Local Structure Plan

No. 116 (Lot 100) Barfield Road,
Hammond Park

URPS

Prepared by

URPS
Level 17, 1 Spring Street
Perth, WA 6000

Prepared for

SPG Capital Fund 21 Pty Ltd
308 Fitzgerald Street
North Perth WA 6006

Endorsement Page

This structure plan is prepared under the provisions of the
City of Cockburn Town Planning Scheme No. 3.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

15 APRIL 2026

Signed for and on behalf of the Western Australian Planning Commission

An officer of the Commission duly authorised by the Commission pursuant to section 24 of the *Planning and Development Act 2005* for that purpose, in the presence of:

Witness

Date	Date of Expiry
21 APRIL 2026	21 APRIL 2036

Table of Amendments to Structure Plan

Amendment Number	Description of Amendment	Date endorsed by WAPC

Executive Summary

This Local Structure Plan (LSP) relates to No. 116 (Lot 100) Barfield Street, Hammond Park. The LSP area comprises 2.0235 hectares of urban zoned land which is zoned 'Development' under the City of Cockburn Town Planning Scheme No. 3. The area is covered by the Southern Suburbs District Structure Plan. The Western Australian Planning Commission (WAPC) has approved structure plans for residential development across the majority of the urban zoned land in the Hammond Park locality.

This LSP seeks to facilitate the subdivision and development of the land for residential land use in a manner that interacts appropriately with both the developing urban environment in this locality and the characteristics of the site.

Specifically, the LSP will provide for:

› Residential lots with an applicable density of R25 and R30; and

› An area of Public Open Space

The preparation of this LSP has been undertaken in liaison with the City of Cockburn and government authorities.

Item	Data	Section within LSP part two
Total area covered by the Structure Plan:	20,235 sqm	2.2
Area of each land use proposed: › Residential › POS › Road Reserve	 15,157sqm 2,328sqm 3,138sqm	5.1
Total Estimated Lot Yield:	44	5.2
Estimated Number of Dwellings:	44	5.2
Estimated Residential Per Hectare	19.97 dwellings	5.2
Estimated Residential Site Density:	29.03 dwellings	5.2
Estimated Population:	112 residents	5.2
Number of High Schools:	None	5.1
Number of Primary Schools:	None	5.1
Area of Public Open Space: › Unrestricted POS › Restricted POS	2,328sqm 1,573sqm 393sqm	5.3

Contents

Part Two: Explanatory Section

Part One
Implementation

1. Structure Plan Area and Operation

This Structure Plan (Structure Plan) applies to the entirety of Lot 100 (No.116) Barfield Road, Hammond Park, being the land contained within the inner edge of the line denoting the Structure Pan Boundary on the Structure Plan Map (Refer to Plan 1 of this Structure Plan Report).

The plan is in effect from the date stated on the cover and for a period of 10 years.

2. Structure Plan Content

This Structure Plan comprises:

Part One – Implementation Section

This section contains the structure plan map and outlines the intent of the structure plan.

Part Two – Explanatory Section

This section contains the background and explanation of the structure plan, including design methodology, relevance and compliance with the planning framework at the State and Local levels.

3. Staging of Implementation

Given the size of the site, development within the Structure Plan area is intended to occur as a single stage.

4. Subdivision and Development Requirements

4.1 *Land Use*

Land use permissibility within the structure plan area shall accord with the corresponding zone in the City of Cockburn Town Planning Scheme No. 3.

4.2 *Density*

The residential density codes applicable to the Structure Plan shall be in accordance with those shown on the Structure Plan Map (Plan 1).

In accordance with the structure plan map, the applicable densities are R25 and R30, with a potential yield of 44 lots and 44 dwellings.

4.3 *Public Open Space*

The Structure Plan provides a total of 2,328sqm of public open space (POS), the creditable area of which equates to 10% of the gross subdivisible area.

4.4 *Notifcations on Title*

A requirement for Notifications to be imposed at the subdivision stage on all lots addressing the future disconnection of Barfield Road and mosquito-borne disease risk in the area, as follows:

a. For all lots: "*The road network connectivity in this area linking Barfield Road to Rowley Road will be permanently closed in the future.*"

b. For all lots: "*This lot is in close proximity to known mosquito breeding areas.*"

5. Local Development Plans

It is expected that the WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to the creation or development of the following lots:

Lots with direct boundary frontage to an area of public open space.

The local development plan(s) should address:

a. primary dwelling orientation towards the adjoining street;

b. rear and side dwelling setbacks to the POS;

c. location of the outdoor living area within the POS setback, plus a minimum of one major opening from a habitable room facing the POS;

d. permeable fencing treatments to the POS frontage, including the provision of direct pedestrian access (including gates and stairs, where required); and

e. location of crossovers and garages.

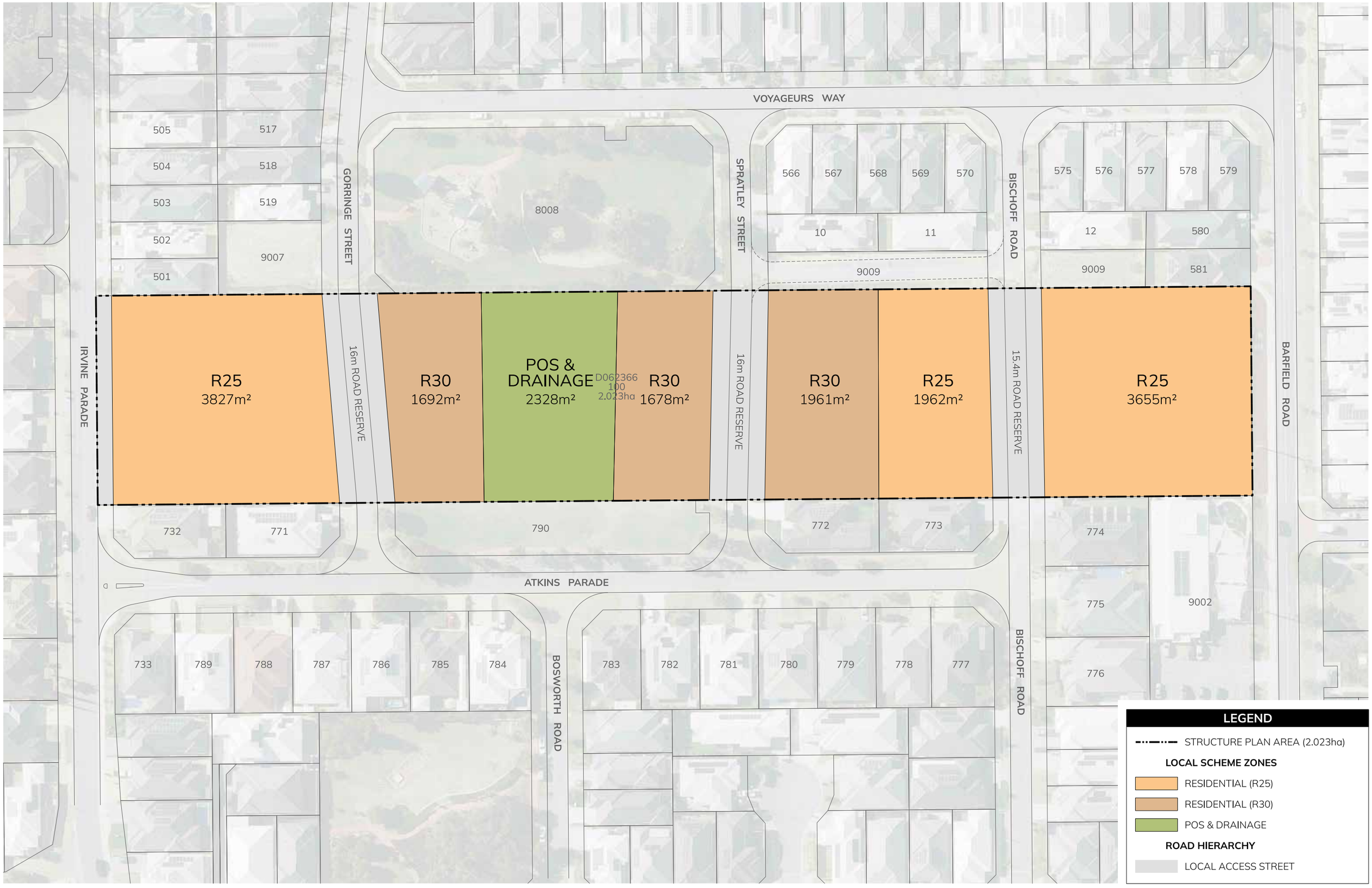
6. Other Requirements

6.1 *Development Contribution Arrangements*

The structure plan area is subject to two Development Contribution Areas under Town Planning Scheme No.3:

Development Contribution Area 9' (DCA9)- relating to the widening and upgrading of Hammond Road between Gaebler and Rowley Roads, as well as ongoing cost of regional drainage infrastructure; and

Development Contribution Area 13 (DCA13) – relating to the provision of local, district and regional community infrastructure. DCA 13 applies to residential subdivision and development throughout the City of Cockburn.



URPS

Plan 1: Proposed Structure Plan

LOT 100 (No. 116) BARFIELD STREET
HAMMOND PARK

NORTH

0 10 20 30m

STRUCTURE PLAN - PLAN 1
24/07/2025
1:1000 @ A3

DWG. REF. - 2-001
REVISION - A
URPS REF. - 25PER-028

Proposed Forty (40) Lot Green Title Subdivision & One (1) POS Lot (Version 3)

SUBJECT TO WAPC APPROVAL

SITE CLEARANCE
ALL EXISTING STRUCTURES TO BE DEMOLISHED

SERVICE LEGEND

DRAINAGE
- COMBO PIT
- GRATE
- SIDE ENTRY PIT
- STORM WATER MANHOLE

ELECTRICITY
- CABLE MANHOLE
- CABLE PIT / BOX — ECP / ECB
- CABLE DOME
- CONSUMER POLE — CP
- LIGHT POLE — LP
- POWER POLE — PP
- STAY POLE — SP
- STAY WIRE ANCHOR — SWA
- O/H POWER LINE

GAS
- GAS MANHOLE
- GAS MARKER — G
- GAS METER — GM
- GAS VALVE — GV

SEWERAGE
- SEWER MANHOLE
- PROPERTY CONNECTION — PC
- SEWER LINE

TELECOMMUNICATION
- TEL / COMMS MANHOLE
- TEL / COMMS MARKER — T / C
- TEL / COMMS PIT — PIT / COM

WATER
- FLUSH POINT — FP
- HYDRANT — HY
- STOP VALVE — SV
- TAP — TAP
- WATER MARKER — W
- WATER METER — M
- WATER LINE

SURVEY
- DATUM
- PEG FOUND — PF

OTHER
- AWNING / EAVES
- ROOF RIDGE
- FLOOR RL
- WINDOW — 1ST
- BANK - BOTTOM
- BANK - TOP

LEGEND

PROPOSE R-CODE

Residential R25

R25 LOT SUMMARY

40	Number of Lots
14,768m²	Total Area
369.2m²	Average Lot Size
318m²	Minimum Lot Size

OTHER LOTS

272.5m²	Road Widening
2,328m²	POS

City of Cockburn Scheme No.3
- Development Zone
- No R-code
- Development Contribution Area DCA 13 & DCA 9
- Development Area DA 9

PERTH GROUNDWATER MAP
Surface Geology Type: Swan Coastal Plain From Busselton To Jurien. Sand Dunes and Sandplains With Pale Deep Sand, Semi-Wet and Wet Soil. Banksia-Paperbark Woodlands and Mixed Heaths.

Maxiumum Groundwater Contour: 22.5 (mAHD)

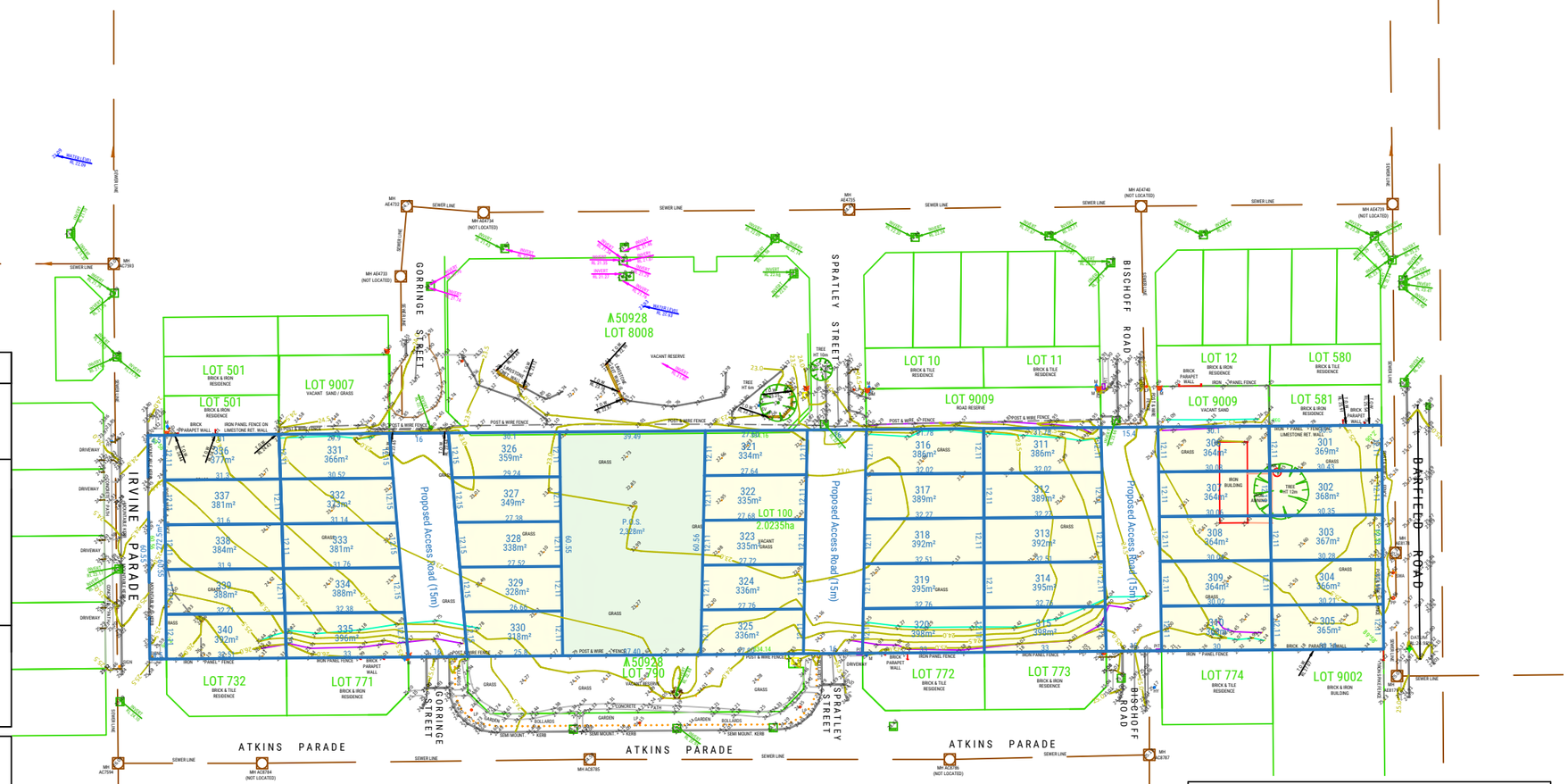


Figure 1: Subdivision Plan

NOTE: INVERT LEVELS SHOWN IN PINK ARE FROM CITY OF COCKBURN'S DRAINAGE INFRASTRUCTURE DATABASE. INVERT LEVELS WERE NOT ACCESSIBLE AT TIME OF SURVEY

NOTE: CADASTRAL CONNECTION HAS BEEN MADE. BOUNDARY LINES SHOWN ARE TRUE POSITIONS. DIMENSIONS & ANGLES SHOWN DERIVED FROM DIAGRAM 62366

NOTE:
THIS PLAN HAS BEEN PREPARED WITH 3D VALUES & PCG94 COORDINATES.

NOTE:
AHD LEVEL DERIVED FROM STANDARD SURVEY MARK THOMPSON 72 - RL = 24.826

116 Barfield Road, HAMMOND PARK 6164

Lot 100 on DIA 62366
CT - 1617 / 396
Lot Area: 20,235m²

Client: SPG CAPITAL FUND 21 PTY LTD (ACN 677 425 982)

City of Cockburn
Bushfire Prone Area: classified BAL—LOW
UXO: No inHerit: No
Contaminated Site Database: No
Acid Sulphate Soils: Moderate to low risk
Survey: Simple Land Solutions
Date: 24/07/2025

Scale: 1:1500 at A3
Datum: AHD (Approx.)
Plan: D.G

STRATEGIC SURVEYING
308 Fitzgerald St
PERTH WA 6000
Direct Phone +61 08 6507 8418
enquiries@strategicsurveying.com.au
www.strategicsurveying.com.au

Please note:
- This plan is intended for the Department of Planning, Lands & Heritage only.
- Strategic Surveying takes no responsibility for changes after the date on the original field survey. This survey shows site features that were visible & accessible at the time of the survey.
- Location of utilities may vary from schematic presentation / check with the appropriate authority before adoption of position.
- This survey does not guarantee the location of boundaries or fences.
- Check the Certificate of Title for easements / Covenants etc.
- If applicable, any proposed lots and dimensions may be subject to change; including but not limited to encumbers & easements.

Part Two

Explanatory Section

1. Introduction and Purpose

This Local Structure Plan (LSP) and report has been prepared on behalf of SPG Capital Fund 21 Pty Ltd, support of a Structure Plan for No. 116 (Lot 100) Barfield Road, Hammond Park. The structure plan will provide for residential development and an associated portion of public open space.

The purpose of the Structure Plan is as follows:

- To provide guidance on the use, subdivision and development of land to create a high quality urban environment.
- To achieve an optimum housing density and diversity with an emphasis on achieving consistency with the existing and future housing demand for the locality.
- Maximise the quality of living of future residents.

The Structure Plan provides densities that are consistent with the Southern Suburbs District Structure Plan and results in 19.77 dwellings per hectare and 26.39 dwellings per site hectare which exceeds the density targets noted in Perth and Peel @ 3.5 Million (15 dwellings per hectare) and Liveable Neighbourhoods (22 dwellings per site hectare).

2. Land Description

2.1 Location

The Structure Plan is located within the suburb of Hammond Park, within the municipality of the City of Cockburn. The structure plan area is located approximately 37 kilometres south of the Perth Central Business District and 7.6 kilometres east of the Indian Ocean. The nearest secondary activity centre is Cockburn Central, which is located 4.8km to the north of the site. This centre provides a range of services including retail, administrative, service, community and entertainment uses.

The closest train station to the Structure Plan area is Auburn Grove station which is 1.5km away. Servicing this train station is the 535/536 bus which is the closest bus route to the Structure Plan area.

Schools in the area include Hammond Park Catholic Primary School (240m), Hammond Park Secondary College (370m), Hammond Park Primary School (550m), Aubin Grove Primary School (916m).

Local Context Plan

Figure 2: Regional Context Plan

Regional Context Plan

Figure 3: Local Context Plan

2.2 *Area and Land Use*

The structure plan area encompasses a total land area of 2.0235ha and comprises of the entirety of Lot 100 (No. 116) Barfield Road, Hammond Park. The structure plan area directly abuts Barfield Road on its eastern boundary and Irvine Parade on its western boundary.

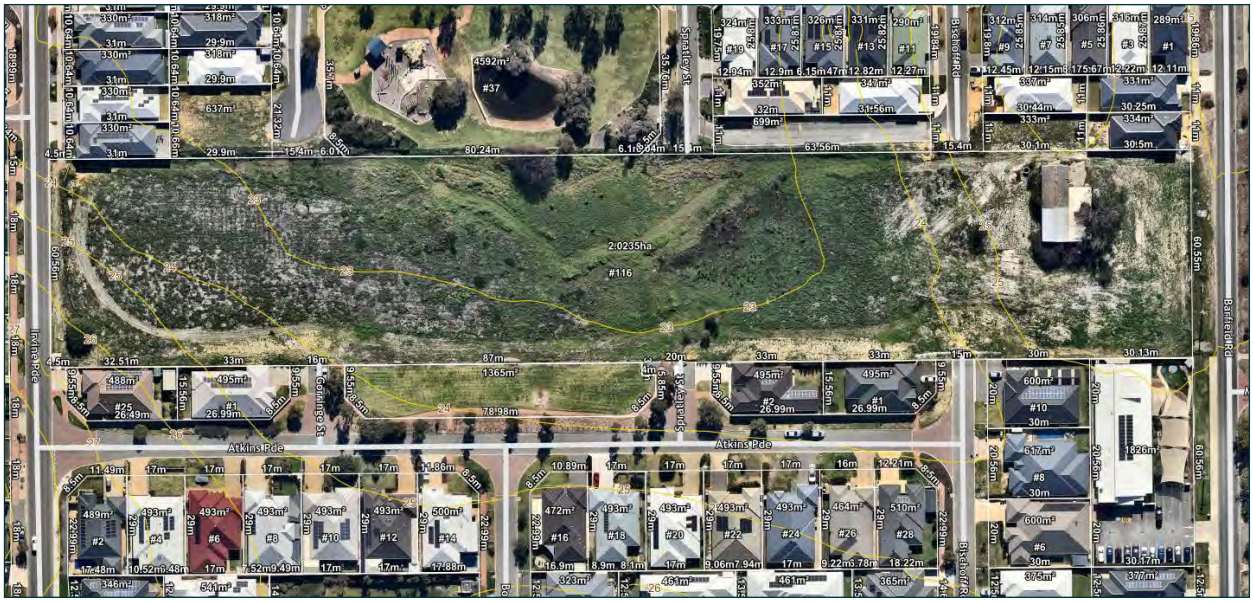


Figure 4: Site Aerial

2.3 *Legal Description and Land Ownership*

The structure plan area has a total land area of 2.0235ha. The Certificate of Title and property details are listed in Table 3 below.

Site Details	Land Area	Land Ownership
No. 116 Barfield Road, Hammond Park **Lot 100, D/P: 62366**	20,235sqm	SPG Capital Fund 21 Pty Ltd

A copy of the Certificate of Title is included in Appendix 1.

