUART LAKES LIFESTLYE VILLAGE

831 Mandurah Rd, Baldivis, WA 6171

EASTERN BOUNDARY - STREETSCAPE

Project number	0001
Date	08.04.2025
Drawn by	RHA
Checked by	RHA

A3.02

Scale@A3 As indicated

10/04/2025 1:27:10 PM

TREES - @8M SPACING

MELALEUCA QUINQUENERVIA

EUCALYPTUS FOECUNDA

GROUND COVERS

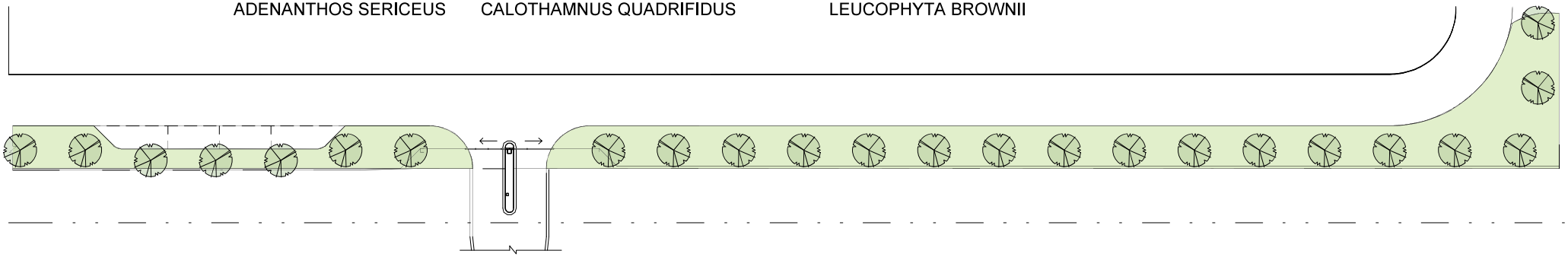
TO MATCH PREVIOUS STAGES WITH FEATURE ROCKS IN BETWEEN TREES AS PER EXAMPLE PHOTOS

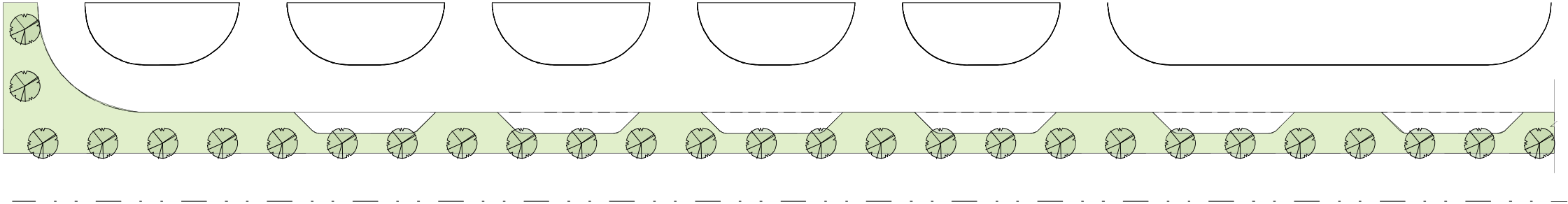
ADENANTHOS SERICEUS

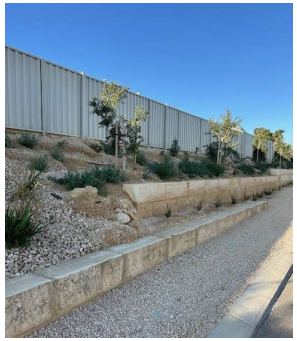
CALOTHAMNUS QUADRIFIDUS

LEUCOPHYTA BROWNII

PLANT LIST	Mature Size	Spacings - m2
Screening		
Adenanthos sericeus	3 metre	2
Calothamnus quadrifidus	1.5 metre	1.5
Ground Covers		
Acacia lasiocarpa	.5 metre	0.5
Grevillea thelmaniuana	.5 metre	0.75
Adenanthos meisneri	1 metre	1.25
Leucophyta brownii	.5 metre	0.75
Olearia axillaris dwarf	1 metre	1
Grasses		
Dianella revoluta	.75 metre	0.5
Anigozanthis flavius	1 metre	0.5
Orthosanthus laxus	.4 metre	0.4