3. Planning Framework

3.1 Zonings And Reservations

3.1.1 Metropolitan Region Scheme

The entirety of the structure plan area is zoned 'Urban' under the provisions of the Metropolitan Region Scheme (MRS).

3.1.2 City of Cockburn Town Planning Scheme No. 3

The structure plan area is zoned 'Development' under the provisions of the City of Cockburn's Town Planning Scheme No. 3.

In accordance with Clause 3.2.1, the relevant objective for the development zone is:

> *"To provide for future residential, industrial or commercial development to be guided by a comprehensive Structure Plan prepared under the Scheme."*

The subject site is also located in Development Area 26, where it is a requirement that a Structure Plan be approved prior to the determination of any applications for subdivision and development.

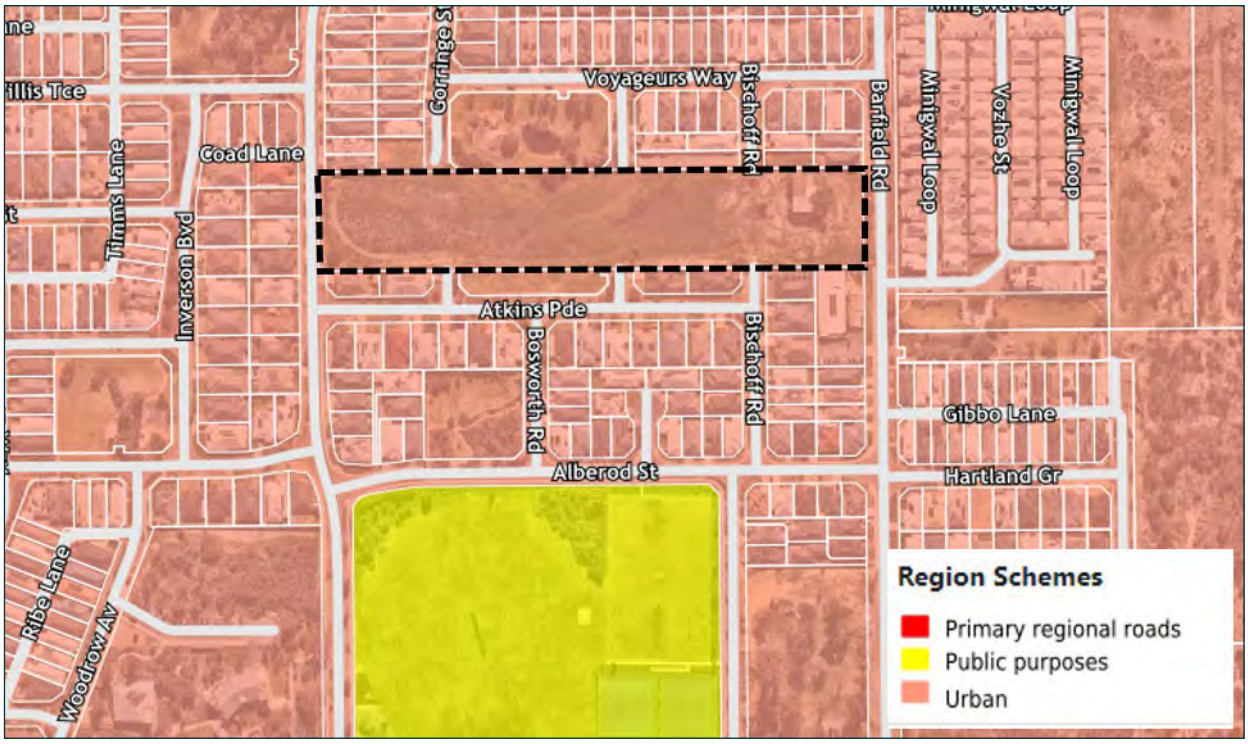


Figure 5: Metropolitan Region Scheme Zoning and Reservations

3.2 *Planning Strategies*

3.2.1 *State Planning Strategy 2050*

The State Planning Strategy 2050 was prepared by the WAPC and provides a strategic planning response to the challenges that Western Australia is likely to face. It contemplates a future in which high standards of living, improved public health and an excellent quality of life are enjoyed by present and future generations of Western Australians.

The Strategy proposes that diversity, liveability, connectedness and collaboration must be central to the vision of sustained growth and prosperity. It envisages that by 2050, Western Australia will double its current population and will have a diverse range of well-connected and vibrant communities of the highest quality in the world.

The structure plan will allow for the future development of under-utilised land for residential purposes which is largely consistent with the existing housing typology within the surrounding locality.

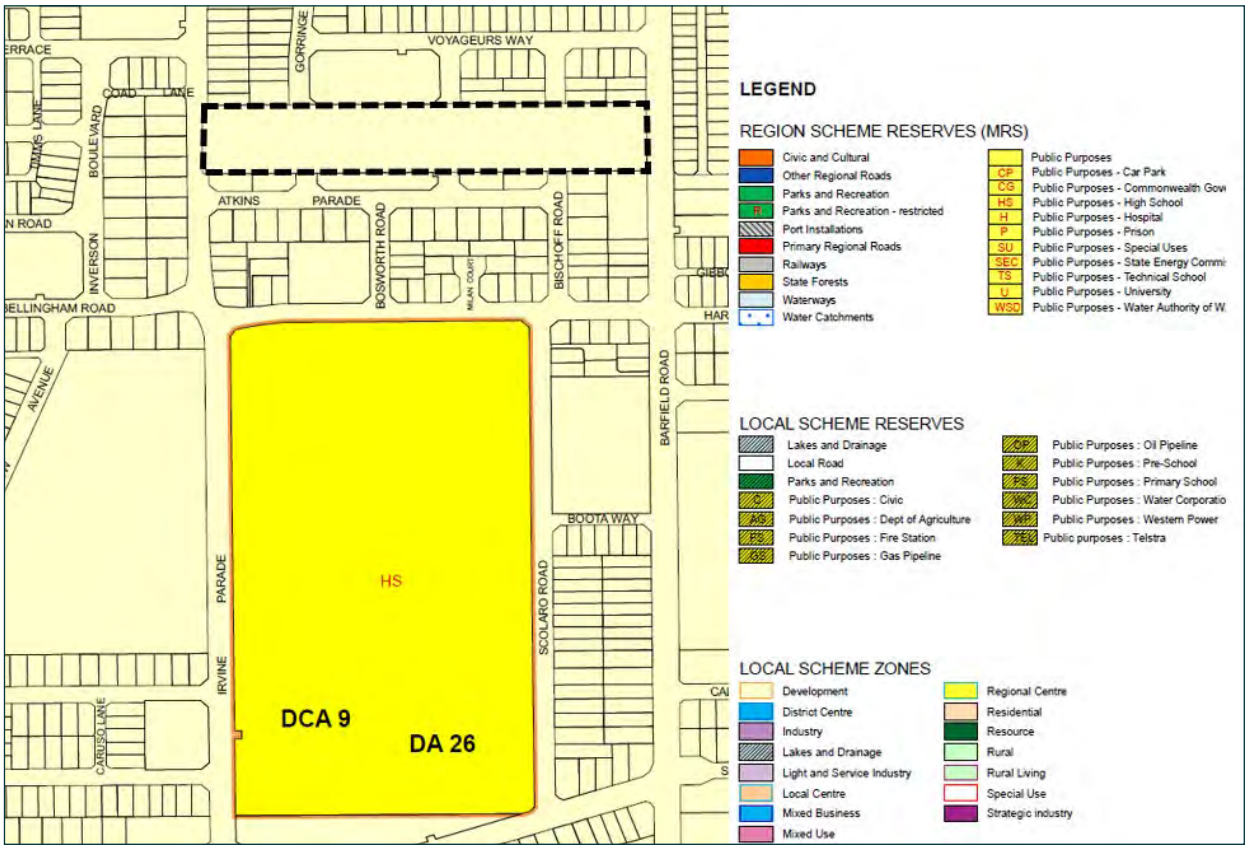


Figure 6: City of Cockburn Town Planning Scheme No. 3 Zoning Map

3.2.2 *Perth and Peel @ 3.5 Million – South Metropolitan Sub-Regional Planning Framework*

Perth and Peel @ 3.5 Million provides the overarching strategic framework for the Perth and Peel Regions. The structure plan area is located within the South Metropolitan Peel sub-regional planning framework which is intended to provide strategic guidance to government agencies and local governments on all aspects of land use and infrastructure provision within the region. The framework clearly identifies a focus on urban infill within areas with proximity to high-quality public transport routes or within activity centres and urban corridors. Specifically an infill development target of 47% by 2050 is identified relative to 2014 rates which reached only 28%.

In accordance with the South Metropolitan Peel sub-regional planning framework, the structure plan area is identified as undeveloped urban land that is earmarked for development in the short term (2015-2021). It is considered that the structure plan will facilitate residential subdivision and development on the subject land which is entirely consistent with what has been proposed in the South Metropolitan Peel sub-regional planning framework.

3.2.3 *Southern Suburbs District Structure Plan*

The structure plan area is subject to the provisions of the Southern Suburbs District Structure Plan – Stage 3 (SSDSP) which was prepared by the City of Cockburn and adopted in September of 2012. The SSDSP provides a framework for urban development to integrate seamlessly with the broader sub-regional context. Under the provisions of the SSDSP the structure plan area is intended for medium density residential development.

The structure plan proposes residential densities of R25 and R30 which are consistent with the overall intentions for density within the of SSDSP.

3.2.4 *City of Cockburn Local Planning Strategy*

The City's Local Planning Strategy (LPS) was endorsed on 28 October 2024 and aims to set the direction for an updated and improved local planning framework.

The Strategy does not identify Hammond Park as an area that is likely for additional dwelling capacity given it is an area that it is a newly structure planned area. By achieving the dwelling targets and densities set out in the broader district structure plan, the proposed local structure plan achieves the aims of the strategy to ensure infill and dwelling targets are achieved in the City of Cockburn.

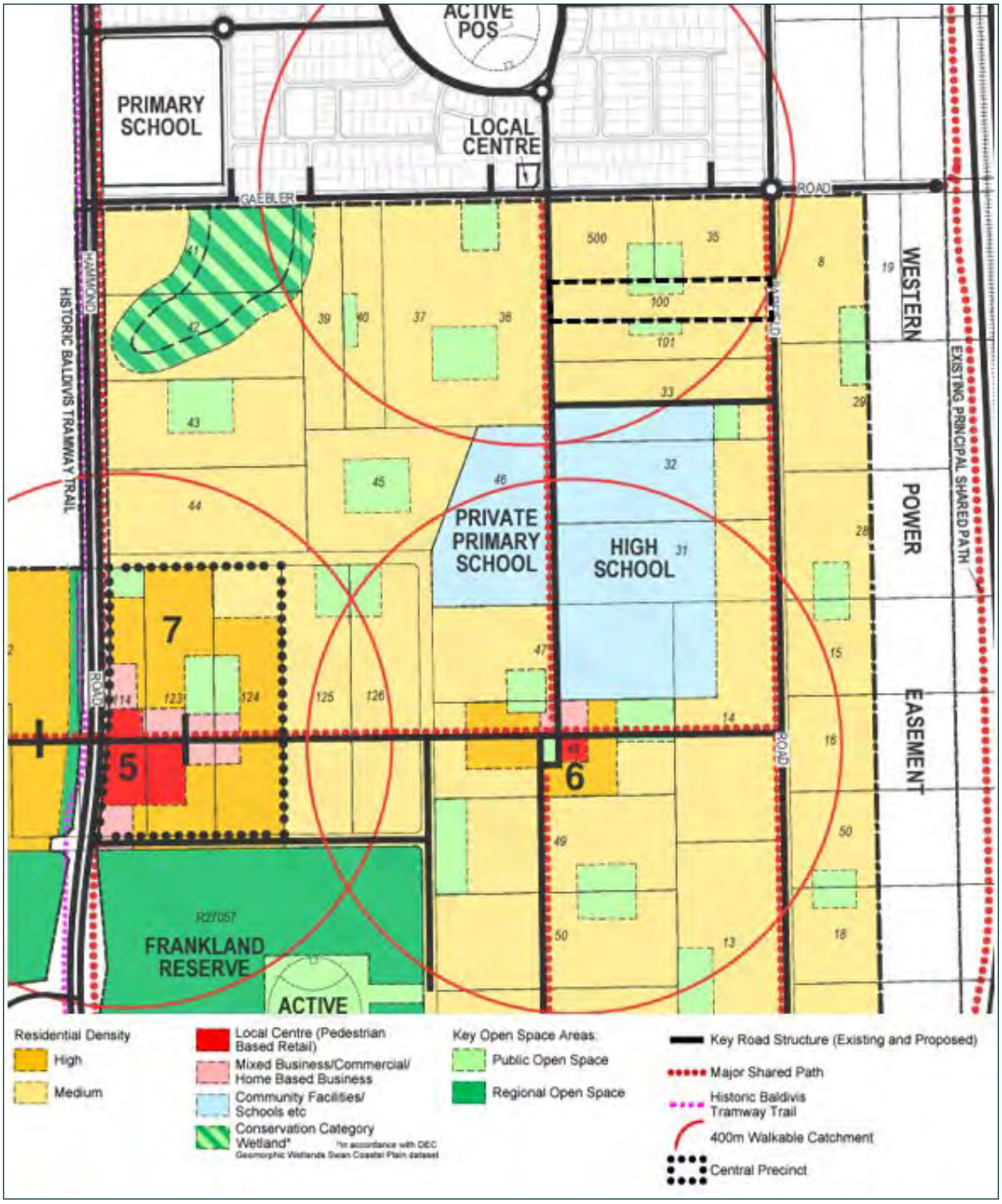


Figure 7: Extract of Southern Suburbs District Structure Plan - Stage 3

3.3 *Planning Policies*

3.3.1 Liveable Neighbourhoods

Liveable Neighbourhoods is the primary policy used for the design and assessment of structure plans (regional, district and local) and subdivision and development applications for new urban areas. Its primary objective is to promote the design of walkable neighbourhoods, places that support community and a sense of place, mixed use and active streets, accessible and sustainable parking, energy efficient design, and housing choice.

The primary objectives are addressed in eight design elements, which if implemented appropriately are considered to fulfil the overall objectives of Liveable Neighbourhoods. These eight design elements are to be considered at the various levels of planning (structure planning and subdivision) to ensure that development will occur in a thoughtful and sustainable manner.

Liveable Neighbourhoods was at the forefront when establishing the structure plan layout and it is considered that the resultant road network, public open space and proposed density will provide diversity in housing choice and residential development that is integrated seamlessly with the surrounding neighbourhood. A comprehensive justification of how the structure plan meets the requirements of Liveable Neighbourhoods is provided in Section 3.2 to 3.4 of this report.

3.3.2 SPP3.0 – Urban Growth and Settlement

State Planning Policy No. 3 – Urban Growth and Settlement (SPP3) applies to all of Western Australia and seeks to promote sustainable and well planned settlement patterns. Various principles included in the broader Perth and Peel @ 3.5 Million provides the overarching strategic framework for the Perth and Peel Regions. The structure plan area is located within the South Metropolitan Peel sub-regional planning framework which is intended to provide strategic guidance to government agencies and local governments on all aspects of land use and infrastructure provision within the region. The framework clearly identifies a focus on urban infill within areas with proximity to high-quality public transport routes or within activity centres and urban corridors. Specifically, an infill development target of 47% by 2050 is identified relative to 2014 rates which reached only 28%.

In accordance with the South Metropolitan Peel sub-regional planning framework, the structure plan area is identified as undeveloped urban land that is earmarked for development in the short term (2015-2021). It is considered that the structure plan will facilitate residential subdivision and development on the subject land which is entirely consistent with what has been proposed in the South Metropolitan Peel sub-regional planning framework.

3.3.3 SPP3.7 – Planning in Bushfire Prone Areas

Planning in Bushfire Prone Areas (SPP 3.7) applies to land designated as bushfire prone by the Fire and Emergency Services Commissioner under the Fire and Emergency Services Act 1998. These areas are identified on the Department of Fire and Emergency Services (DFES) Map of Bushfire Prone Areas and reflect locations where bushfire risk may be present due to vegetation and landscape characteristics.

As illustrated in Figure 12, a small portion of the subject site is mapped as bushfire prone. In response to this designation, a Bushfire Attack Level (BAL) Assessment was undertaken by a Bushfire Smart. The assessment was based on site-specific vegetation analysis, slope conditions, and separation distances, and concluded that the site is subject to a BAL–LOW rating.

The BAL–LOW classification indicates that the bushfire risk is negligible and does not warrant specific construction requirements under AS 3959–2018. This outcome is supported by the following key findings:

- Vegetation within 100 metres of the site is either non-vegetated, low-threat, or comprises isolated patches under 0.25 hectares, qualifying for exclusion under AS 3959 Clause 2.2.3.2.
- The site is located within a fully urbanised context, surrounded by residential development and serviced by reticulated water and compliant emergency access routes.
- The proposed development does not introduce vulnerable or high-risk land uses and maintains adequate separation from any vegetation that could pose a bushfire hazard.

Given the low-risk classification and the absence of any triggers under SPP 3.7 or the Guidelines for Planning in Bushfire Prone Areas, the preparation of a Bushfire Management Plan (BMP) is not required to support the structure plan. Bushfire risk can be appropriately managed through standard building controls at the development application stage, where applicable.

4. Site Context And Analysis

4.1 Landform And Soils

The site slopes very gently downwards towards the centre of the structure plan area, with the highest points being approximately 26.2 AHD in the south-western corner of the structure plan area, towards Irvine Road and approximately 26.0 AHD towards Barfield Road. The lowest point of the structure plan area is approximately 22.6 AHD, located towards the northern boundary in the centre of the structure plan area.

The soil type across the structure plan area is mix of the Spearwood Soil System and the Bassendean Soil System and there is a Low-Moderate risk of there being Acid Sulfate present in the soil.

The structure plan area is not identified as a contaminated site on the DWER Contaminated Sites database.

Figure 8: Soil Systems and Site Contours

4.2 *Flora and Vegetation*

The structure plan area is completely cleared of native vegetation with the exception of one 12m high tree located towards Barfield Road.

It is intended that the existing tree will be retained during future subdivisional works and remain on the site prior to a future dwelling be constructed.

The City has recently advertised draft Local Planning Policy 5.26 – Tree Protection, which seeks to establish the requirement for trees 8m in height and above to obtain development approval for their removal and some maintenance works.

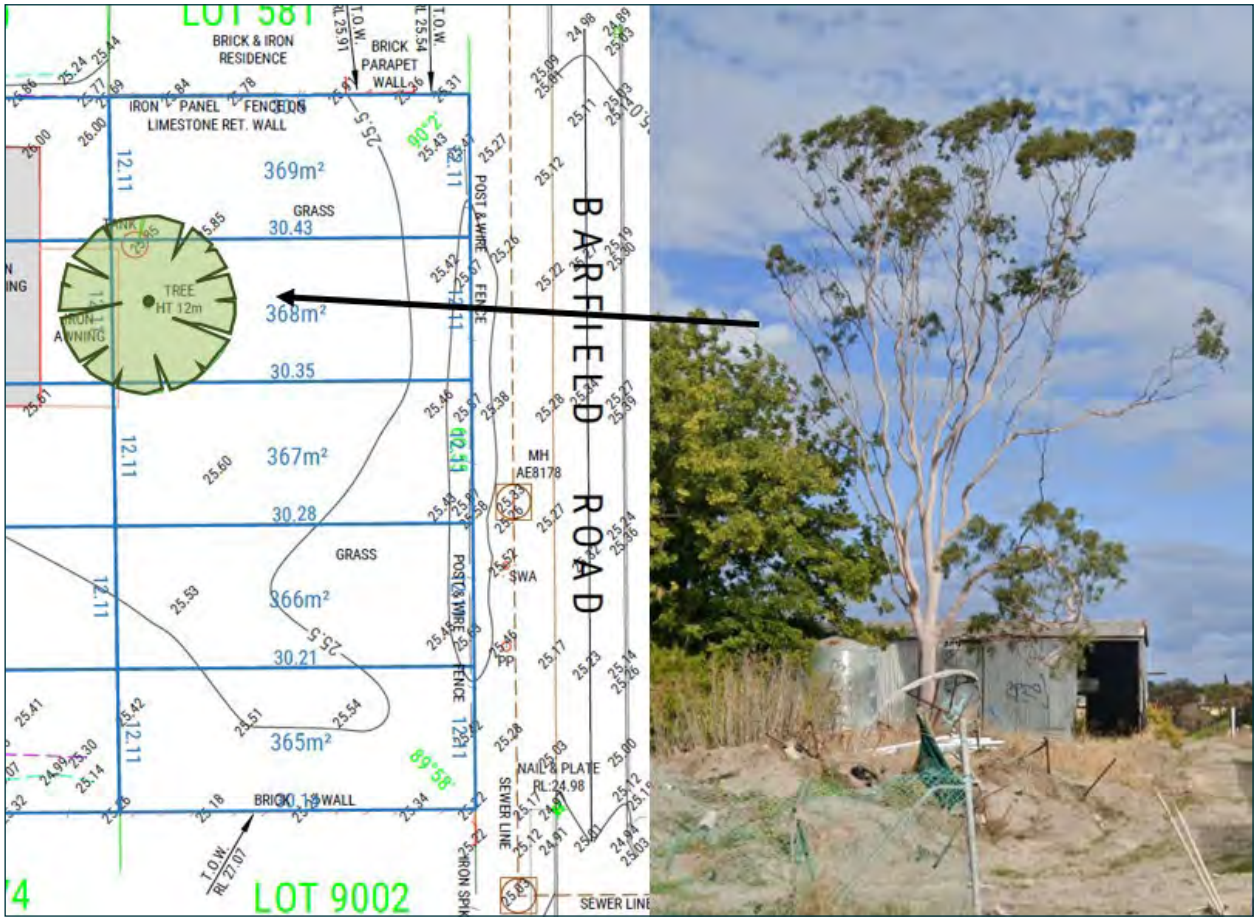


Figure 9: Existing tree to be retained

4.3 Ground and Surface Water

The Perth Groundwater Atlas provides basic details on groundwater levels and subsurface geology for consideration in desktop planning for drainage reviews. Local Geotechnics have provided a Geotechnical Report (Appendix 3) which confirms depth to groundwater within the structure plan area as well as discusses soil geology and absorption / infiltration rates for the existing soil geology.

Throughout the structure plan area, groundwater ranges between 0.9m below surface and >2.5m below surface.

The soil profile throughout the Study Area consists mostly of sand and has a high permeability.

Figure 10: Excerpt from the Perth Groundwater Atlas

4.4 *Bushfire Hazard*

In accordance with Figure 12, a portion of the subject site is identified as 'Bushfire Prone' under the Department of Fire and Emergency Services (DFES) Bushfire Prone Areas Map. In response to this designation, a Bushfire Attack Level (BAL) Assessment was undertaken by Bushfire Smart.

The assessment concluded that the site is subject to a BAL–LOW rating, reflecting minimal bushfire risk due to the predominance of non-vegetated and low-threat vegetation across the site and surrounding area. Given the limited extent of bushfire-prone land and the low-risk classification, the preparation of a Bushfire Management Plan is not required to support the proposed development.

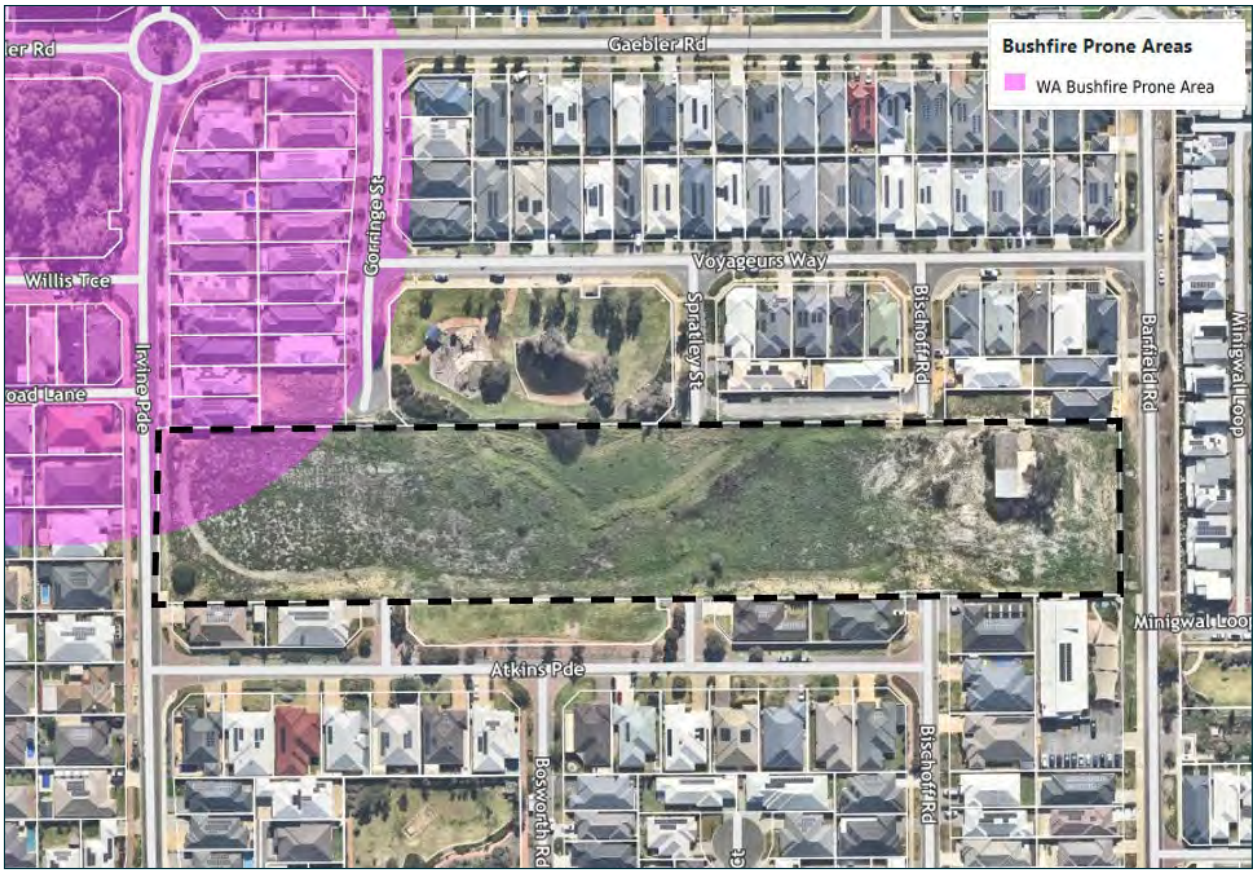


Figure 11: Map of Bushfire Prone Areas

4.5 Noise

As detailed in Figure 13, the structure plan area is not located within the 200m trigger distance to the Kwinana Freeway and Perth-Mandurah railway lines, as identified in State Planning Policy 5.4 – Road and Rail Noise (SPP 5.4).

Figure 12: Road and Rail Noise Buffer Areas as per SPP5.4

4.6 Aboriginal and European Heritage

The structure plan area does not contain any listed Aboriginal heritage sites (under the Aboriginal Heritage Act 1972) and other heritage sites (under the City's Local Heritage List and State Register of Heritage Places).

5. Structure Plan

In accordance with SSDSP the structure plan proposes medium density residential development (R25 and R30) with an associated portion of Public Open Space (POS). The structure plan also notes a safe and efficient road network that will connect seamlessly to the adjoining established road network.

5.1 *Land Use*

The structure plan proposes residential development on the subject site with the land use permissibility to be consistent with the 'Residential' zone under TPS3. The proposed residential density of R25 and R30 is considered to be 'medium density' in accordance with the SSDSP and is appropriate when considering access to POS, public transport and local schools.

The residential densities proposed in the structure plan (R25 and R30) is considered to be entirely consistent with the medium density residential development planned for the site through the SSDSP.

Further the proposed densities integrate with the adjoining densities to ensure a coordinated response to the existing context.

The R30 and R40 residential density will also assist in achieving the dwelling yield per hectare targets outlined in both Perth and Peel @ 3.5 Million and also Liveable Neighbourhoods. Table 5 below provides an assessment of the recommended and proposed dwelling yields.

Structure Plan Summary	
Total area covered by the structure plan	20,235 sqm
Area of specified land use	Residential: 15,157 sqm POS: 2,328sqm Road Reserve: 3,138 sqm
Estimated lot yield/dwellings	44 lots/dwellings
Estimated population	112 persons

Figure 13: Surrounding Residential Densities

5.2 *Public Open Space*

5.2.1 *Provision of POS*

The location and size of the proposed public open space (POS) is intended to service the residents of the Structure Plan Area and has been proposed in addition the POS required through the SSDSP. The function of the POS will be consistent with a Local Park classification in accordance with Liveable Neighbourhoods with the POS being within a 200m walkable catchment of all dwellings within the Structure Plan.

The Structure Plan provides a total of 2,328sqm of public open space, whereby a minimum 1,573sqm (8%) needs to be 'unrestricted' POS, and maximum 393sqm (2%) may be 'restricted' POS. The provision of 2,032sqm (equivalent 11%) of creditable POS ensures a minimum 10% provision is provided.

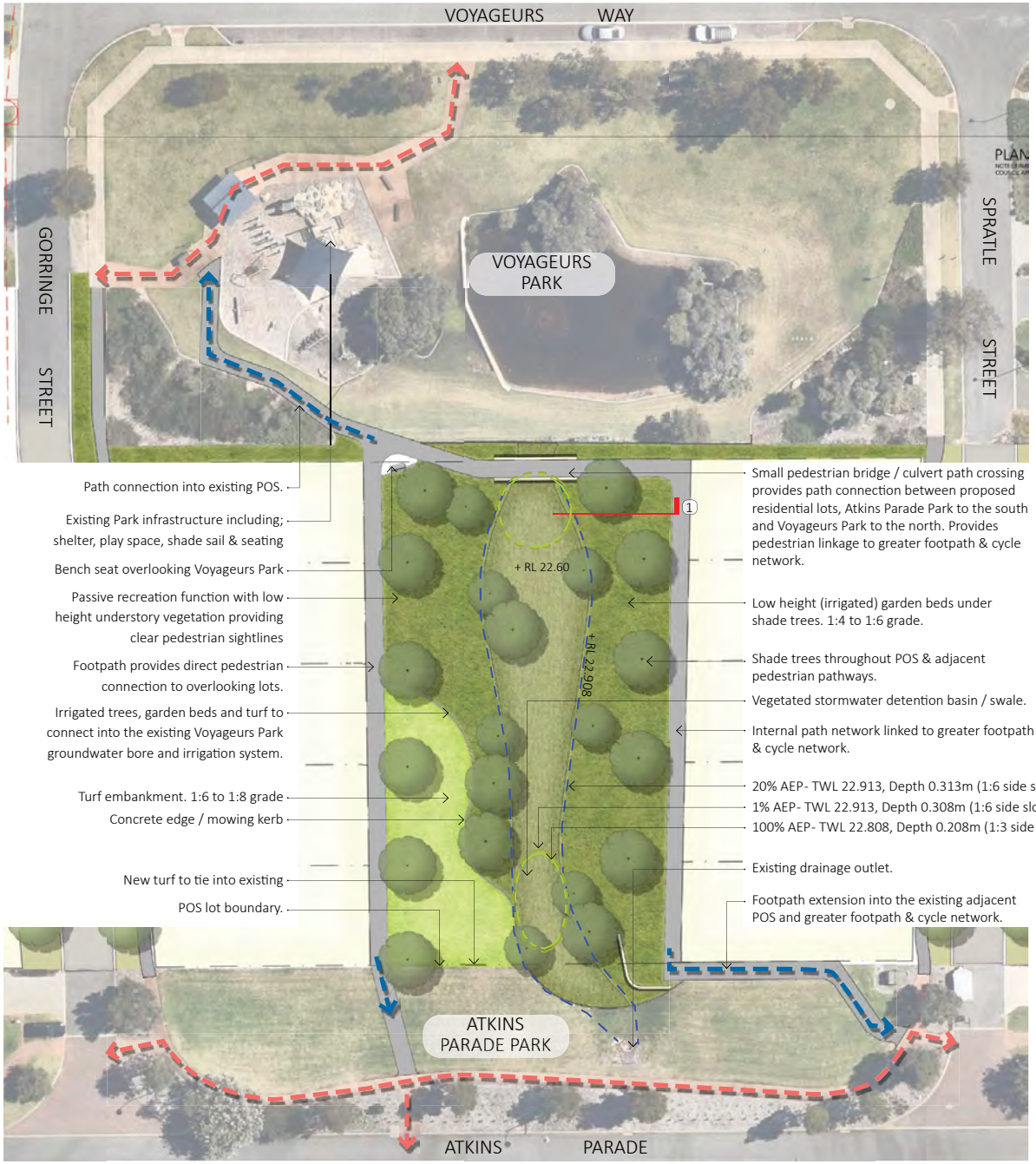
Table 1:

POS Schedule - LSP Barfield Road, Hammond Park		Ha	
(A) Gross Area		2.0235	
(B) Total Deductions		0.0423	
(Bi) Drainage >1:1yr ARI (Non Creditable)	0.015		
(Bii) Drainage >1:5yr ARI (Over 2% Restricted POS)	0		
(Biii) Road Widening (Irvine Parade)	0.0273		
(C) Gross Subdivisible Area (A - B)		1.9813	
(D) Total Creditable Public Open Space Required @ 10% (C*10%)		0.1981	
		80:20 Allowance	80:20 Provided
(D1) 8% 'Unrestricted' POS Minimum Required (D*80%):		0.1585	0.2028
(D2) 2% Maximum 'Restricted' POS Permitted (D*20%):		0.0396	0.0150
			0.2178
(E) Total Public Open Space Provided		0.2328	
(F) Total Creditable Public Open Space Provided (E-Bi-Bii)		0.2178	
POS Provision as a Percentage (F/C)		11.0%	
Equivalent POS Shorfall (-) or Surplus (F-D)		0.0197	

The proposed drainage swale within the public open space is a key element of the site's water management approach. It provides at-surface conveyance and detention of stormwater, supports infiltration where feasible and assists in meeting the water quality and flow management requirements of Liveable Neighbourhoods and State Planning Policy 2.9.

Integrating the swale into the public open space allows it to function effectively during rainfall events while maintaining the amenity and usability of the space under normal conditions. This ensures a practical and water sensitive outcome that complements the drainage provision of surrounding Public Open Space areas.

Lot 100 Barfield Road , Hammond Park
POS Landscape Concept Plan



EXISTING PEDESTRIAN CONNECTION

PROPOSED PEDESTRIAN CONNECTION POINTS

GARDENBED (IRRIGATED)

TURF (IRRIGATED)

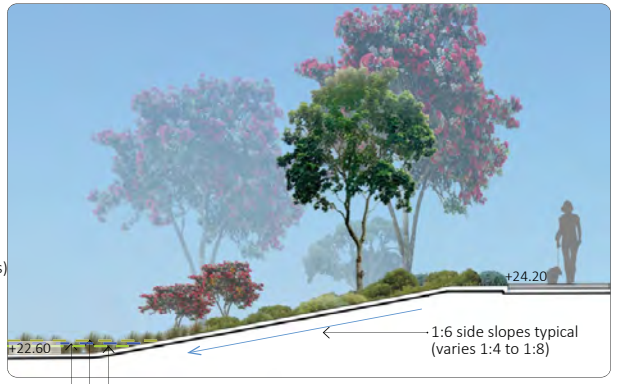
SWALE / BASIN


Bike and scooter connection.


Low understory planting.


Pedestrian connection and passive recreation.


Vegetated drainage swale.



1. basin / swale cross section
1:200 scale

N

0 2 4 6 8 10 15 20m

Drawing No	SPG001:CP01	Revision	B
Date	Oct 2025	Scale	1:500@ A3

Considered Space
Landscape Architecture
Urban Design
Play Spaces

Figure 14: POS Landscape Concept Plan

5.2.2 *Irrigation of POS*

Estimated Ground Water Requirements of the POS

The POS includes three distinct irrigated landscape treatment areas. Turf, Garden Beds and Swale / Basin Planting. The below table breaks down the treatment type and the ongoing irrigation requirements for each area with the garden beds and swale / basin irrigation requirements reducing overtime as the planted areas establish.

Table 2:

POS Irrigation Requirements - 116 Barfield Road, Hammond Park							
Item	Treatment	Total Area m²	Annual Usage Rate (KL per Ha)	Estimated Total Annual Usage Year 1 (KL)	Estimated Total Annual Usage Year 2 (KL)	Estimated Total Annual Usage Year 3 Onwards (KL)	Notes
1	Turf	368	7,000	258	258	258	Turf to be irrigated at 100% usage across all years and ongoing
2	Garden Bed	1,142	6,500	742	371	186	Garden beds to be irrigated at a rate of; 100% usage Year 1, and then reduced to 50% Year 2, and then reduced to 25% Year 3 and ongoing once established
3	Swale / Basin	492	6,500	320	160	80	Swale / Basin planting to be irrigared at a rate of; 100% usage Year 1, and then reduced to 50% Year 2, and then reduced to 25% Year 3 and ongoing once established
		Total (KL) per Year 1		1320			
		Total (KL) per Year 2			789		
	Total (KL) per Year 3 and onwards					524	

Irrigation Licence

There is existing irrigation infrastructure servicing the adjoining public open space. However, due to the constrained groundwater allocation for the locality, the availability of groundwater to support irrigation of the proposed public open space is currently undetermined. Groundwater licensing, irrigation supply arrangements and any alternative irrigation solutions will be resolved through detailed design and the subdivisional works process in consultation with the relevant agencies.

5.3 *Water Management*

The proposed Stormwater drainage system for the structure plan area consists of a network of reinforced concrete pits and pipes traversing the area, conveying surface flows from storm events up to the 100-year ARI to the drainage basin and external roads.

It is proposed that general overland flows from within the structure plan area are to be managed to a basin that located in the POS of the structure plan area and the adjacent basin to the north.

Table 3 of the Drainage Strategy provides the storage requirements for the 1, 5 and 100 year rainfall events for the structure plan area only. If the proposed basin was to cater for the structure plan area only, the base size of the basin would be 180sqm and extend to an area of 460sqm at the top of the catchment area.

Table 3 - Stormwater Drainage Details for Proposed Basins

ARI Event	Base	Top Water Level	Depth (m)	Basin Area - Base (m^2)	Storage Volume Required (m^3)
		116 Barfield Road, Hammond Park			
1% AEP	22.60	22.908	0.308	1200	411
18.1% AEP	22.60	22.913	0.313	150	69
100% AEP	22.60	22.808	0.208	150	41

The proposed drainage swale within the southern area of public open space has been designed as a multi-functional asset, supporting both stormwater management and landscape amenity outcomes. The swale will provide for the conveyance and treatment of stormwater runoff generated within the structure plan area, consistent with the principles of water sensitive urban design (WSUD). It will assist in attenuating peak flows, improving water quality, and promoting infiltration where appropriate. Importantly, the swale is integrated into the broader open space network in a way that complements the function and usability of the reserve, ensuring it retains a recreational character while also delivering essential servicing infrastructure in a visually unobtrusive manner. This approach supports a sustainable and coordinated drainage solution that aligns with the City of Cockburn's design expectations and the intended urban landscape character

However given the topography of the wider area, which illustrates the structure plan area being in a low point within Hammond Park more broadly, the drainage strategy has considered the impacts of stormwater from the structure plan area as well as external catchments.

The calculations provided in the drainage strategy has determined the proposed area required for the basin, which is approximately 150sqm for a 1 year, and further 150sqm for a 5 year event.

Figure 15: Proposed POS and Drainage Basin Connections – 1 in 5 year flood events

5.4 *Movement Network*

5.4.1 *Road Reserves & Pedestrian Network*

The proposed road network within the Structure Plan area is made of three north-south orientated roads that connect with the existing road network, directly to the north and south of the structure plan area.

The proposed road design is largely consistent with the indicative street reserve width of an Access Street D Road reserve, as per draft Liveable Neighbourhoods 2015. The proposed road reserves of Gorronge Street and Spratley Street are 16m and 15m for Bischoff Road. These roads connect to existing road reserves to the north and south of the structure plan area, therefore the width and design of these roads are determined by the existing infrastructure.

Consistent with the existing development to the north and south of the structure plan area, the structure plan also includes the widening of the Irvine Parade road reserve for a width of 4.5 metres to facilitate the construction of a footpath and verge along this road reserve.

In addition, the development of the structure plan area, will also facilitate the extension of footpaths along the existing road reserves to ensure the connection between the subdivisions to the north and south of the structure plan area.

Figure 16: Proposed Connections to Existing Road and Pedestrian Network

5.4.2 *Public Transport*

The Aubin Grove train station is the closest train station to the structure plan area and is situated approximately 1.5 kilometres to the north of the structure plan area.

At present the structure plan area is serviced via bus route 535 and 536, with the closest bus stop located right outside the boundaries of the structure plan area. At present bus route 535 travels between the Aubin Grove Train Station and Hammond Park Primary School and bus route 536 travels between Aubin Grove Station and Hamond Park Secondary College.

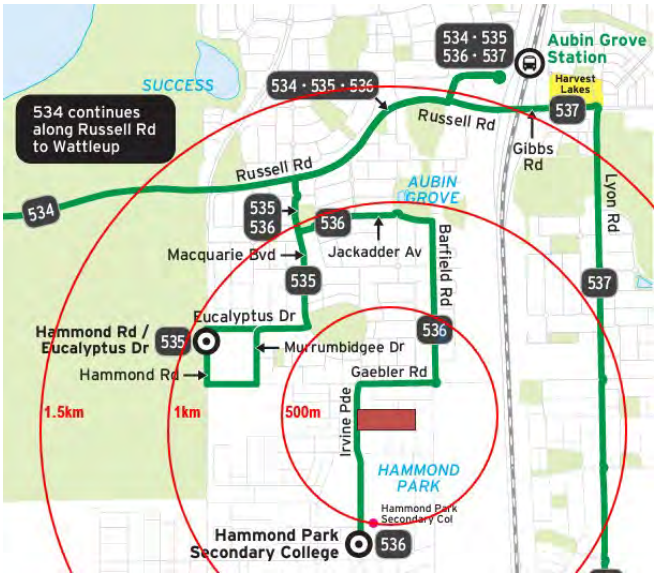


Figure 17: Public Transport Network

5.4.3 *Pedestrian and Cycle Network*

The area surrounding the structure plan area consists of a well-connected pedestrian network. A proposed subdivision of the structure plan area will finish off the pedestrian network in the locality.

5.5 *Servicing and Staging*

The structure plan area is one of the last remaining lots undeveloped within the Structure Plan area. The area surrounding the structure plan area has already been developed with all lots sold and co taining single houses.

All required infrastructure will be extended as necessary at the subdivision stage to support the delivery of new residential lots, with utility providers including Western Power, Water Corporation, ATCO Gas and NBN Co confirming that existing networks in the locality are capable of being extended to service the structure plan area in a coordinated and staged manner.

The provision of utility infrastructure, such as the provision of any required Western Power padmount, Water Corporation pump infrastructure, etc, is not to be provided within areas designated as public open space under the approved Structure Plan.

5.6 *Development Contributions*

The structure plan area is subject to two Development Contribution Areas (DCA), being DCA 9 and DCA 13. An owner's liability to pay a cost contribution to the City of Cockburn is set out in clause 5.3.13.2 of Town Planning Scheme No.3.

Appendices

Appendix 1: Certificate of Title

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1617	**396**

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 100 ON DIAGRAM 62366

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

SPG CAPITAL FUND 21 PTY LTD OF 308 FITZGERALD STREET PERTH WA 6000
(T Q254087) REGISTERED 17/12/2024

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

1. Q254088 MORTGAGE TO DORADO FIRST MORTGAGE 170 PTY LTD OF LEVEL 3 3 PIER STREET PERTH WA 6000 REGISTERED 17/12/2024.

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:	1617-396 (100/D62366)
PREVIOUS TITLE:	236-119A
PROPERTY STREET ADDRESS:	116 BARFIELD RD, HAMMOND PARK.
LOCAL GOVERNMENT AUTHORITY:	CITY OF COCKBURN

Appendix 2: BAL Report & Certificate

Bushfire Attack Level (BAL) Contour Map

For project at: Lot 100 (#116) Barfield Road, Hammond Park, WA, 6164

Client: Strategic Property Group

Report Number: 24-20991

Assessment Date: 18 February 2025

Report Date: 9 October 2025

Prepared by a BPAD Accredited Practitioner

BUSHFIRE SMART

Site Assessment & Site Plans

The assessment of this site was undertaken by a BPAD Accredited Practitioner for the purpose of determining the Bushfire Attack Level in accordance with AS 3959–2018 Simplified Procedure (Method 1).