EXISTING VERGE WORKS EXAMPLE

ISSUE	DATE	REVISION	
PROJECT	TUART LAKES		PROJECT # L0241
CLIENT	NVL	DATE # 10/04/2025	DWG # S03
		SCALE @ A3 1:500	
DWG	EAST BOUNDARY	DRAWN XX	
		CHKD XX	REVISION

EARTHCARE LANDSCAPES

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E: earthcare@earthcare.net.au

Appendix 7

Traffic Technical Note

1. EXECUTIVE SUMMARY

1.1. This technical review is provided to assess the traffic impacts of a proposed change of land use at the Tuart Lakes lifestyle Village, Mandurah Road, Baldivis.

1.2. The assessment of the forecast traffic concludes that no traffic assessment is required under the *WAPC Transport Assessment Guidelines*.

2. LOCATION AND BACKGROUND

2.1. Tuart Lakes is an established Lifestyle Village, located at Lot 102 (831) Mandurah Road, Baldivis. The land parcel has approval for a lifestyle village, with the rear portion of the site identified as Residential R20 under a Structure Plan applicable to the Site. Figure 1 shows the location of the subject site.

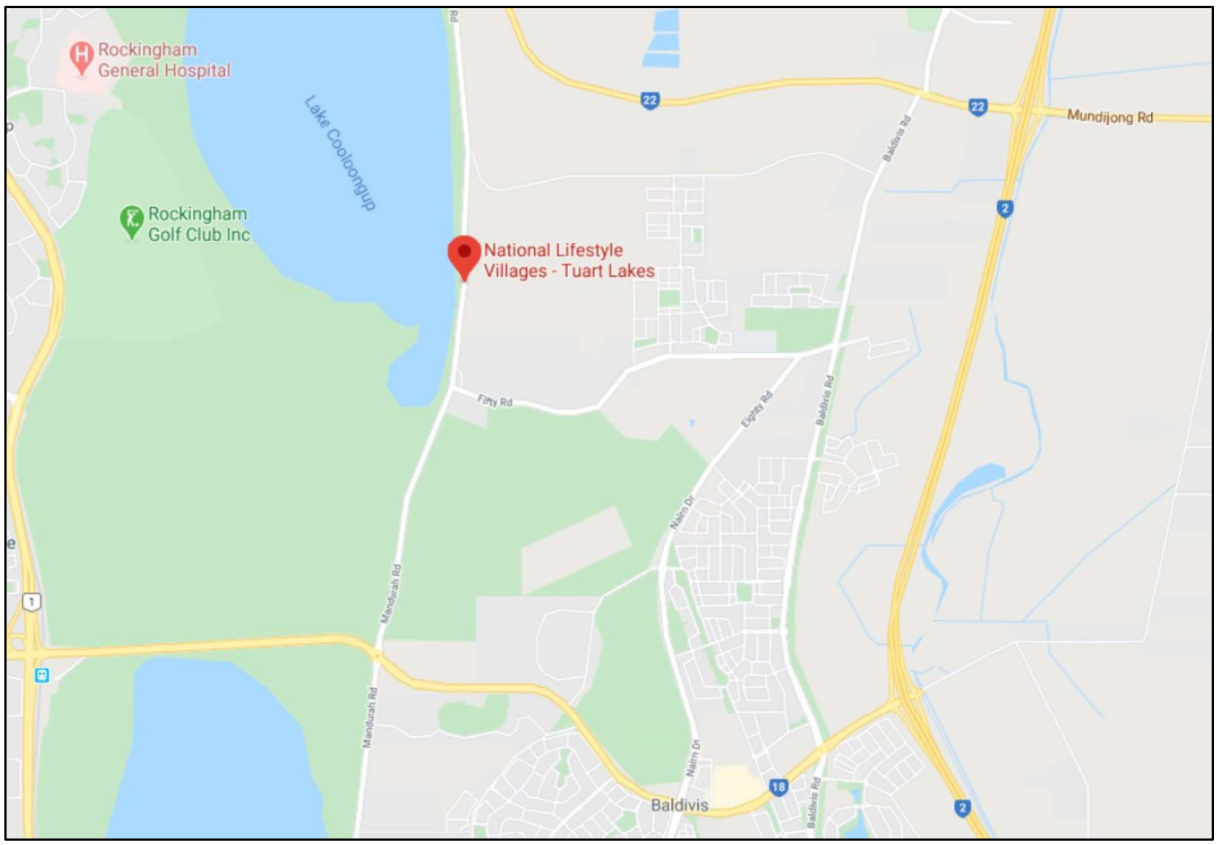


Figure 1 Location of Tuart Lakes Lifestyle Village

PO Box Z5578
Perth WA 6831

2.2. Development approval for the lifestyle village was granted in 2006 and since that time construction has occurred. Reference to current aerial images indicates the site is about 60%-70% completed.

2.3. It is now proposed to amend the plan to convert 23 R20 residential lots located to the east of the subject land to lifestyle homes. Appendix A shows the master plan for the subject land.

3. TRAFFIC GENERATION

3.1. The approved development of 23 residential lots (R20) would be expected to generate 8 to 10 vehicle movements per lot per day. It is commonly accepted that 10% of the daily demand can be expected during the peak hours.

3.2. The current structure planning would forecast between 184 and 230 vehicle movements per day with 18 to 23 peak hour movements.

3.3. Reference to the RTA Guide to Traffic Generating Developments identifies that housing for the aged and disabled can be expected to generate 1 to 2 trips per dwelling per day. However, the trip rate is perhaps not reflective of a lifestyle village.