The aerial imagery used was the best available at the time of review; however, it may no longer reflect the most current conditions.

Figure 1: Vegetation Classification	**Legend**					
Lot 100 (#116) Barfield Road, Hammond Park, WA, 6164	Proposed Lots	150m area assessment	A Forest	D Scrub		
Assessment Date: 18 February 2025 Prepared by: Billy Hulands Accreditation Level: 1 Accreditation Number: 59401	Site boundary	Photo point	B Woodland	G Grassland		
	100m area assessment	Plot Label	Plot / Veg Class. & Slope	C Shrubland	Excluded	

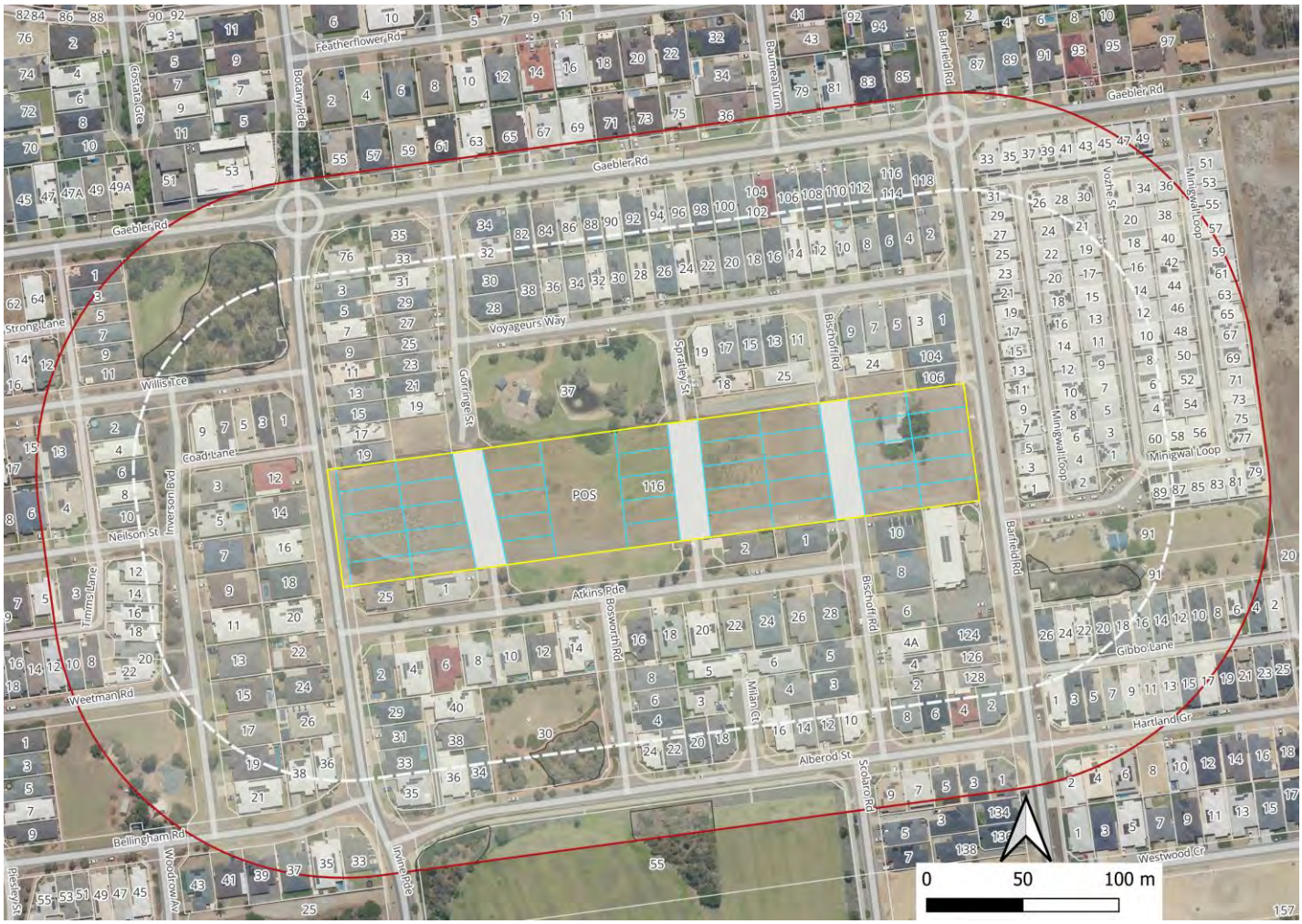


Figure 2: BAL Contours (Attainable)	Legend					
Lot 100 (#116) Barfield Road, Hammond Park, WA, 6164	Proposed Lots	150m area assessment	BAL FZ	BAL 19		
Comments:	Boundary	Photo point	BAL 40	BAL 12.5		
	100m area assessment	Plot Label: Plot / Veg Class. & Slope	BAL 29	BAL Low		

Vegetation Classification

All vegetation within 100m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959 – 2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below.

Plot:	1	**Effective Slope (°):**	N/A	**Separation Distance (m):**	N/A
Vegetation Classification or Exclusion Clause:			Excludable - 2.2.3.2 (e/f) Non-Vegetated Areas & Low Threat Vegetation		
Description / Justification for Classification:					
The surrounding developed residential area is characterized by extensive non-vegetated zones and low-risk vegetation throughout the assessment area. This includes isolated, managed public open spaces with short, cropped grasses (<100mm), isolated trees, and small gardens that maintain low overall fuel loads and high moisture content. Additionally, there are large non-vegetated areas such as driveways, roads, walkways, and cleared lots in preparation for development.					

Photo ID: 1

Photo ID: 2

Photo ID: 3

Photo ID: 4

Plot:	1	Effective Slope (°):	N/A	Separation Distance (m):	N/A
Vegetation Classification or Exclusion Clause:			Excludable - 2.2.3.2 (e/f) Non-Vegetated Areas & Low Threat Vegetation		

Description / Justification for Classification:

The surrounding developed residential area is characterized by extensive non-vegetated zones and low-risk vegetation throughout the assessment area. This includes isolated, managed public open spaces with short, cropped grasses (<100mm), isolated trees, and small gardens that maintain low overall fuel loads and high moisture content. Additionally, there are large non-vegetated areas such as driveways, roads, walkways, and cleared lots in preparation for development.

Photo ID: 5

Photo ID: 6

Photo ID: 7

Photo ID: 8

Plot:	1	Effective Slope (°):	N/A	Separation Distance (m):	N/A
Vegetation Classification or Exclusion Clause:			Excludable - 2.2.3.2 (e/f) Non-Vegetated Areas & Low Threat Vegetation		

Description / Justification for Classification:

The surrounding developed residential area is characterized by extensive non-vegetated zones and low-risk vegetation throughout the assessment area. This includes isolated, managed public open spaces with short, cropped grasses (<100mm), isolated trees, and small gardens that maintain low overall fuel loads and high moisture content. Additionally, there are large non-vegetated areas such as driveways, roads, walkways, and cleared lots in preparation for development.

Photo ID: 9

Photo ID: 10

Photo ID: 11

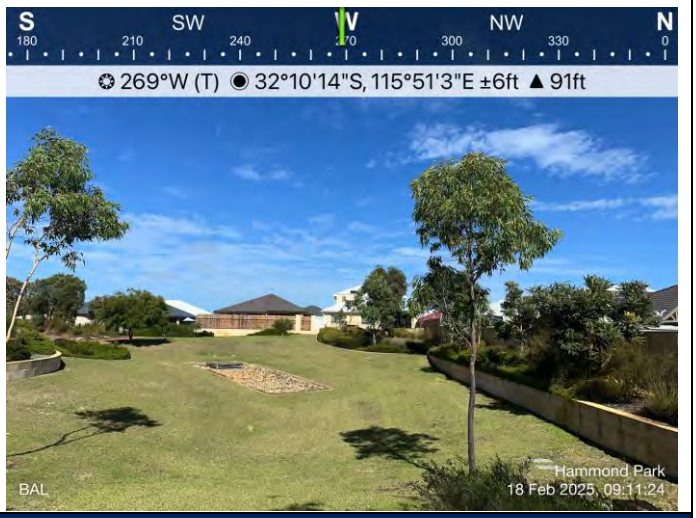


Photo ID: 12

Plot:	2	Effective Slope (°):	N/A	Separation Distance (m):	N/A
Vegetation Classification or Exclusion Clause:			Excludable - 2.2.3.2(c) Multi Areas < 0.25Ha		

Description / Justification for Classification:

Throughout the assessment area, there are small, isolated patches of vegetation that border onto public open spaces. These patches consist of multi-storied vegetation with high foliage cover and unmanaged understory fuels. Each patch is separated by at least 20 meters from its neighbours, does not exceed 0.25 hectares, and has been excluded under AS 3959 2.2.3.2(c).

Photo ID: 13

Photo ID: 14

Photo ID: 15

Photo ID: 16

Plot:	2	Effective Slope (°):	N/A	Separation Distance (m):	N/A
Vegetation Classification or Exclusion Clause:			Excludable - 2.2.3.2(c) Multi Areas < 0.25Ha		

Description / Justification for Classification:

Throughout the assessment area, there are small, isolated patches of vegetation that border onto public open spaces. These patches consist of multi-storied vegetation with high foliage cover and unmanaged understory fuels. Each patch is separated by at least 20 meters from its neighbours, does not exceed 0.25 hectares, and has been excluded under AS 3959 2.2.3.2(c).

Photo ID: 17

Photo ID: 18

Relevant Fire Danger Index

The fire danger index for this site has been determined in accordance with Table 2.1 or otherwise determined in accordance with a jurisdictional variation applicable to the site.

Fire Danger Index			
FDI 40 ☐	FDI 50 ☐	FDI 80 ☒	FDI 100 ☐
Table 2.7	*Table 2.6*	*Table 2.5*	*Table 2.4*

Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below.

Table 1: BAL Analysis

Plot	Vegetation Classification	Effective Slope	Separation (m)	BAL
1	Excludable - 2.2.3.2 (e/f) Non-Vegetated Areas & Low Threat Vegetation	N/A	N/A	BAL – LOW
2	Excludable – Clause 2.2.3.2(c)	N/A	N/A	BAL – LOW

Determined Bushfire Attack Level (BAL)

The Determined Bushfire Attack Level (highest BAL) for the site / proposed development has been determined in accordance with clause 2.2.6 of AS 3959 – 2018 using the above analysis.

Determined Bushfire Attack Level	**BAL – LOW**

Appendix 1: Plans and Drawings

Plans and drawings relied on to determine the bushfire attack level

Appendix 2: Shielding Provisions

AS 3959 – 2018 Part 3.5 allows for a reduction in construction requirements due to shielding, where an elevation not exposed to the source of a bushfire attack may be reduced to the next lower BAL (But not to BAL LOW).

A reduced level due to shielding may be applied to this project as shown in the diagram below. This lower BAL level may be applied to the elements of the walls (including openings) but shall not be applied to subfloors or roofs.

No shielding applies to this development.

Appendix 3: Construction Requirements

The construction requirements for each determined Bushfire Attack Level (BAL) are outlined below. Depending on your BAL rating, as indicated in this report, construction must comply with the corresponding sections listed. Detailed construction specifications can be found within the relevant sections of AS3959-2018.

SECTION 3 GENERAL CONSTRUCTION REQUIREMENTS

3.1 GENERAL

This Section specifies general requirements for the construction of buildings for all Bushfire Attack Levels (BALs). The BALs and the corresponding Sections for specific construction requirements are listed in Table 3.1.

TABLE 3.1 (**BUSHFIRE ATTACK LEVCELS AND CORRESPONDING SECTIONS FOR SPECIFIC CONSTRUCTION REQUIREMENTS (AS3959:2018, p. 34).**

Bushfire Attack Level (BAL)	Classified Vegetation (Heat Flux Exposure)	Description of Predicted Bushfire Attack	Construction Section
BAL—LOW	See Clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL—12.5	≤12.5 kW/m²	Ember attack	3 and 5
BAL—19	>12.5 kW/m² ≤19 kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers, together with increasing heat flux	3 and 6
BAL—29	>19 kW/m² ≤29 kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers, together with increasing heat flux	3 and 7
BAL—40	>29 kW/m² ≤40 kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers, together with increasing heat flux, with the increased likelihood of direct contact with flames	3 and 8
BAL—FZ	>40 kW/m²	Direct exposure to flames from the fire front, in addition to heat flux and ember attack	3 and 9

Appendix 4: Glossary of Terms

AS 3959 -2018	AS 3959 is the Australian Standard for Construction of Buildings in Bushfire-Prone Areas. It outlines the requirements for building design and construction to improve the resilience of structures against bushfire attacks.
BAL	Bushfire Attack Level, referring to the level of bushfire risk for a property, typically denoted by a rating (e.g., BAL 29), or to the report assessing this risk.
BCA	Building Code of Australia, a set of guidelines and regulations for building construction and safety.
BPAD Accreditation	The Bushfire Planning and Design (BPAD) Accreditation Scheme is administered by Fire Protection Association Australia (FPA Australia) to formally recognize professionals who provide bushfire assessment, planning, design, and advisory services. BPAD Accreditation confirms a practitioner's skills and gives confidence that bushfire services are provided by qualified professionals.
BPAD	Bushfire Planning and Design, involving measures to mitigate bushfire risks in urban planning and building design.
Effective Slope	The slope of the land under the vegetation in relation to a building, which affects the speed and intensity of a bushfire. Fires move faster uphill, so steeper slopes increase bushfire risk.
FDI	A numerical scale that indicates the severity of bushfire conditions based on factors like temperature, humidity, wind speed, and drought. Higher values mean greater fire danger.
Method 1	Method 1 for determining Bushfire Attack Level (BAL) ratings is a simplified approach outlined in *Australian Standard AS 3959: Construction of Buildings in Bushfire-Prone Areas*. It uses readily available information and basic measurements to determine the potential exposure of a building to bushfire hazards
Shielding	Shielding is the protection of an elevation of a structure that does not have line of sight to potential bushfire attack, reducing its exposure to radiant heat, embers, and direct flames during a bushfire.

Appendix 3: Local Water Management Strategy

116 Barfield Road, Hammond Park

Strategic Property Group

Job No: P003127

Rev: C

20 October 2025

Premise

PART OF THE Amey GROUP

Document Reference: P003127 No 116 Barfield Road LWMS

Document Authorisation					
Revision	**Revision Date**	**Proposal Details**			
A	10/02/2025	Issued for Approval			
B	22/07/2025	Issued for Approval			
C	20/10/2025	Amended to Reflect Updated Subdivision Layout and Concept Plan Received			
Prepared by		**Reviewed by**		**Authorised by**	
G. Kleyweg	GK	C. Kleyweg	CK	C. Kleyweg	CK

CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

This document outlines the Local Water Management Strategy (LWMS) for the subdivision development of 116 Barfield Road Hammond Park, herein referred to as the Study Area. The principles and strategies defined herein have been developed in accordance with the guidelines in Better Urban Water Management (BUWM) (WAPC, 2008), and in accordance with the City of Cockburn.

Premise have worked closely with the City of Cockburn to show that the proposed POS area provided by Strategic Property Group complies with the requirements for local and regional POS and manages the drainage outflows from the proposed developable area in a responsible way by not impacting the existing POS areas to the north and south of the subject landholding. This LWMS has been prepared to support the requirements stated by the City of Cockburn. Below is a table showing the comments made by the City of Cockburn along with responses from Premise Perth: -

Table 1 – City of Cockburn Comments and Premise Response

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
1.	Revise 'Table 2 – Sizing of Storage Requirements for Rainfall Events' to detail the sizing requirements for the 100% AEP (1:1 year event).	To determine the specific area of POS required to detain stormwater up to the 1:1 year event. In accordance with Element 4 of Liveable Neighbourhoods, areas within POS that are subject to inundation more frequently than a one-year average recurrence interval event are not suitable to be located within 'restricted' open space, and therefore do not form part of the creditable POS.	The 63.2% AEP event described throughout the Drainage Letter is the 1:1 year event. For clarity, this is now referred to as the 100% AEP in the Local Water Management Strategy. The drainage calculations can be found in Appendix H.		
2.	Provide information on the estimated water demand for the proposed POS. Provide evidence that an irrigation license has been obtained to provide a future irrigation source for the POS.	The proposed POS will likely require a permanent irrigation source to support its classification as 'low-threat' under AS3959-2018 and to enable vegetation (including turfed areas) to be maintained to an appropriate standard. Without knowing if sufficient water is available to irrigate the POS, it is	A Landscaping Concept Plan which details the irrigation requirements for the Study Area has been submitted to the City of Cockburn for review.		

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
		uncertain how it can be maintained to the required standard. In determining the water demand for the POS, an understanding of the extent of vegetation and other infrastructure (such as footpaths and other paved areas) needs to be determined through a Landscape Concept Plan.			
3.	Provide evidence that the Department of Water and Environmental Regulation is supportive of a Drainage Strategy being prepared for the Structure Plan area, in lieu of a comprehensive Local Water Management Strategy.	A Structure Plan typically requires preparation of a Local Water Management Strategy, in accordance with the WAPC's Better Urban Water Management Policy.	This Local Water Management Strategy has been prepared to satisfy the requirements of the Structure Plan for this Study Area.		
4.				Insert the 'Surrounding Land Use' plan into Appendix D – Surrounding Land Use.	Please refer updated Appendix D – Surrounding Land Use.

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
5.				Section 2.2 Subdivision Approval – Delete Section (due to no existing subdivision approval).	This section has been deleted as part of the revision C of this report.
6.				Section 5.1 Drainage Strategy Summary – Update 'Figure 7 Stormwater Drainage Strategy' to be consistent with the direction of drainage flows shown in the Drainage Catchment Plan (C370, Rev B).	Figure 7 has been updated to reflect what is shown in the Drawing C350 – Rev C.
7.				Section 5.3.2 Public Safety – Delete the first paragraph referencing the fencing of the proposed drainage basin.	The first paragraph referencing the fencing of the proposed drainage basin within Section 5.3.2 has been removed as well as all instances within this report that fencing of the proposed basin is mentioned.
8.				Section 5.4.2 Non-Structural Controls – Revise the subheading title from 'Non-Structural Controls' to 'Structural Controls' consistent with the Western	Please refer updated Section 5.4.2 Structural Controls.

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
				Australian Planning Commission's *Better Urban Water Management Policy.*	
9.				Section 7.1 Irrigation – Provide confirmation that an irrigation license has been obtained and is sufficient for ongoing irrigation of the proposed public open space.	An irrigation license is not required for the subject landholding as the landscaping proposes the use of native vegetation species that conserve water usage.
10.				Section 8.2.3 Dewatering – Include additional commentary consistent with the advice from the Department of Water and Environmental Regulation which states: *'A separate temporary license for dewatering activities will be required, unless the dewatering meeting the following exemption criteria:* • *The development is within the water table (non-artesian) aquifer; and*	The required section has now been added to the report. Please refer updated Section 8.2.3 Dewatering.

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
				• *Water is taken from the well solely for the purpose of removing underground water to facilitate construction or other activity (that is, dewatering) which does not include those activities that relate to the extraction of basic raw materials or result in the lowering of the natural ground level; and* • *The water is taken at a pump rate not exceeding 10 litres per second over a period of 30 consecutive days; and* • *The volume of water taken over the period does not*	

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
				exceed 25,000 kilolitres.'	
11.				Section 8.3.1 Groundwater Modelling – Revise the subheading title from 'Groundwater Modelling' to 'Groundwater Monitoring'.	The subheading title for Section 8.3.1 has been corrected to Groundwater Monitoring as part of the Revision C of this LWMS.
12.				Appendix C Subdivision Plan – Remove the annotation depicting fill within Voyageurs Park and Atkins Parade Park, where directly adjacent to proposed residential lots.	Annotation depicting fill within Voyageurs Park and Atkins Parade Park has been removed from all appendix graphics, including the aforementioned Appendix C Subdivision Plan.
13.				Appendix D Surrounding Land Use – Insert the referenced plan.	Appendix D Surrounding Land Use Plan has been attached to this LWMS submission.
14.				Appendix F Topography Plan – Remove the annotation depicted fill within Voyageurs Park and Atkins Parade Park, where directly adjacent to proposed residential lots.	As stated above, annotation depicting fill within Voyageurs Park and Atkins Parade Park has been removed from the appendix graphics as part of the Revision C of this LWMS.

	City of Cockburn Comments	City of Cockburn Comments	Premise Perth Response	City of Cockburn Comments (28/07/2025)	Premise Perth Response
15.				Appendix G Earthworks Plan – Revise the proposed design level contours, where adjacent to Voyageurs Park and Atkins Parade Park, such that the level difference between these reserves and the finished levels of Lots 11, 15, 16 and 20 is managed by retaining walls within the boundary of residential lots.	The C100 Earthworks Plan within Appendix G Engineering Drawings has been updated to reflect these amendments. Retaining walls within the boundary of the residential lots have been added to Lots 326 (previously Lot 11), 330 (previously Lot 15), 321 (previously Lot 16) and 325 (previously Lot 20) and the design level contours have been amended in accordance with the revised basin design and tie into existing contours of Voyageurs Park and Atkins Parade Park.

The pre-development characteristics of the subject site are principally supportive of the development proposal; however, the main parameter for the proposed residential design is integration with existing and future developments as well as the proficient negotiation of topography and the utilisation of the proposed POS area within the LSP to detain most of the overland flows created within this area.

The proposed basin is to be located at the low point within the Study Area. Therefore, the topography of the land and the overland flow paths will remain consistent with its existing features as well as the surrounding developments.

Once of the main objectives of this LWMS is to detail the best management practise for the management of Stormwater for the Study Area for both minor and major events and to review all inputs into the design process inclusive of geotechnical, environmental, landscaping and any acid sulphate soils requirements. Ultimately, all stormwater runoff from the site for minor and major events will be captured, stored and infiltrated in the proposed basin within the Study Area. The effectiveness, efficiency and benefits provided by the best management practices require a collaborative effort between local governments, developers and relevant regulatory authorities.