3.4. A survey of the NLV Joondalup lifestyle village undertaken in 2006 derived an average trip rate of 3.18 trips per dwelling per day during the week and 3.11 trips per dwelling on the weekend. During the morning peak 7.09% of the daily flow was recorded. During the evening peak 6.47% of the daily flow was recorded/

3.5. The masterplan identifies that the land area occupied by the 23 residential lots would yield 46 lifestyle units. Based on the Joondalup trip rate, the lifestyle lots can be expected to generate 146 vehicle movements per day. During the peak periods the generation would be 10 trips and 9 trips respectively.

3.6. Table 1 shows the expected change to the traffic generation of the subject land.

Table 1 Traffic Generation

	Daily	AM	PM
Current planning - 23 lots	184	18	18
Proposed - 46 lifestyle dwellings	146	10	9
Traffic Increase	**-38**	**-8**	**-9**

*Peak figures ignore pass-by trips

3.7. It was intended to undertake a traffic count of the existing lifestyle village to determine the current trip rates associated with the subject land. However as a result of the Covid 19 virus, a traffic count would not be representative of normal operating conditions.

4. TRAFFIC IMPACT

4.1. The *WAPC Transport Assessment Guidelines for Developments* identifies the thresholds at which certain levels of traffic assessment are required. Figure 2 of the TIA Guidelines Volume1 – Introduction and General Guidance states that where a development generates less than 10 vehicle movements in any peak hour, no transport information is normally required (refer Appendix B).

4.2. It can be seen from Table 1 that the proposed change to the structure plan will result in a nett decrease in traffic demand to the surrounding road network.

4.3. The development proposal will not alter the current road network. Therefore there can be no requirement to undertake a transport assessment and the proposal will have no material traffic impact to the current planning of the local road network.

4.4. It is noted that a connection to a possible new road to the east of the subject land has been stated as required to be shown on the revised structure plan. However, the new road is reliant upon the future development of North Baldivis by third parties. The impacts of the road connection would need to be addressed in the North Baldivis structure plan (assuming that the lifestyle village chooses to access the new road.