This report examines the critical control points for the drainage, providing the City of Cockburn with clear guidance on how the stormwater drainage is intended to work within 116 Barfield Road, Hammond Park.

The parties involved in the development of the Study Area shall be aware of their responsibilities and commitments to the concepts and outcomes outlined herein this report. With all parties working together to implement and undertake the necessary measures to monitor and maintain the drainage system designed specifically for this subdivision.

Table 2 – Study Area Information

Site Overview	Description
Subject Site Location	116 Barfield Road, Hammond Park.
Study Area	The area covered by this LWMS is approximately 2.0235 hectares, inclusive of 40 residential lots and 1 POS area. The subject site is bordered by existing developments to the north and south, Barfield Road to the east and Irvine Parade to the west.
Existing Use	The site currently features an existing shed to the east side as well as some small to medium trees and bushes. The site does not have any significant environmental constraints that will limit the proposed development.
Proposed Development	The proposed development of 116 Barfield Road contains 40 residential lots and 1 area of POS.

Table 3 – Executive Summary of Key Design Parameters

Key LWMS Element	Design and Compliance Objectives
Water Conservation Strategy (Section 4)	Potable water supply will be provided by the Water Corporation via the existing scheme water systems located in Irvine Parade, Goringe Street, Spratley Street and Bischoff Road. Wastewater will be disposed of via the proposed trunk sewer reticulation system which will connect via the same road networks. The subject landholdings will be earthworked in accordance with the attached drawings to ensure compliance with all minimum cover requirements of the Water Corporation under Design Standard DS 50 for the provision of wastewater infrastructure within road reserves. The development will include the following water efficiency measures to aid in achieving potable water consumption targets: > Water efficient fixtures and fittings within future dwellings (responsibility of the lot owner at the time of building approvals) > Education material provided at the point of sale for each residential lot (responsibility of the proponent) > Waterwise landscaping – lot scale landscaping will be encouraged to be based on waterwise landscape principles. > Waterwise landscaping within the POS area which will not require irrigation.
Stormwater Management (Section 5)	Premise have ensured that all proposed levels for dwellings are set at a minimum of 2m clearance from groundwater. During construction it is essential to remain mindful of perching of groundwater as well as higher groundwater levels in pockets of the site. The earthworks Contractor will be managed to ensure there is a 2m layer of sandy material between all lots and the expected groundwater to minimise the occurrence of groundwater perching under dwellings. Soakwells will manage lot runoff generated up to and including the 20% AEP within all lots, given the expected 2m buffer to groundwater and sandy conditions. Each builder will be required to submit a calculation to the City of Cockburn showing sufficient soakwells to manage the 20% AEP event in accordance with the City's requirements for management of on-site drainage. Overland flows within the Study Area are to be managed to a basin that will be located centrally in the Public Open Space within 116 Barfield Road, Hammond Park. This basin and POS connects to existing POS and drainage infrastructure directly north, and south of the Study Area, making a logical extension of the local POS and drainage function. The drainage systems constructed in this LSP area will connect to the north via the proposed road networks and then circulate back through the road network to the south and into the expanded POS and basin network. Therefore, the approval of the LWMS and LSP will provide an important, complimentary completion of the local network for the City of Cockburn. Section 3.7 Pre-Development Surface Water Hydrology shows the calculations for the pre-development catchments, with post-development drainage calculations shown in Section 5.2 Drainage Calculations.

Key LWMS Element	Design and Compliance Objectives
	All lots are to be set at a minimum of 0.3m above the 1% AEP flood level of the urban drainage system such as roads and drainage basin. At sag points, the targeted freeboard from proposed lot levels to sag is 0.5m. These levels are shown in the Premise Civil Engineering Plans provided in Appendix G.
Groundwater Management (Section 6)	Sufficient clearance above groundwater will be managed through an earthworks strategy that maintains an absolute minimum of 2.0m above AAMGL. The targeted minimum requirement for clearance to AAMGL / CGL is 1.8 metres. All levels will be set at a minimum of 2m clearance to AAMGL and throughout construction it is important to be mindful of any perching of groundwater.
Management of Subdivision Works (Section 7)	Dust management, erosion, sediment controls and maintenance of infrastructure will all be implemented to ensure the impacts of construction are minimised.
Monitoring (Section 8)	The post-development monitoring programme will cover the requirements of the drainage system and be to the satisfaction of the City of Cockburn.

1. PROPOSED URBAN SUBDIVISION

The Principal proposes to subdivide 116 Barfield Road, Hammond Park into 40 urban residential lots and 1 area of POS. A basin will be built in the POS area within the Study Area. More information on the drainage strategy is provided in the appropriate sections of this report.

The site is located inside the south corridor of the Perth Metropolitan Area within the City of Cockburn, approximately 28 km south of the Perth Central Business District (CBD). A locality plan of the proposed subdivision has been included in Appendix B.

The proposed subdivision is an urban residential project. Access and egress to the proposed development is provided from Gorringe Street, Spratley Street and Bischoff Road, as shown on the subdivision plan in Appendix C. The land use breakdown of the Study Area has been provided below, with proposed lots and proposed road reservations in the Study Area tabulated separately. The total development area of 116 Barfield Road is shown in Table 4 below.

Table 4 – Land Use Breakdown

Land Use	Number of Parcels	Total Area (ha)
116 Barfield Road, Hammond Park		
Residential Lots	**40**	**1.4768**
Road / Road Reserves	(incl truncations)	0.3139
	Gorringe Street	0.0977
	Spratley Street	0.0974
	Bischoff Road	0.0916
	Irvine Parade Road Widening	0.0272
Public Open Space	**1**	**0.2328**
Total	**40 Lots**	**2.0235**

1.1 Design Objectives and Criteria

This Local Water Management Strategy (LWMS) has been provided to support the proposed development of the Study Area. The water management strategies for the Study Area have been based on the following documents:

- Liveable Neighbourhoods (Western Australian Planning Commission, 2007)
- Statement of Planning Policy 2.9: Water Resources (WAPC, 2004)
- Stormwater Quantity Management Manual for WA (Department of Water, 2007)
- Decision Process for Stormwater Management in WA (Department of Water and Environmental Regulation, 2017)
- Better Urban Water Management (WAPC, 2008);
- Stormwater Management Manual for Western Australia (DoW, 2004 – 2007).

The plans, designs, and strategies for development identified herein address the potential development constraints, surrounding environment, existing site conditions, and future residential use. Moreover, the

contents of this LWMS demonstrate the suitability of the Study Area for urban development, addressing potential development constraints, the surrounding environment, the existing site conditions, and future residential use.

The key elements implemented within the development are summarised below.

Water Conservation Strategy

- Aim to achieve the State Water Plan target of less than 100 kL/person/year.
- Promote water efficient appliances and fixtures to be used in each residential lot to achieve potable water consumption targets (inclusive of the provision of educational material on water saving measures).
- Minimise the use of potable water where drinking water quality is not essential, particularly ex-house uses.

Stormwater Management

- Road networks shall be graded generally toward the future proposed drainage basin areas.
- One-way cross falls will be utilised where appropriate to guide overland flows.
- Surface water flows from major events (above 20% AEP) will be managed to protect infrastructure and assets from flooding and inundation: finished lot levels will have sufficient clearance about 1% AEP flood levels.
- This Study Area provides a valuable interlink between the existing drainage outlets and basin areas directly to the north and south, and this LWMS provides the mechanism to interlink and equalise the drainage flood management between these sites. Our calculations have been completed both separately for the subject Local Structure Plan area to ensure no encroachment of flows into adjoining developed POS areas, and for the wider catchment area to ensure the existing POS areas drain to wards our proposed basin located centrally.

Monitoring

- A post-development monitoring programme shall address all requirements of the proposed drainage design system.
- Pre- and Post-development monitoring programme of all potable water requirements of the best management procedures.

Detailed monitoring requirements are shown in Section 8 of this LWMS.

2. PLANNING SUMMARY

2.1 Planning Preparation

This LWMS supports the proposed subdivision of the Study Area into 40 urban residential lots of varying sizes, consistent with the proposed residential densities for this area. To achieve a water-sensitive urban subdivision design, this LWMS addresses the principles and strategies that are required for best planning practices for the sustainable use of water resource. These principles focus on key elements such as the consideration of groundwater, water balance, conservation, use and efficiency, and the management of flood events.

The rationale for the proposed development is in keeping with the pattern of urban development in the predefined precincts, and with existing developments surrounding the Study Area, the 'in-fill' nature of the project makes the development proposal logical.

The design and management practices enclosed consider integrated water cycle management as its use on similar projects has demonstrated it to be an effective way to manage water resource management issues typically associated with urban development. Additionally, this LWMS has been prepared to be consistent with the Department of Water's (DoW) *"Guidelines for preparing plans and for complying with subdivision conditions."*

2.2 Previous Reports

To comply with the geotechnical requirements of the LWMS, information on the existing geotechnical characteristics of the subject landholdings was required. Geotechnical investigations for the proposed residential development were undertaken by Local Geotechnics in July 2024. The information obtained from the report (Local Geotechnics Report) has been referenced extensively in this LWMS. The report itself is attached in Appendix E.

3. EXISTING SITE CHARACTERISTICS

3.1 Existing Information

The existing undeveloped site is located approximately 28km south of the Perth CBD and is bordered by existing developments to the north and south, Barfield Road to the east and Irvine Parade to the west. Development over the Study Area is zoned for R25 residential development.

3.2 Environmental Considerations

Preliminary desktop investigations of the Study Area assessed no potential environmental constraints to urban development. Information obtained from the Department of Planning reveal no bush forever protected areas are present throughout the Study Area. Furthermore, the proposed development is not expected to encounter any environmentally sensitive area, nor does it propose to adversely impact the surrounding environment. The City of Cockburn requested one existing mature tree was maintained on Lot 302. This tree has been protected in the design.

3.3 Climate

The Study Area experiences a Mediterranean-type climate, characterised by warm dry summers and mild wet winters. The long-term average rainfall over the past 23 years is 792.8mm, with most of the rain being dissipated between May and September. Climate statistics for the City of Cockburn have been provided below from the Bureau of Meteorology website, the closest weather station in operation being the Anketell Station (Site No. 009258, 32.22°S, 115.88°E), operating from 2002.

Ref: Monthly Rainfall - 009258 - Bureau of Meteorology

Table 5 – Average Monthly Rainfall Statistics

Month	*Mean Monthly Rainfall (mm)
January	15.4
February	15.8
March	21.6
April	45.0
May	93.9
June	138.1
July	162.7
August	128.1
September	84.6
October	43.0
November	28.5
December	13.1
Annual	**792.8**

*Source: Bureau of Meteorology. Anketell Weather Station No. 009258 (*Mean from 2002 – 2025).*

3.4 Topography

There are high points to the west and east of the Study Area, with a low point of 22.66 in the centre of 116 Barfield Road.

3.5 Groundwater

Throughout the Study Area, groundwater ranges between 0.9m and >2.5m below surface as per the figure below:

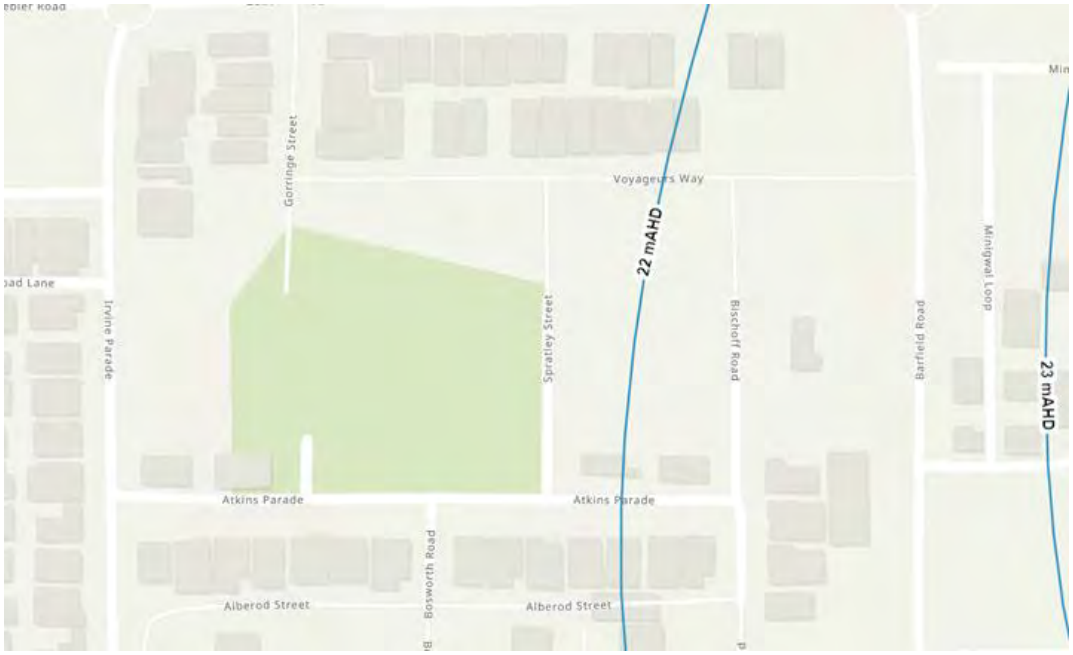


Figure 1 – Groundwater Contours – 116 Barfield Road, Hammond Park

Groundwater within the Study Area has been discussed in the Local Geotechnics Geotechnical Report. The key issue to manage within the Study Area is the distance between groundwater level and surface level. This issue has been managed using fill within the Study Area. All lots will have a minimum clearance of 2m to groundwater. Another risk to remain mindful of is the possibility of perching of groundwater as well as higher groundwater levels in pockets of the Study Area.

3.6 Wetlands

There are no geomorphic wetlands over 116 Barfield Road. The entire Study Area is classified as consanguineous wetland as shown on the following page:

Figure 2 – Consanguineous Wetlands – 116 Barfield Road, Hammond Park

3.7 Geotechnical Characteristics

Geotechnical investigations were undertaken by Local Geotechnics in July 2024. The geotechnical investigation took place over the entire Study Area, verifying the geotechnical characteristics of the site. The following description is a summary of the field studies:

- **TOPSOIL, SAND (SP) –** fine to medium grained, grey, with grass and roots, trace of silt, slightly moist, loose to medium dense, up to a depth of 0.3m; followed by
- **SAND (SP) –** fine to medium grained, grey / pale grey / yellowish brown, trace of silt, moist to wet, loose to dense, up to the maximum investigated depth.

The noted sand formations are considered suitable for cut where the depth to groundwater is at least 2.0 metres.

The Premise earthworks plans show that natural groundwater is kept to the minimum of 1.8 metres beneath all proposed finished lot levels due to the use of fill, therefore subsoil is not required within the Study Area. The Study Area has sufficient depth to groundwater to allow cut to fill and no controlled groundwater requirements.

The Figure on the following page shows the location of the Test Pits in 116 Barfield Road, Hammond Park:

Figure 3 – Test Pit Locations – 116 Barfield Road, Hammond Park

3.7.1 INFILTRATION / PERMEABILITY

As presented in the Local Geotechnics geotechnical report, 6 in-situ percolation tests were undertaken by Local Geotechnics to provide information on the drainage capabilities of the soil present over the Subject Area. Results from the tests show that the in-situ soils are suitable for localised infiltration through the placement of weep holes at the base of all drainage pits where there is greater than 2 metres clearance to groundwater. For the proposed basin, the local soils also are suitable for infiltration, post rainfall events.

Based on the analysis of the permeability testing (of the encountered ground conditions), a preliminary permeability value of 5m/day will be used for drainage calculations over the Study Area, this is conservative given the results obtained in the permeability testing, however this allows for some concentration of smaller particulate matter in 100% AEP (1 in 1-year) treatment areas. We believe this is good design practice considering there is generally a greater concentration of drainage flows when an area is developed as per the proposed development plan. Nonetheless, the permeability value taken for this site indicates that infiltration is an appropriate means of managing stormwater, provided the infiltration systems (soakwells, swales, and the drainage basins) are maintained on a regular basis and all bases of soakwells and drainage pits with weep holes are set at a minimum clearance to MGL of 0.3 metres.

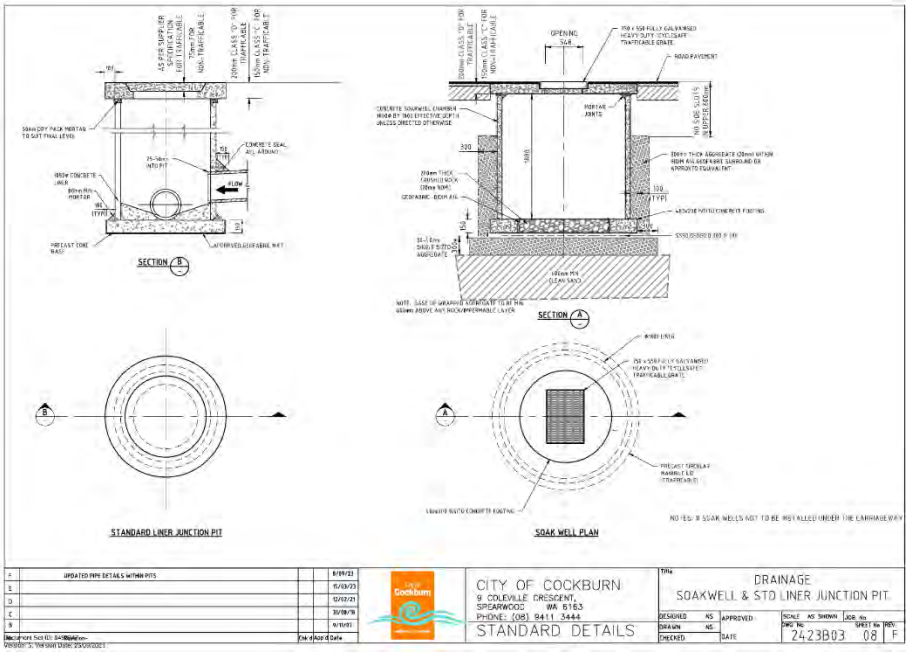


Figure 4 – Typical Soakwell and Standard Liner Junction Pit (City of Cockburn Standard Drawing 2423B03)

3.7.2 PHOSPHORUS RETENTION INDEX

To address water quality requirements for Stormwater infiltration, the Phosphorus Retention Index (PRI) for various substrates must be determined. The PRI is used as a measure of the ability of a soil to treat Stormwater via the adsorption of phosphorus particles. Higher PRI values correspond to a greater capacity for the soil to retain phosphorus, and hence an increased ability to treat Stormwater. Conversely, lower values indicate poor treating capabilities.

In the absence of site-specific testing, the non-structural controls and best management practice guidelines have been utilised to provide an indication of PRI, seen in Table 6 and Table 7. The geologic profile of the site would suggest that the upper portion of the soil layer would have a PRI in the range of 2 – 30, indicating a good ability to treat Stormwater.

Table 6 – Relative Permeability and PRI for Various Substrates

Substrate	Permeability (m/day)	PRI
Bassendean Sands	30+	0-0.5
Karrakatta Sands	10+	2-4
Cottesloe Sands	10+	5-12
Crushed Limestone or Lime Sands	2-5	5-20
Natural Clay or Loam Soils	<0.4	30-1,000+

Table 7 – PRI Fixation Properties

PRI	Description
Negative	Desorbing
0-2	Weakly Adsorbing
2-20	Moderately Adsorbing
20-100	Strongly Adsorbing
>100	Very Strongly Adsorbing

Source: Department of Agricultural and Food.

3.7.3 ACID SULPHATE SOILS

Preliminary Acid Sulphate Soil (ASS) investigations were not undertaken as part of the geotechnical investigation, nor were they independently requested in the WAPC Application Conditions. Regional Mapping of Acid Sulphate Soils (ASS) risk indicates that the Study Area has a "moderate to low" risk of the presence of Acid Sulphate Soils.

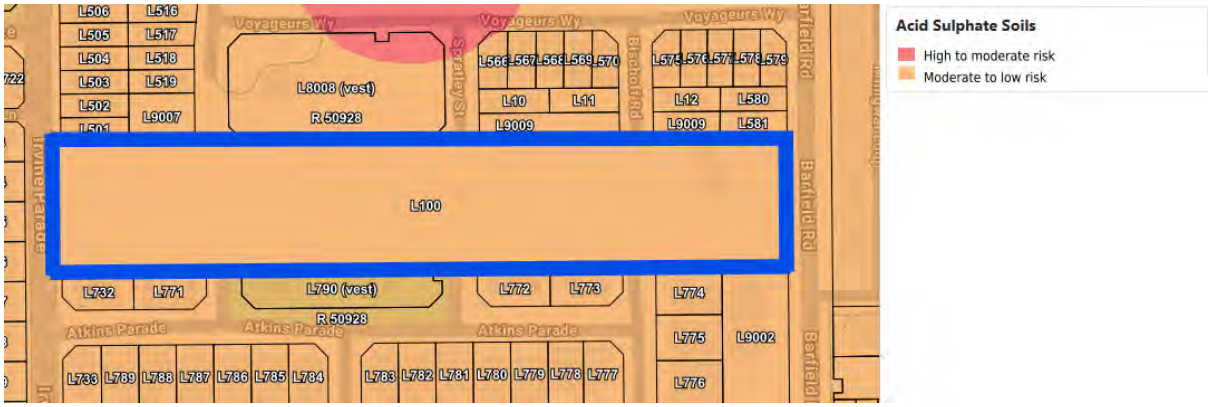


Figure 5 – Acid Sulphate Soils Mapping – MNG Access

No deep excavations are proposed as part of this LWMS, therefore at this stage of the project we do not believe there is a requirement to undertake ASS investigations.

3.8 Pre-Development Surface Water Hydrology

The site currently generates run-off due to its natural state. Current runoff generated by the Study Area will be a sheet flow that therefore does not create a visible path for water; its sandy soil classification means that most storms will soak prior to running off due to the high infiltration rate.

Overland flow-paths generally flowing to the southwest as per the Figure on the following page: -

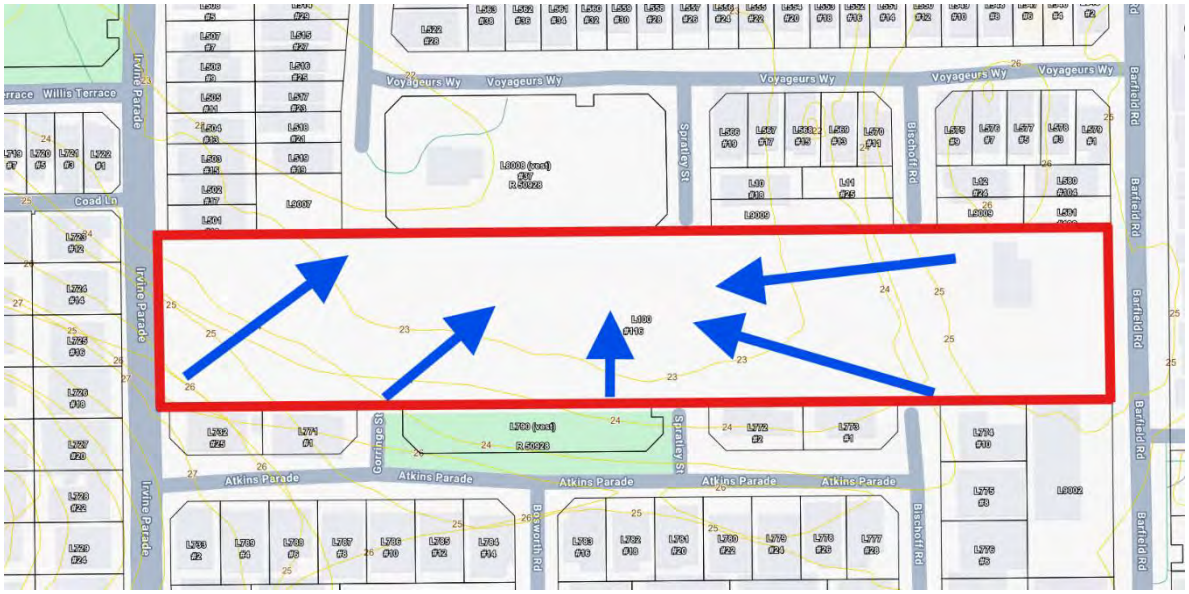


Figure 6 – Existing Overland Flow-Paths – 116 Barfield Road, Hammond Park

The Time of Concentration was calculated in accordance with the formula below: -

$$t(c) = 107 * n * L\text{^}0.333 — S\text{^}0.2$$

t = time of travel over the surface

(minutes)

n = Horton's n values for the surface (n = 0.04 for poor to average grassed surface)

L = length of flow (metres)

s = slope of surface (%).

There is no Water Corporation main drainage infrastructure within the Study Area. Existing flow paths generally grade to the west and east and the intent of the stormwater drainage design for the proposed development is to mirror the existing pre-development flows from the subject site.

The Premise civil engineering design plans are shown in Appendix G.

3.9 Pre-Development Groundwater Hydrology

Groundwater is noted as being approximately 0.9m to >2.5m metres beneath the natural surface. In the Local Geotechnics Geotechnical Report, groundwater was found in test holes TH3, TH4 and TH5 with depths of 1.1m, 0.9m and 1.0m respectively.

4. WATER SUSTAINABILITY INITIATIVES

4.1 General Consideration for Development

The potential areas of potable water use reduction involve replacing potable water use with non-potable use. However, the risks associated with the failure to reach an appropriate water quality standard must not outweigh the benefits of implementing the alternative option.

Strategies that do not include the substitution of potable water include promoting waterwise landscaping initiatives, involving the use of appropriate plants. Other water conservation efforts will focus on encouraging the community to use water efficient appliances and devices and provide educational programs that highlight the importance of the homeowner's role in preserving potable water resources.

4.2 Water Conservation and Efficiency Measures

The site lies within the Perth Metropolitan water supply area serviced by the Water Corporation. Potable water will be supplied through a connection to the mains water supply (through the Water Corporation). The conservation strategies and efficiency measures proposed aim to achieve a reduction in potable water use.

The consensus on the current use of scheme water in Perth's households is that it is unsustainable, and measures need to be put in place to achieve significant reductions in potable water use. The Perth household average potable water use in 2003 was 460 kilolitres (kL), according to the "Domestic Water Study" undertaken by the Water Corporation (Water Corporation 2003). The use of potable water in the watering of gardens contributed 260kL to this total.

This LWMS has adopted the State Water Plan of 2007 water usage target (in Western Australia) of 100 kilolitres per person a year.

The general approach to implement water conservation measures will be to encourage a 'waterwise' development. The water conservation strategy for this development will aim to reduce scheme water demand by incorporating a variety of effective initiatives, which include the provision of the following:

- Use of higher density residential zoning and smaller lots to reduce garden (ex-house) use of water – development will consist of R25 lots, with the average area of the lots being 369.2m2.
- Promotion of use of waterwise practices including water efficient household fixtures and fittings, limiting the amount of potable water use through water efficient (AAA rated) shower heads, 4-star WELS rated tap fittings in all kitchen sinks, bathroom basins, and vanities, waterwise landscaping, and at least 4-star toilets and appliances (AAA rated washing machines).
- Gas hot water system with a minimum 5 stars WELS rating (alternatively, the use of a solar hot water system or high energy efficient electric heating pump may be appropriate).
- Encouraging hot water outlets be located close to the hot water system or a recirculating hot water supply to minimise wastage of energy and water.
- Covering all new swimming pools as now required by legislation.
- Maximising on site retention of stormwater.
- The proposed landscaping in the POS will rely on native vegetation which is used to the bell curve rainfall patterns typically exhibited in the southwest of Western Australia.

4.3 Waterwise Landscaping

The waterwise landscaping measures adopted for this development aim to reduce the amount of water used for irrigation by utilising low water use plants, soil amendments and efficient irrigation systems. The following principles will be implemented where practical:

- Waterwise vegetation – Plants must have low watering requirements and be suited to the local area, local native species preferred.
- Gardens will be mulched or filled with pin bark mulch (particle size between 15-75mm) to reduce evaporation. Garden beds will be mulched to 75mm with a product certified to AS4454.
- Hydro-zoning of plants of similar water requirements.
- Where required, soil shall be improved with soil conditioner certified to be planted and a minimum depth of 300mm for garden beds.
- Reticulation systems shall be designed and installed according to best water efficient practices.

The planting of native species is to be in accordance with the Vegetation Guidelines for Stormwater Biofilters in the South-West of Western Australia (Monash University, 2014).

5. STORMWATER DRAINAGE MANAGEMENT

The aim of the drainage strategy is to successfully manage Stormwater runoff for critical storm events such as the 100%, 20% and 1% AEP events. This Chapter addresses the management of surface flow for both major and minor events. On site retention is promoted in this LWMS wherever possible.

The Stormwater drainage system for the proposed development will consist of a network of interconnected reinforced concrete pipes to convey captured runoff from the 100% and 20% AEP ("minor") storm events into the catchment previously described in this document.

116 Barfield Road, Hammond Park encompasses a simple drainage strategy with overland flows within the Study Area to be managed to a basin that will be located centrally in the Public Open Space within the site. This basin and POS connects to existing POS and drainage infrastructure directly north, and south of the Study Area, making a logical extension of the local POS and drainage function. The drainage systems constructed in this LSP area will connect to the north via the proposed road networks and then circulate back through the road network to the south and into the expanded POS and basin network in this LPS area.

Therefore, the approval of the LWMS and LSP will provide an important, complimentary completion of the local network for the City of Cockburn.

5.1 Drainage Strategy Summary

The POS design is an interlinking natural storage area which will be planted. The goal of this design is to allow equalisation of storage from the existing basins to the north and south. The interconnecting basin in this LSP has been designed at an invert level that ensures no greater flooding in the existing basins and POS areas to the north and south. Drainage from the Study Area flows through the existing drainage to the north in Voyageurs Way and will then flow through the existing northern POS into the proposed basins within 116 Barfield Road, Hammond Park. Drainage from Irvine Parade flows to the existing basin in Lot 770 Gaebler Road to the north-west of the Study Area.

The subject site has an import fill regime proposed to ensure the future road grades are suitable for residential land development purposes. A Controlled Groundwater strategy is not necessary due to the distance between the existing surface and groundwater levels being at a minimum of 2.0m below the surface once earthworks have been completed in the Study Area.

Soak wells will manage lot runoff generated up to and including the 20% AEP within all lots. The volume required for each individual soak well shall be 0.0122*AC where AC is the impervious (roof) area in square metres.

Premise proposes to provide weep holes (to City of Cockburn Standard Drawing 2423B03) at the base of all drainage pits in the Study Area to promote localised infiltration given the required clearances to MGL are met. Using weep holes at the base of all drainage pits in the Study Area, Premise have ensured that post-development flows for the 20% AEP are equal to or less than those in pre-development.

The Figure on the following page shows the ultimate drainage strategy.

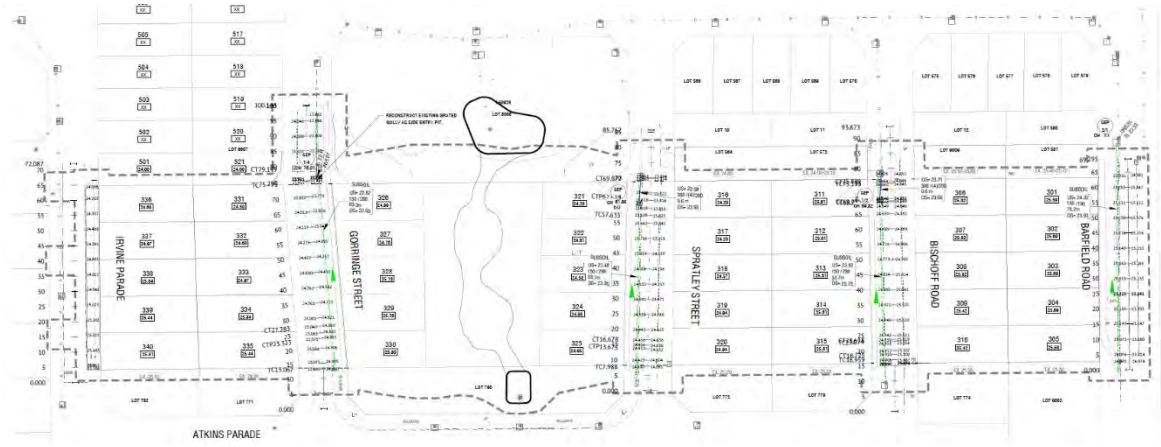


Figure 7 – Stormwater Drainage Strategy – 116 Barfield Road, Hammond Park

As shown above, the overland flows within the Study Area shall be managed to a basin located centrally in the Public Open Space within 116 Barfield Road, Hammond Park. The existing basins to the north and south of the Study Area as well as the proposed basin within the site will interlink storage areas. The new proposed basin will be planted with native species to minimise any watering requirements. The invert of the interlinking basin within this LWMS has been designed to ensure the existing basins hold TWL's in rainfall events no greater than their present TWL's. Therefore, the approval of the LWMS and LSP will provide an important, complimentary completion of the local network for the City of Cockburn.

The drainage system strategy will consist of a network of gully pits and reinforced concrete pipes traversing the development area (under roads). Runoff from major events (above the 20% AEP and up to and including the 1% AEP) will be conveyed via the road reserves shown in the Figure above.

All roads within 116 Barfield Road, Hammond Park have one-way crossfalls which enable the flow of on-road runoff in the direction of the existing topography.

All lots will be set with a target minimum of 0.3m above the gutter level of roads on the lower side of the road adjoining that lot. For lots on the higher side of the road, the targeted level difference is between 0.1m to 0.3m above the gutter level. At sag points, the targeted freeboard from proposed lot levels to sags is 0.5m.

These levels are shown in the Premise Civil Engineering Plans provided in Appendix G.

Therefore, the drainage strategies proposed in this LWMS and the accompanying Premise Civil Engineering Drawings in Appendix G are wholly in accordance with the DSP.

The following sections provide further detail on the strategy, calculations, and management of Stormwater to ensure that best management practices of stormwater management and flood protection are achieved.

5.2 Drainage Calculations

The drainage calculations undertaken for this project employ hydrologic methods outlined in the Australian Rainfall & Runoff (ARR) 2016 publication. The methods adopted are appropriate for the type of catchment in which the Study Area exists, with the design parameters used calibrated for the given site environment.

The drainage calculations undertaken for the Study Area assess the hydrological impact of the development because of urbanisation. The resulting designs manage storm events on a qualitative and quantitative basis such that the critical post development flow characteristics of the site mirror pre-development characteristics, and Stormwater is effectively managed within the development.

The design of volume dependent systems such as the retention basin utilise calculation methods that generate hydrographs for critical storm events to facilitate the design of components for the drainage system. This is described in further detail in the sections below.

5.2.1 RUNOFF COEFFICIENTS

The choice of runoff coefficient for drainage design can greatly influence the design of soil and water management structures included in the treatment systems for a particular site. The derived infiltration rate of the soils tested in the pre-development investigation of the Study Area was 5 metres per day, which corresponds to soil group A with an average infiltration of around 208mm/hr.

Soil type A is generally described as soils with moderate to high runoff potential. The soils in the Study Area appear to have excellent infiltration qualities which suit the provision of soak wells.

The runoff coefficients for the drainage calculations on the Study Area are provided in Table 8 below. The coefficients provided account for each of the critical storm events and factor the SHG for the Study Area. These coefficients are also illustrated in the drainage calculations in Appendix H.

Table 8 – Runoff Coefficients

	Storm Event		
Type	**100% AEP**	**20% AEP**	**1% AEP**
Lots (R25)	Stored within Lot Note: Lots less than 300m^2 to be connected or shown with specific drawings of the proposed building pad and the locations of sufficient soak wells to the City's satisfaction.	Stored within Lot Note: Lots less than 300m^2 to be connected or shown with specific drawings of the proposed buildings pad and the locations of sufficient soak wells to the City's satisfaction.	0.5
Road	0.8	0.8	0.8
Pre-Development	0.2	0.2	0.3
POS	0.5	0.5	0.5

5.2.2 CATCHMENT AREAS AND HYDROLOGY

The hydrologic assessment of the Study Area is based on the urbanisation of the 'catchment', with the catchment area being defined as the area bound by the spatial lot boundaries of the Study Area.

Contributing areas to the catchment were then broken down as road reserve areas, lot runoff areas, verge areas and public open space areas, each of these having the necessary parameters factored into drainage calculations (permeability, runoff losses, development category etc.). This assessment verifies the adequacy of the pipe data assigned in the design and provides a backup check of the backwater analysis for the drainage system.

This site provides a valuable interlink between the existing drainage outlets and basin areas directly to the north and south, and this LWMS provides the mechanism to interlink and equalise the drainage flood management between these sites. Our calculations have considered the whole of these catchments to determine the TWLs for the 1yr, 5yr and 100yr events. To confirm existing TWL's we also ran calculations for

the subject site as a standalone entity and compared these with the existing POS levels and areas of inundation shown from aerial imagery. The interconnecting TWL was then set to suit the visible existing areas and the interconnecting basin on the subject site was sized to suit an equalisation of flows to that maximum TWL.

It should be noted that the geotechnical report for the site was assessed to determine the infiltration capacity of the soils over the Study Area. The assigned volumetric runoff coefficient was based on the findings from the geotechnical report and best reflects the geology of the entire site.

5.3 Stormwater Management of Major Events

The lot size over the proposed development varies considerably, consisting of R25 lots of varying sizes. All lots will have soak wells installed on site, positioned to be at least 1.8m from building and property boundaries.

The soak wells are generally designed to have adequate capacity to accommodate events up to the 20% AEP storm, though this is dependent on the thickness of clean sand fill beneath the soak well (distance down to the impervious layer). The 116 Barfield Road, Hammond Park LWMS assumes that the soak wells will manage the 20% AEP due to the high infiltration qualities of the soil, in accordance with the Local Geotechnics Geotechnical Report and the clearance to groundwater achieved in the cut to fill strategy shown in Appendix G. Soak wells will have inadequate capacity to manage major events over this minor storm event, with runoff generated from major events flowing from lots onto the road reserve. The calculations presented in Appendix H, and the design drawings presented in Appendix G allow for this scenario.

The major drainage system has been designed for AEP events up to the 1% AEP. The major drainage system consists of a network of concrete pit and pipes, laid under roadways, both existing and proposed, plus the roadways themselves. The pipes have been sized based on flows from the 20% AEP events, restricting inundation for that event.

Runoff from major events will enter the piped drainage system via gully pits spread throughout the proposed development. From here, runoff water will then be conveyed into the basin being built in POS within the Study Area.

Stormwater modelling indicates that there will be minor areas of inundation in the 1% AEP event. This inundation is limited to roadways which generally serve as 1% AEP flood paths. All lots have been set above these inundation levels.

5.3.1 DRAINAGE BASIN – 116 BARFIELD ROAD

Basin sizing calculations were used to size the basins for 116 Barfield Road, Hammond Park. The calculations undertaken are consistent with that of a synthetic unit hydrograph procedure, in which a time-area diagram of the catchment is constructed. This graph is routed through a linear storage, the convolution of the resulting unit hydrograph for the City of Cockburn area with the hyetograph provides a hydrograph specific to the area that the basin serves. Premise have utilised a standard permeability of 5m/day with clogged base at 0.5m/day for a depth of 0.5 metres.

The resulting outputs from this calculation can be seen in Appendix H.

Table 9 – Stormwater Drainage Details for Proposed Basins

Drainage Basin Details					
ARI Event	**Base**	**Top Water Level**	**Depth (m)**	**Basin Area – Base (m^2)**	**Storage Volume Required (m^3)**
116 Barfield Road, Hammond Park					
1% AEP	22.600	22.908	0.308	1200	411
20% AEP	22.600	22.913	0.313	150	69
100% AEP	22.600	22.808	0.208	150	41

The base of the basin and the top water levels (TWL) for each storm event are provided in Table 9 above for each of the basins.

The calculations above and attached in Appendix H, therefore show that the proposed drainage design is robust and fit for purpose.

5.3.2 PUBLIC SAFETY

There will be warning signs placed around the basin, and a water depth marker installed within the basin indicating water depth from the base.

A Water Safety Audit will be required to be undertaken upon completion of construction of the basins.

5.3.3 FLOOD PROTECTION

The main Stormwater drainage strategy is proposed to dispose of water from all events by directing runoff along roadways and piped networks to the proposed drainage basin. This is to ensure delivery of the 1% AEP storm. Piped drainage systems will be sized in accordance with the intensity of the 20% AEP event and carry the overflow to these locations.

All lot levels are above the adjoining road levels, with finished floor levels having at least 0.3m clearance above the estimated 1% AEP flood levels on the road in front of the lots.

5.4 Water Quality Management

This chapter addresses the water quality management approach for the development of the Study Area. Though it is not strictly an objective of managing major events to treat for quality, the control measures implemented will provide some level of quality management. Structural and non-structural controls will be implemented to manage the quality of smaller rainfall events.

5.4.1 NON-STRUCTURAL CONTROLS

Non-structural controls such as public awareness and community education can be used to support the structural controls in achieving Stormwater quality management. The following non-structural controls will be used in the development of the Study Area:

- Nutrient control through landscaping – planting of appropriate native species managed together with an appropriate fertiliser, pesticides, and irrigation regime (drought tolerant gardens to lot purchasers via landscaping packages). Utilisation of groundwater bores for gardening will be promoted where applicable.
- Waste and construction management – management of litter, sediment and organic material by regular street sweeping, stormwater drainage manhole education co-ordination with the City of Cockburn and discouraging waste dumping in drainage channels (such as the basins and / or piped networks) through restricted access or landscaping design.

5.4.2 STRUCTURAL CONTROLS

The structural controls used as part of this drainage design include the retention and infiltration of minor events within the lots and setting the base of the basin at least 300mm above AAMGL levels in that area.

6. GROUNDWATER MANAGEMENT

The groundwater management criteria for this development are governed by the key principles and objectives of the DSP. The focus of groundwater management for the Study Area is to ensure that groundwater levels are maintained within their existing natural regime, and where applicable, developed land is provided with sufficient clearance above groundwater levels. Furthermore, groundwater will be managed to achieve a high-water quality. The following criteria are key points applicable for the development of the Study Area:

- Soak wells to be used in areas with 2.0m sand (as classified by a geotechnical engineer), which includes a combination of imported sand and in-situ sand. Sandy clay and clayey sand are deemed to be unsuitable for infiltration drainage techniques.
- If less than 2.0m of sand, the lot will have an overflow direct connection to the Stormwater drainage system.
- If the AAMGL is 1.8m below the finished surface or greater, no subsoil drainage is required and infiltration drainage is considered acceptable.
- During construction, it is important to be mindful of the risk of any perching of groundwater that occurs throughout the Study Area.

6.1 Groundwater Quality Targets

The earthworks operations undertaken for this development (detailed in the subsequent section) are large in scale, however, the existing groundwater levels across the Study Area are unlikely to rise because of development of the land. The key management requirement for this project is to ensure there is sufficient clearance between groundwater and surface level and no perching of trapped groundwater beneath proposed buildings and roads.

The post-development monitoring of groundwater will be required due to the construction of the ultimate basin within the POS area. This monitoring plan is outlined in Section 8.3 of this report and should be undertaken for a minimum of 3 years.

7. PUBLIC OPEN SPACE AND VERGE PLANTING WITHIN ROAD RESERVES

There is one area of Public Open Space area proposed within 116 Barfield Road, Hammond Park. In accordance with the DSP, this LWMS discusses the short and longer-term irrigation and landscaping requirements for verge and median street tree planting. Appendix K shows the proposed street tree layout throughout the Study Area. Street trees are to be planted at the time of occupation of houses in coordination with the new landowners to ensure street trees are planted clear of driveway crossovers. As per City of Cockburn requirements, a landscaping concept plan has been submitted.

7.1 Irrigation

The City of Cockburn prefers the planting of street trees and verge vegetation as part of the occupation of lots in front of all proposed lots. The developer confirms street trees will be planted upon occupation with irrigation the responsibility of each property owner. It will be the responsibility of the Lot owners to maintain their portions of verges.

Water supply for the irrigation systems will be from mains water or otherwise mentioned.

The landscaping within the POS areas will be native vegetation selections not requiring irrigation.