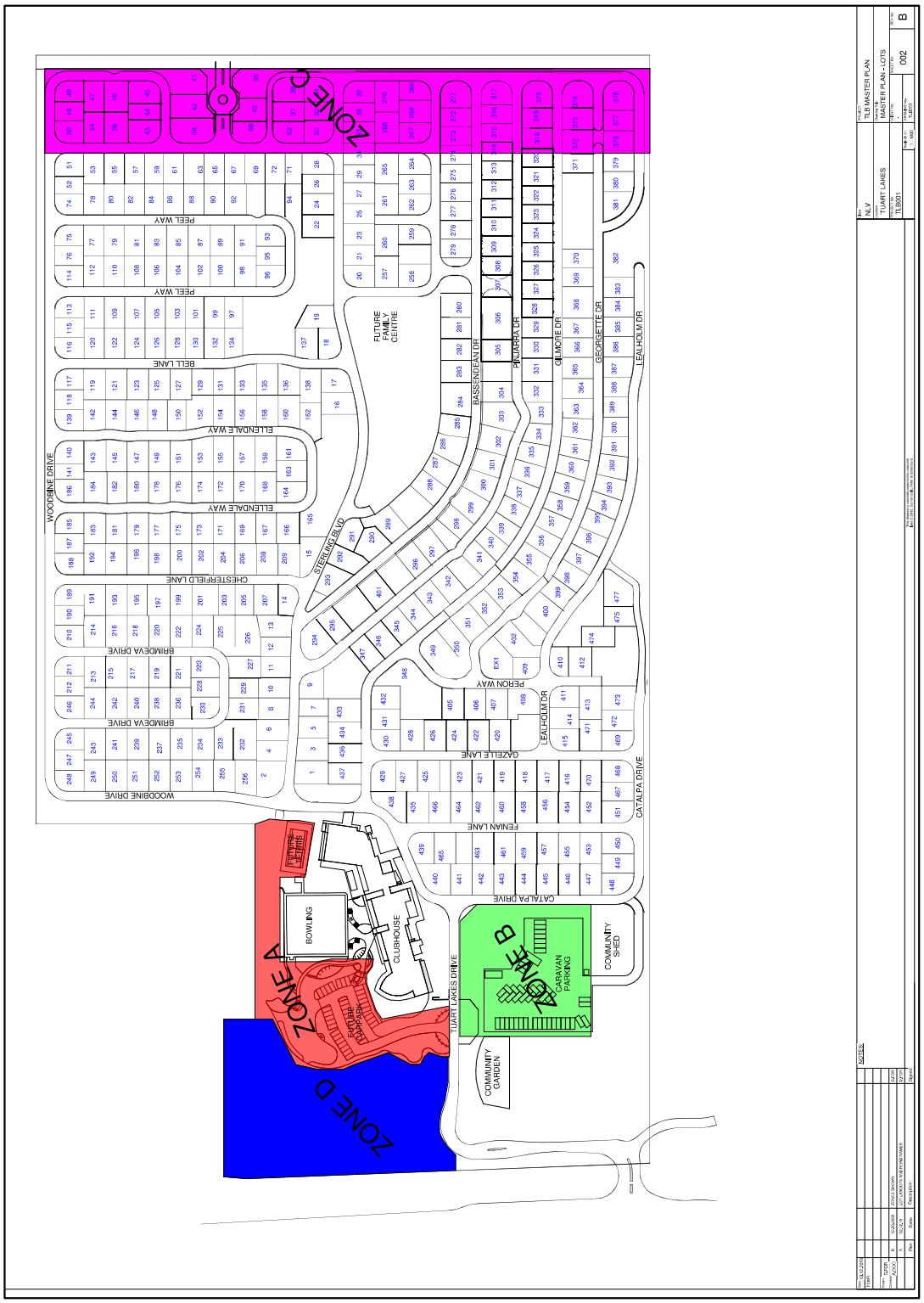
5. CONCLUSIONS

5.1. The subject site has extant approval as a lifestyle village and the proposed change in land use from 23 rural residential lots to 46 lifestyle units is shown to result in a nett reduction to forecast traffic demands.

5.2. The findings of the traffic report submitted at the time of the development approval will therefore not change.

5.3. As the proposal has reduced the forecast level of traffic and no changes to the exiting road network are proposed it is concluded that under the WAPC Transport Assessment Guidelines, no traffic assessment is required.

APPENDIX A STRUCTURE PLAN



APPENDIX B WAPC TRANSPORT ASSESSMENT GUIDELINES

Figure 2: Level of assessment required