7.2 Landscaping

As discussed in Section 4.3, the waterwise landscaping measures recommended for this development will aim to reduce the amount of water used for irrigation by utilising low water use plants, soil amendments and efficient irrigation systems. The following principles will be implemented where practical:

- Waterwise vegetation – Plants must have low watering requirements and be suited to the local area, local native species preferred.
- Gardens will be mulched or filled with pine bark mulch (particle size between 15-75mm) to reduce evaporation. Garden beds will be mulched to 75mm with a product certified to AS4454.
- Hydro-zoning of plants of similar water requirements, (where required for POS landscaping).
- Where required, soil shall be improved with soil conditioner certified to be planted and a minimum depth of 300mm for garden beds.

8. MONITORING AND MAINTENANCE

8.1 Pre-Development

Preliminary desktop investigations have been undertaken to establish site characteristics to determine any potential impacts (if any) that development of the Study Area may have. Further, the information from Local Geotechnics geotechnical investigation have also provided groundwater levels across the Study Area.

Pre-development investigations have also confirmed existing groundwater quality so that baseline information has been obtained to verify the strategies outlined in this LWMS are satisfactory.

8.2 Construction Management

Management of subdivision works will ensure that any potential impacts to the surrounding environments and existing residential developments are minimised through the implementation of correct management measures and exercising best management practices.

Each of these measures are discussed at length below.

8.2.1 DRAINAGE INFRASTRUCTURE

Thorough inspection of the entry points to the drainage network will be undertaken during the construction phase and prior to Practical Completion to ensure all litter and clogging sediment is removed. Further, sediment and litter on roads will be monitored and removed as necessary with street sweeping. These control measures are implemented to ensure that the drainage infrastructure is not adversely impacted during the construction phase and will maintain function and efficiency post construction.

8.2.2 DUST AND SEDIMENT CONTROL

Dust is generated when there is sufficient wind velocity and frequency to lift fine particles from a surface. The susceptibility of the particles to the uplift is dependent on the size and weight of the particles as well as the compaction and moisture content of the ground. Consequently, the mitigation of the issue of dust is controlled by addressing the parameters for uplift. The strategy employed is to consider the surrounding land uses, the closest sensitive receptors and the prevailing wind and climatic condition for the season in which the works are to be conducted.

Dust management is required to ensure the health and amenity of neighbours and employees, good visibility on site, maintenance of machinery and equipment, and maintenance of the surrounding water quality. Environmental protection measures to mitigate adverse effects include:

- Retain vegetation if possible, prior to clearing. The use of temporary fencing to maintain vegetation during construction where possible. This is the most effective method of dust suppression (Soil Conservation Authority, 1979).
- Stabilisation of disturbed areas in a timely manner.
- Exposed soils managed by wetting down.
- Truck loads to be covered and washed down prior to entering and leaving the site.

A non-potable source of water shall be used for dust control.

The construction will occur in a manner consistent with an approved Erosion and Sediment Management Plan put forth by the approved contractor for the works. Management of the sediment during development is a key

factor in the success of installed best management practices. The DER requires that all development construction projects, including road and infrastructure construction, implement sediment and erosion control measures. Measures include:

- Designated construction transport routes across the site.
- Single transport entry points with shake down grids.
- Street sweeping to reduce sand drift.

8.2.3 DEWATERING

In accordance with the requirements of this LWMS, all groundwater must be recharged locally. Dewatering operations where required as part of the construction works will require a dewater license, unless the dewatering meets the exemption criteria outlined in advice from the Department of Water and Environmental Regulation:

- *The development is within the water table (non-artesian) aquifer; and*
- *Water is taken from the well solely for the purpose of removing underground water to facilitate construction or other activity (that is, dewatering) which does not include those activities that relate to the extraction of basic raw materials or result in the lowering of the natural ground level; and*
- *The water is taken at a pump rate not exceeding 10 litres per second over a period of 30 consecutive days; and*
- *The volume of water taken over the period does not exceed 25,000 litres per kilolitres.*

8.3 Post-Development Monitoring

As part of the Best Management Practices incorporated into the drainage system design, a monitoring program is to be implemented post construction.

A minimum of three years of post-development monitoring is proposed for the site following practical completion of the development, after which time, the program will be assessed to determine if further post-development monitoring is required. The aim of the post-development monitoring is to demonstrate that potential impacts to groundwater and surface water have been avoided or minimised through the WSUD design incorporated into the development and ensure that the drainage system is functioning as designed. Post-Development monitoring for this stage will likely be incorporated with post-development monitoring for other stages as they progress.

8.3.1 GROUNDWATER MONITORING

Groundwater levels will be monitored monthly during the winter period from May to October to obtain a clear picture of the seasonal groundwater peak, and quarterly outside of this. Groundwater quality will be monitored on a quarterly basis. The groundwater quality monitoring will include field measurement of physical-chemical parameters and the collection of samples for nutrient analysis at a NATA accredited laboratory. The nutrient suite will include TN, TKN, NOx-N, NH4-N, TP and FRP.

8.3.2 SURFACE WATER MONITORING

The area studied under this LWMS does not have a direct interface to a surficial water layer; therefore surface water monitoring is not required under this LWMS.

8.3.3 TRIGGER LEVELS AND CONTINGENCY MEASURES

The post-development results of the monitoring program will be compared against the ANZECC (2000) freshwater guidelines for slightly-moderately disturbed lowland rivers in south-west Australia, the long-term irrigation water guidelines (ANZECC 2000), the HRAP targets for TN and TP, as well as trigger values derived from the pre-development data, which is proposed to be 20% above the mean of the pre-development results. If water quality measurements in the post-development monitoring exceeds the pre-development trigger values on two consecutive occasions, the CoC and DWER will be notified. Contingency actions and assessments should then be undertaken.

Table 10 – Post-Development Water Quality Monitoring Trigger Values 2020

Bore ID	TP (mg/L)	FRP (mg/L)	TN (mg/L)	TKN (mg/L)	NH4-N (mg/L)	NOx-N (mg/L)	Organic N (L)
ANZECC FWG	0.065	0.04	1.2	-	0.08	0.15	-
HRAP	0.1	-	1	-	-	-	-
LIWG	0.05	-	5	-	-	-	-

Ref: ANZECC FWG "Lowland Rivers in South West Australia for slightly disturbed ecosystems, Table 3.3.6 ANZECC 2000. HRAP "Healthy River Action Plan Targets, Swan River Trust 2007. LIWG "Long-term Irrigation Water from Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000).

Possibility contingency actions and assessments may include:

- Assessment of whether the pollution is a point or diffuse source
- Assessment of whether the pollution is due to the development or an external factor
- Removal of the pollution; source where practicable
- Assessment of whether the drainage system and bio-filtration areas are functioning as designed
- Further soil amendment in the bio-filtration areas
- Increased planting of nutrient stripping vegetation in the infiltration areas
- Review of drainage maintenance plans to ensure correct practices are being implemented
- Public awareness and education programs
- Increased monitoring program including groundwater monitoring up gradient of the site to determine potential off-site nutrient sources.

8.3.4 REPORTING AND MONITORING SUMMARY

The Post-Development monitoring results will be compared against the trigger levels derived from the pre-development data, ANZECC (2000) guidelines and the HRAP guidelines and reported annually to the City of Cockburn and DWER. The report will discuss if the development has caused any adverse impacts on the hydrological conditions and proposed any necessary contingency plans where required.

The health and functionality of the proposed drainage basin, and associated drainage structures will require regular maintenance to ensure efficient operation. Maintenance inspections should be scheduled to be conducted after significant storm events, the inspections should place focus on the time taken for the basin to empty, potential scouring within the basin, and build ups of sediment.

The findings from monitoring inspections and maintenance schedule should be discussed with the City of Cockburn. Information collected from monitoring programs will be summarised in report format by the developer and provided to the City of Cockburn for review. A monitoring plan for the area has been provided in Table 11 below. With standard monitoring requirements for the drainage system outlined in Table 12 on the following page.

Table 11 – Post-Development Monitoring Plan

Monitoring Type	Parameter	Location	Method	Frequency	Reporting
Groundwater Level	Groundwater Level (mAHD)	1 Monitoring Bore Location (tbc)	Electrical depth probe or similar	Monthly from May to October (winter period) for 3 years	Annual assessment to be submitted to DoW and CoC for 3 years. Suitability of existing monitoring and reporting frequencies to be assessed annually with any modifications requiring agreement by all parties (DoW, CoC & Developer)
Groundwater Quality	pH, EC, Nitrogen, Phosphorus, Metals		Pumped bore samples	Quarterly for 3 years (Jan, Apr, Jul & Oct)	
Basin Functionality	Water Level (mAHD)	Water Level Recorder at Basin storage area	Continuous water level measurements via water level recorder and data logger	Continuous for 3 years	

Table 12 – Monitoring Schedule

Item	Location	Maintenance Trigger / Indicator	Action Required	Maintenance Interval			
				As Required	Monthly	Quarterly	Biannually
Surface water quality (physical parameters and nutrient levels)	Drainage Basin	Swales and Basin not emptying and available for recharge. Change of colour of water being withheld.	1st step is to monitor visual appearance and emptying time. If the colour of water becomes green, or the emptying time is longer than 48 hours for the 20% AEP event, samples shall be collected for testing.		✓ (for winter months: May to October)		
Erosion Inspection	Drainage Basin	The presence of severe erosion in drainage locations. Batters in drainage infrastructure suffering from erosion.	Investigate extent of erosion and determine cause. Rectify cause with maintenance or replacement works.				✓ (suggested)
Rubbish and litter inspections	Throughout the development	Rubbish or litter blocking drainage structures or detracting from visual appearance of the development	Remove litter, identify source, and respond accordingly. Rubbish / litter inspections should be done monthly.	✓			

Item	Location	Maintenance Trigger / Indicator	Action Required	Maintenance Interval			
				As Required	Monthly	Quarterly	Biannually
Sediment build-up inspections	Drainage Basin	Build-up of sediments within drainage infrastructure (restricting inundation)	Investigate – determine cause of sediment source. Remove accumulated specimens, replace filter material if required. Sediments should be checked as required / after rainfall events.				✓
Weed control (assessment of vegetation health)	Throughout the development	Highly invasive weeds and / or dead plants (pattern of plant deaths)	Manually remove. Weed control inspections should be done monthly.			✓	

9. IMPLEMENTATION PLAN

9.1 Roles and Responsibilities

Table 13 – Implementation Plan

Management Commitment / Item	Responsibility (funding where applicable)
Construction of street drainage system and drainage basins	Developer
Maintenance and monitoring of street drainage system	Developer (defects liability period of 24 months)
Construction of lot soak wells	Builder / Lot owners (after lot purchase)
Design and construction of the required water and sewer reticulation	Developer
Appropriate cut / fill levels in building envelopes and roadways achieved for necessary clearance requirements	Developer
Planting of vegetation consistent with City of Cockburn requirements	Developer
Monitor performance of the drainage basins for a period of 2 years (Post-Development)	Developer
Maintenance of the Stormwater drainage system (after defects liability period of 24 months)	City of Cockburn
Education and encouragement of waterwise practices for lot owners	City of Cockburn / Developer (at point of sale)
Maintain water and sewer supply system	Water Corporation

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APPENDIX A

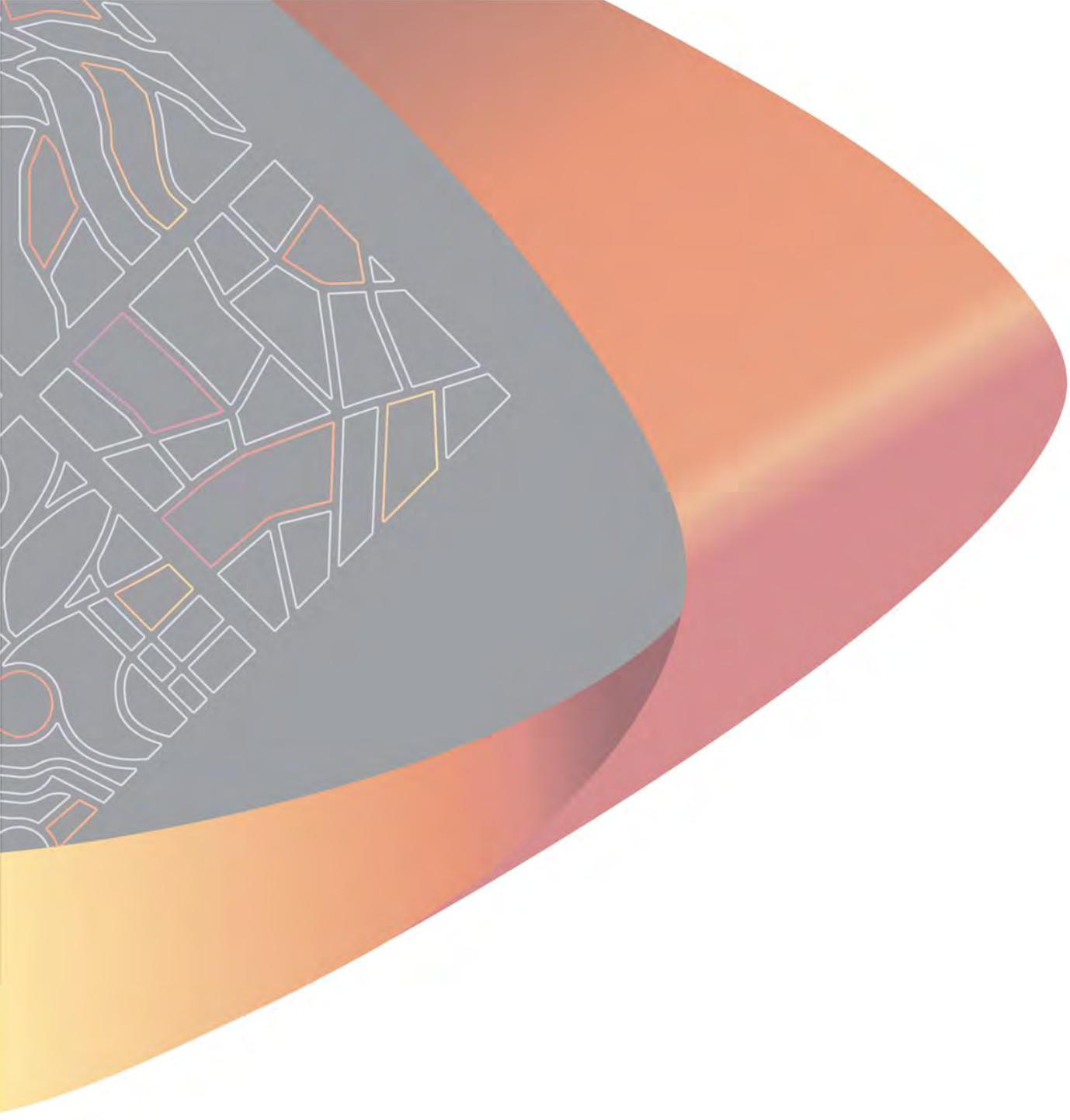
LWMS CHECKLIST

The following is the summary / checklist for a Local Water Management Strategy in accordance with the Department of Waters Guidelines for preparing plans and for complying with subdivision conditions.

Deliverable	Status (Y / N)	LWMS Item
Summary		
Design elements and requirements (Table form)	Y	Development of design elements and compliance with design objectives.
Design requirements for critical control points (Table form)	Y	Key design requirements for detailed design – critical control points and elements.
Planning Approval		
Location plan	Y	Location plan, adjoining lots, key landscape features and roads, local water management strategy.
Site context plan	Y	Structure plan, zoning and land use.
Subdivision layout plan	Y	Subdivision plan and / or approval (WAPC). Subdivision plan provided as submitted to WAPC.
OR a combination of the above	Y	Location Plan, Site Context Plan and Subdivision Layout Plans provided.
Site Characteristics		
**Addressed in document	Y	Existing information and more detailed assessments (monitoring) of site; explanation of how the site characteristics affect the design.
Site condition plan	Y	Site conditions – existing topography / contours, aerial photo underlay, major physical features.
Geotechnical plan	Y	Geotechnical – topography, test pit locations, soil zones and descriptions, site classification zones, proposed earthworks, and approximate finished contour levels.
Environmental plan, plus supporting data where appropriate	Y	Environmental – sensitive or significant vegetation areas, wetlands and buffers, waterways and buffers, contaminated sites.
Surface water plan	Y	Surface water – topography, 100-year floodways and flood fringe areas, 100-year proposed flow paths, water quality of flows entering and leaving (if applicable). Location of basins, TWL and basin invert levels shown and referenced in this report. Refer Premise drawings P003127 C350s and C370.
Landscape plan	Y	Street Tree plan provided in Appendix K.
Water Sustainability Initiatives		
**Addressed in document	Y	Water supply and efficiency measures.

Deliverable	Status (Y / N)	LWMS Item
Alternative supply scheme and plan	Y	Water supply and efficiency measures.
Alternative supply scheme and plan	Y	Fit-for-purpose strategy and agreed actions. if non-potable supply, support with water balance.
**Addressed in document	Y	Wastewater management.
Stormwater and Groundwater Management		
100-year flood plan	Y	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 Catchment plan shows all 20% and 1% AEP flows from the Study Area.
Long section of critical points	N / A	
1-year event plan	Y	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. The Drainage Strategy Plan P003127 C370 is provided in Appendix G.
5-year event plan	Y	
Typical cross sections	Y	
Groundwater / subsoil plan	Y	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.
Typical cross section (max and minimum)	N / A	
Acid Sulphate Soils and / or contamination	N / A	Actions to address acid sulphate soils or contamination.
**Addressed in document	N / A	Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages.
**Addressed in document	Y	Management of disease vectors and nuisance insects.
Other Issues – Landscape Concept		
**Addressed in document	Y	Landscaping concept for street trees provided in Appendix K.
**Addressed in document	N / A	If a constructed water body is proposed and has been endorsed in the local water management plan, the LWMS shall address the requirements of the Department of Water's *Interim position*

Deliverable	Status (Y / N)	LWMS Item
		statement: Constructed lakes and any local government requirements or policies. The proposed constructed water bodies are temporary drainage basins.
**Addressed in document	N / A	Where significant environmental areas exist on or near the site, additional measures are likely to be needed to ensure their protection. Provide information about the areas' current hydrology and demonstrate that it will not be dissimilar post-development.
Managing Subdivision Works		
**Addressed in document	Y	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		
**Addressed in document	Y	Sampling and assessment plan including duration and arrangements for ongoing actions.
Implementation Plan		
**Addressed in document	Y	Roles, responsibilities, funding for implementation.
**Addressed in document	Y	Agreed maintenance arrangements.
**Addressed in document	Y	Assessment and review.



Premise

PART OF THE Amey GROUP

Appendix B

SITE LOCATION PLAN

SHIRE OF CHITTERING

SHIRE OF TOODYAY

CITY OF WANNEROO

CITY OF SWAN

CITY OF JOONDALUP

SHIRE OF NORTHAM

CITY OF STIRLING

SHIRE OF MUNDARING

TOWN OF BASSENDEAN

CITY OF VINCENT

CITY OF BAYSWATER

TOWN OF CAMBRIDGE

CITY OF SUBIACO

CITY OF PERTH

CITY OF BELMONT

CITY OF NEDLANDS

TOWN OF VICTORIA PARK

PERTH

CITY OF SOUTH PERTH

TOWN OF COTTESLOE

TOWN OF MOSMAN PARK

SHIRE OF PEPPERMINT GROVE

SHIRE OF KALAMUNDA

TOWN OF EAST FREMANTLE

CITY OF CANNING

SHIRE OF YORK

CITY OF FREMANTLE

CITY OF MELVILLE

CITY OF GOSNELLS

CITY OF COCKBURN

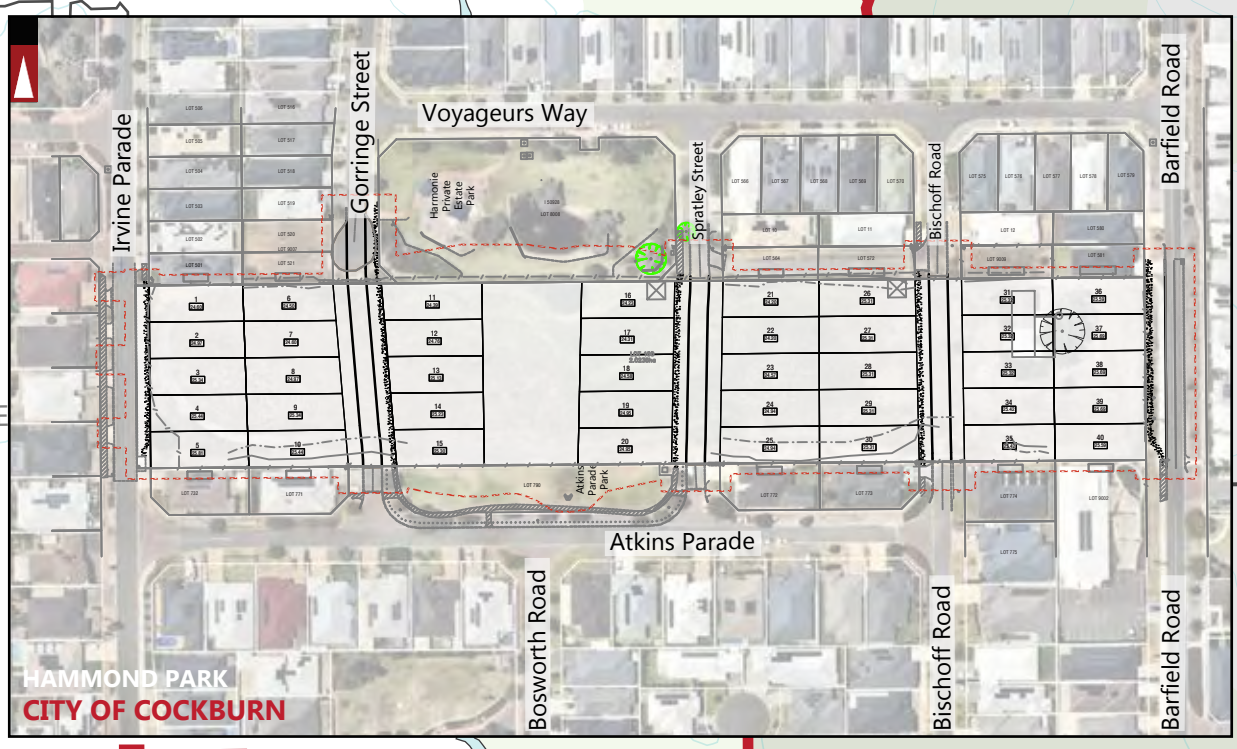
SUBJECT SITE

SHIRE OF BEVERLY

CITY OF ARMADALE

CITY OF KWINANA

CITY OF ROCKINGHAM



PARKS AND RECREATION

WATERWAYS

PUBLIC PURPOSE

Irvine Parade — STREET NAME

HAMOND PARK — SUBURB NAME

CITY OF COCKBURN — LOCAL GOVERNMENT NAME

STAGE BOUNDARY

CADASTRAL BOUNDARY

RAILWAY

LEGEND

REV	DATE	AMENDMENT
B	21-07-2025	ISSUED FOR REVIEW
A	05-02-2025	ISSUED FOR REVIEW

PROJECT: No 116 Barfield Road, Hammond Park

TITLE: Site Location Plan

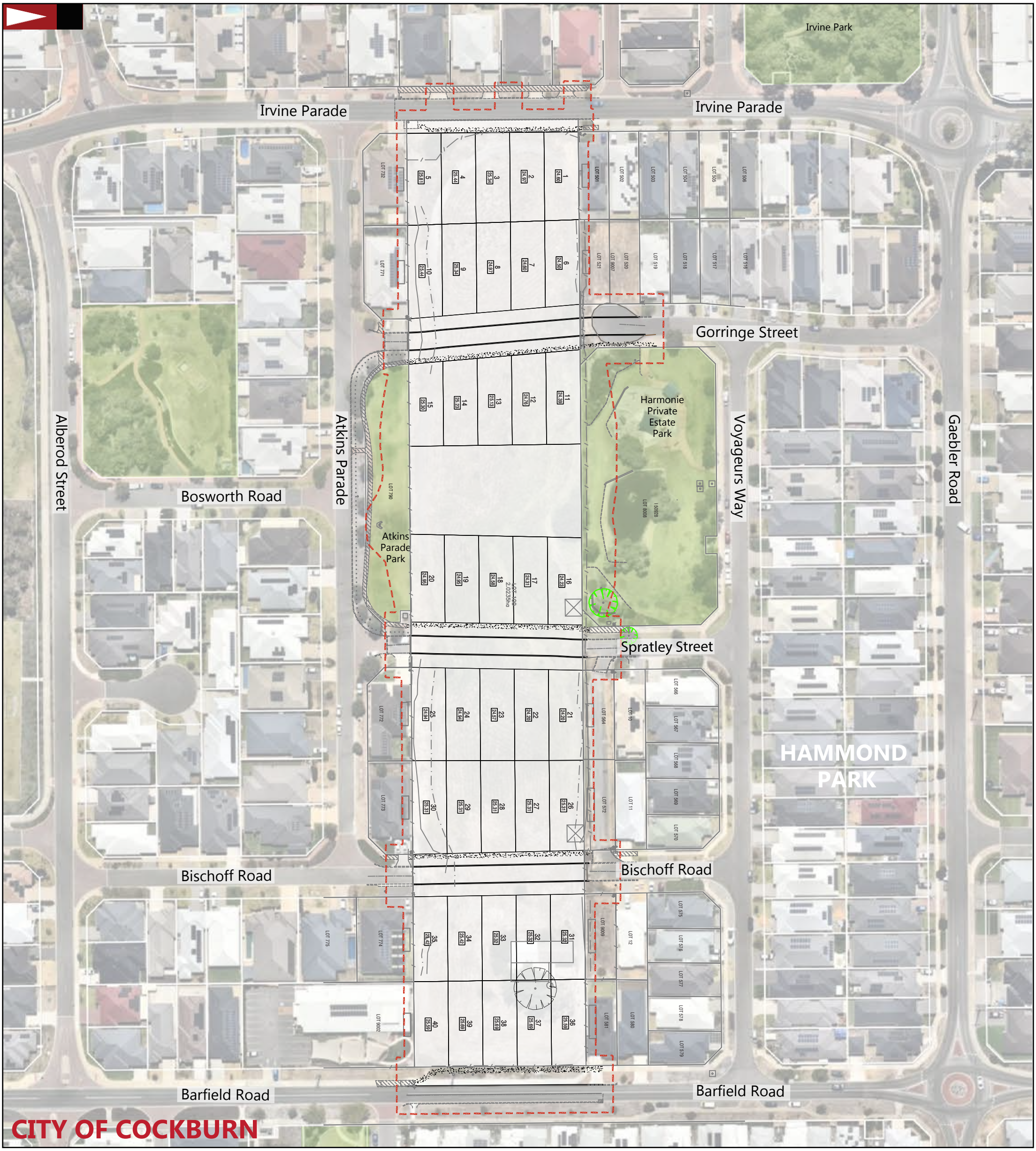
DRAWING NUMBER: P003127_S01

DRAWN BY: J.S.

Premise

Appendix C

SUBDIVISION PLAN



PARKS AND RECREATION

WATERWAYS

PUBLIC PURPOSE

Irvine Parade — STREET NAME

HAMOND PARK — SUBURB NAME

CITY OF COCKBURN — LOCAL GOVERNMENT NAME

STAGE BOUNDARY

CADASTRAL BOUNDARY

LEGEND

REV	DATE	AMENDMENT
B	21-07-2025	ISSUED FOR REVIEW
A	05-02-2025	ISSUED FOR REVIEW

PROJECT: No 116 Barfield Road, Hammond Park

TITLE: Subdivision Plan

DRAWING NUMBER: P003127_S02

DRAWN BY: J.S.

Premise

Appendix D

SURROUNDING LAND USE

PARKS AND RECREATION

WATERWAYS

PUBLIC PURPOSE

Irvine Parade — STREET NAME

HAMOND PARK — SUBURB NAME

CITY OF COCKBURN — LOCAL GOVERNMENT NAME

STAGE BOUNDARY

CADASTRAL BOUNDARY

RAILWAY

LEGEND

REV	DATE	AMENDMENT
B	21-07-2024	ISSUED FOR REVIEW
A	05-02-2024	ISSUED FOR REVIEW

PROJECT: No 116 Barfield Road, Hammond Park

TITLE: Surrounding Land Use Plan

DRAWING NUMBER: P003127_S03

DRAWN BY: J.S.

Premise

Appendix E

LOCAL GEOTECHNICS GEOTECHNICAL REPORT

LOCAL GEOTECHNICS

26 July 2024

Report on

Geotechnical Site Investigation

116 Barfield Road, Hammond Park WA

Project:
LG8122024GI REV_0

Client:
Strategic Property Group Pty Ltd

12/8 Production Road, Canning Vale WA 6155
PO Box 5050, Canning Vale South, WA 6155
08 9457 3517 (0), 0425 545 508 (M)
ABN 61 737 984 867
admin@localgeotechnics.com.au
localgeotechnics.com.au

LOCAL GEOTECHNICS

26 July 2024

To
Strategic Property Group Pty Ltd

Dear Sir/Madam,

RE: Geotechnical Site Investigation for 116 Barfield Road, Hammond Park WA.

This letter presents our report on a geotechnical site investigation carried out at *116 Barfield Road, Hammond Park WA*. The report must be thoroughly read and implemented in full, no partial implementation of this report is allowed.

If you have any questions in regards to the geotechnical site investigation or we can be of further assistance, please do not hesitate to contact Local Geotechnics.

Sincerely yours

Dr. Harun Meer
Ph.D.(Geotech), M. Eng. (Geotech), B. Eng. (Civil)
MIEAust, CPEng, EngExec, NER, APEC Engineer, IntPE(Aust)
Director
Local Geotechnics

PROJECT INFORMATION

Project	**LG8122024GI REV_0** **Geotechnical Site Investigation**
Site Location	**116 Barfield Road, Hammond Park WA**

Rev	Description	Date	Prepared by	Approved by
0	Issued to client	26 July 2024	O Bandara	H Meer

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EXECUTIVE SUMMARY

Strategic Property Group Pty Ltd commissioned Local Geotechnics to prepare a geotechnical site investigation report for 116 Barfield Road, Hammond Park WA. The proposed construction will be a land subdivision for residential dwellings.

The objectives of the site investigation were to obtain information on the subsurface conditions in order to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011.

Field works were conducted on 19 July 2024 in cloudy weather conditions. The investigation work consisted of field observation, documentation, sub-surface probing, soil profile logging, conducting of penetrometer testing alongside the test holes and conducting of field permeability test.

The findings of the site classifications are presented in the following sections

Six Test holes (TH1, TH2, TH3, TH4, TH5 and TH6) were conducted at the site by using a hand auger. TH1 – TH6 consist of a similar soil profile as described below:

- **Topsoil, SAND (SP)** – fine to medium grained, grey, with grass and roots, trace of silt, slightly moist, loose to medium dense, up to a depth of 0.3 m; followed by
- **SAND (SP)** – fine to medium grained, grey/ pale grey/ yellowish brown, trace of silt, moist to wet, loose to dense, up to the maximum investigated depth

TH1, TH2 and TH6 were terminated at the target depth of 2.5 m, TH4 and TH5 were terminated at a depth of 1.2 m due to hole collapsed and TH3 was terminated at depth of 1.3 m due to hole collapsed.

Ground watertable was encountered in TH3, TH4 and TH5 at a depth of 1.1 m, 0.9 m and 1.0 m respectively, during the time of invesatigation. Test hole logs are attached in Appendix B.

It is observed from the PSP test that the site soil is in loose to dense condition. Based on the PSP results, we recommend that the foundation material is not capable of sustaining an allowable bearing pressure of 100 kPa in its current condition.

Site Classification
Provided earthworks are completed as per the recommendation in Section 6.8 of this report, based on the site soil profile and surrounding condition, the site can be classified as **"CLASS A"** in accordance with the definitions provided in Australian Standard AS2870 - 2011. The characteristics surface movement ***Ys*** is considered to be zero or negligible.

Stormwater Drainage
Onsite disposal of roof runoff and stormwater via soak well is appropriate for this site. The drainage system must be designed by a qualified engineer as per requirements of the local government authority. Water table was observed at shallow depth at (TH3,TH4 and TH5) test holes during the investigation.

Details of engineering recommendations, such as earthworks, bearing capacity and settlements are presented in Section 6.0.

It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction to ensure that all organic, roots, demolition debris, loose material have been adequately removed from the area and that the fill material is adequately compacted.

1.0 INTRODUCTION

Strategic Property Group Pty Ltd commissioned Local Geotechnics (LG) to prepare a geotechnical site investigation report for 116 Barfield Road, Hammond Park WA (the project). The site location is shown in Figure 1.

Figure 1. Aerial view of the site location (Source: Google Map)

The objectives of the investigation are to obtain information on the sub-surface conditions to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011 and to provide recommendations on stormwater drainage system for the site. Field works were conducted on 19 July 2024. Weather condition on the day of field investigation was cloudy.

The scope of the investigation did not include compaction control, bearing capacity, wind force calculations or classifications, slope stability checking, and settlement calculation. Environmental issues were not considered in this report.

2.0 PROPOSED DEVELOPMENT

The proposed construction will be a land subdivision for residential dwellings.

3.0 SCOPE AND OBJECTIVES

The scope and objectives of the investigation are as follows:

- Conducting of up to Six (06) Test Holes (TH) by using a hand auger up to 2.5 m or refusal;
- Logging of site soil profile as per Australian Standard AS1726;
- Groundwater recording as per test hole observation;
- Conducting of Perth Sand Penetrometer (PSP) tests alongside the test holes up to a depth of 1.95 m or refusal;
- Submit a factual report on findings to classify the site in accordance with the Australian Standard AS2870 - 2011;
- Provide recommendation on earthworks; and
- Provide recommendation on stormwater drainage.

4.0 SITE CONDITIONS

4.1 Surface Condition

The site is located at 116 Barfield Road, Hammond Park WA. There is an existing shed to the east side. There are small to medium size trees and the site is covered with grass and bushes. Site surface condition and overall topography is undulating. There are double storey houses in the surrounding properties.

Water ponding was not observed at the site during the time of investigation. Site photos taken during the field investigation are shown in Appendix C.

4.2 Subsurface Condition

A review of Environmental Geological Western Australia survey Map of Fremantle 1:50,000 (Part sheets 2033 I and 2033 IV) was conducted before site investigation. Environmental Geological map of Fremantle revealed that the site is consisted of S8 – SAND - very light grey at surface, yellow at depth, fine to medium grained, sub-rounded quartz, moderately well sorted, of eolian origin.

Environmental Geological map of Fremantle also revealed that the site soil has high permeability, low corrosion potential, low slope stability, medium to high bearing capacity. Well drained when dry and vegetation free it could be remobilised, drainage disposal is only a problem in areas of high water table.

4.3 Groundwater Information

A review of 'Perth Ground Water Atlas' of the Department of Water was carried out for this site. 'Perth Ground Water Atlas' revealed that the site has a natural surface level of approximately 23.17 m AHD, maximum water table level of 22.60 m AHD and minimum water table level of 21.89 m AHD as per Perth Ground Water Atlas, 2019.

Natural Surface Level: 23.17 m AHD

Maximum water table Level = 22.60 m AHD

Minimum water table level = 21.89 m AHD

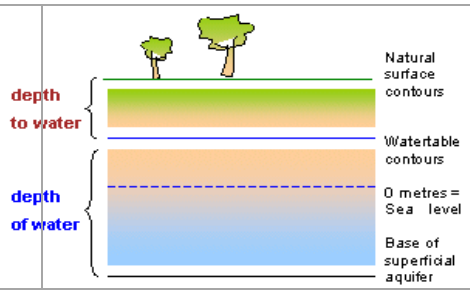

Figure 2. Water Table Information (Source: Perth Ground Water Atlas)

5.0 FIELD INVESTIGATION

The field investigation consists of test holes by using a hand auger at six locations, taking photograph and conducting of Perth Sand Penetrometer (PSP) testing alongside the test holes.

5.1 Test Hole Logs

Six Test Holes (TH1, TH2, TH3, TH4, TH5 and TH6) were conducted at the site by using a hand auger. Test hole locations are shown in the site sketch in Appendix A.

TH1 – TH6 consist of a similar soil profile as described below:

- **Topsoil, SAND (SP)** – fine to medium grained, grey, with grass and roots, trace of silt, slightly moist, loose to medium dense, up to a depth of 0.3 m; followed by

- **SAND (SP)** – fine to medium grained, grey/ pale grey/ yellowish brown, trace of silt, moist to wet, loose to dense, up to the maximum investigated depth.

TH1, TH2 and TH6 were terminated at the target depth of 2.5 m, TH4 and TH5 were terminated at a depth of 1.2 m due to hole collapsed and TH3 was terminated at depth of 1.3 m due to hole collapsed.

Ground watertable was encountered in TH3, TH4 and TH5 at depths of 1.1 m, 0.9 m and 1.0 m respectively, during the time of invesatigation. Test hole logs are attached in Appendix B.

5.2 Perth Sand Penetrometer (PSP) Tests

PSP tests were conducted alongside the test holes. PSP test indicates soil density of the site as per Standard Australia HB 160-2006, Table 6.4.6.1(A) & (B). PSP data are presented in Table 1. PSP test certificates are attached in Appendix B.

Table 1. Summary of PSP test data

PSP No.	PSP1		PSP2		PSP3		PSP4		PSP5		PSP6	
Depth (mm)	**Penetration Resistance - Blows/300mm I Density Classification**											
0 – 150	Seating		Seating		Seating		Seating		Seating		Seating	
150 - 450	3	L	4	L	4	L	4	L	7	MD	2	L
450 - 750	4	L	19	VD	7	MD	3	L	6	MD	7	MD
750 - 1050	5	L	22	VD	10	D	3	L	7	MD	11	D
1050 - 1350	8	D	14	D	10	D	4	L	10	D	10	D
1350 - 1650	10	D	15	VD	10	D	6	MD	5	L	12	D
1650 - 1950	8	D	14	D	11	D	7	MD	5	L	12	D
Note: Density Classification is obtained based on Number of blows required for 300 mm penetration of PSP Very Loose (VL) < 2; Loose (L) 2 – 6; Medium Dense (MD) 6 – 8; Dense (D) 8 – 15; Very Dense (VD) > 15												

It is observed from the PSP test that the site soil is in loose to dense condition.

6.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS

6.1 Inferred soil profile

Six test holes (TH1, TH2, TH3, TH4, TH5 and TH6) were conducted at the site by using a hand auger. Test hole locations are shown in the site sketch in Appendix A.

TH1 – TH6 consist of a similar soil profile as described below:

- **Topsoil, SAND (SP)** – fine to medium grained, grey, with grass and roots, trace of silt, slightly moist, loose to medium dense, up to a depth of 0.3 m; followed by
- **SAND (SP)** – fine to medium grained, grey/ pale grey/ yellowish brown, trace of silt, moist to wet, loose to dense, up to the maximum investigated depth.

TH1, TH2 and TH6 were terminated at the target depth of 2.5 m, TH4 and TH5 were terminated at a depth of 1.2 m due to hole collapsed and TH3 was terminated at depth of 1.3 m due to hole collapsed.

6.2 Groundwater

Ground watertable was encountered in TH3, TH4 and TH5 at depths of 1.1 m, 0.9 m and 1.0 m respectively, during the time of invesatigation.

6.3 Geotechnical Design Parameters

Geotechnical design parameters for the site were inferred from the site investigation data and are presented in Table 2.

Table 2. Inferred Geotechnical Design Parameters for the current site conditions

Depth (m, bgl)	Layer Description	Soil Parameters					k_s (MN/m^3)
		ϕ' (deg.)	c'/c_u (kN/m^2)	γ (kN/m^3)	E' (MPa)	ν'	
0 – up to 2.5	SAND – loose to dense	32	-/-	20	20	0.3	10

Notes: ϕ' = Drained friction angle, c' = Drained cohesion, c_u = Undrained shear strength, γ = Bulk density, E' = Drained Elastic Modulus, ν' = Drained Poisson's Ratio, k_s = Modulus of vertical subgrade reaction.

6.4 Geotechnical Design Parameters for Retaining Structures

Earth pressure parameters for the design of retaining structures are presented in Table 3. These parameters should be considered as preliminary.

Table 3. Geotechnical Design Parameters for Retaining Structures

Material type	γ (kN/m^3)	ϕ' (degrees),	K_0	Wall friction, $\delta = 0^o$	
				K_a	K_p
Loose to medium dense in situ sand	17	30	0.50	0.33	3.00
Dense Sand or Compacted Sand Fill	18	34	0.44	0.28	3.54

Notes: γ = Bulk unit weight, ϕ'= Effective friction angle, K_0 = Coefficient of earth pressure at rest, K_a = Coefficient of drained active earth pressure, K_p = Coefficient of drained passive earth pressure.

6.5 Suitability of Excavated Materials for use as Fill

The majority of the soil encountered within the site comprises sand is considered to be suitable for reuse as structural fill material.

6.6 Structural Fill

Suitable materials for structural fill shall be a clean sand fill. The fill material at compaction should comprise of sand that is free from oversized material (i.e. material > 75 mm in any dimension), contains less than 5% fines (material passing 0.075 mm sieve), and free from foreign material, organic material or other deleterious material. It should also be free from industrial waste, solid waste, or construction and demolition debris.

6.7 Earthquake Design Factor

Australian Standard AS1170.4-2007 Structural design actions Part 4 "Earthquake actions in Australia" is recommended for earthquake consideration. AS1170.4-2007 outlines the design criteria required for a structure in consideration of the risk of being subjected to earthquake loads. Earthquake design factors are summarised in Table 4.

Table 4. Earthquake Design Factors

Factor/Class	Value/Name	Ref. AS1170.4- 2007
Hazard Factor (z)	0.09	Figure 3.2 (D)
Site sub-soil class	**Class C_e** – Shallow Soil	Section 4 Clause 4.1

6.7.1 Site Sub-Soil Classification

The earthquake site sub-soil class was assessed based on the requirements of Australian Standard AS1170.4-2007, available geological maps and subsurface conditions encountered at the site. The sub-soil class for the site has been assessed as Class "**Ce - Shallow Soil Site**".

6.8 Earthworks

Earthworks should be carried out in general accordance with the Australian Standard AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments". The following are general guidelines to be followed during the preparation of the site areas within the proposed development footprints:

- Remove any uncontrolled fill, cobbles and boulders, paved materials, demolition debris, green waste, organic matter or other deleterious material, if any and stockpile them separately. Then removed from the site.
- **This site is lower the than road level, which could be prone to flooding. The final surface level of the site must above the flood level. In order to do that, LG recommends that raise the site to the level of adjacent properties. Or at least 400 mm above the kerb level of Barfield Road.**
- Compact the sub-grade of built area to dense condition up to depth of 600 mm from final surface level, 8 PSP Blows per 300 mm of penetration. *No compaction will be required if there is solid limestone layer at the base.*
- Backfilling layer thickness should not be more than 300 mm in loose condition. Any backfilled layer must be compacted to a dense condition as per AS 3798-2007.
- The site should be prepared in such a way that surrounding stormwater does not pass through the building envelope.
- Care needs to be given to the existing or adjacent structures to avoid any damage from the excavation may require for the earthworks and excessive vibrations during compaction.
- For site maintenance, it is recommended to follow the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance" in Building Technology File Number 18. This document provides important information on the implications of plumbing, property maintenance, site classification on foundation design, drainage and performance expectations.
- *It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction to ensure that all organic, roots, demolition debris, loose material have been adequately removed from the area and that the fill material is adequately compacted.*

6.9 Bearing Capacity for Strip and Pad Foundation

Based on the inferred state of soils as presented in Section 6.1, and the results of Perth Sand Penetrometer (PSP) Tests (Section 5.2; Appendix B) it can be concluded that the ground has sufficient bearing capacity to support typical size pad or strip foundations at the design ground level assuming that the material below the foundations is adequately compacted and prepared as per Section 6.8.

The allowable bearing pressures presented in Table 5 are preliminarily estimated to limit settlements to less than 25 mm and provide a minimum factor of safety of 2.0 against general bearing capacity failure. These bearing pressures do not consider eccentric loading conditions and interaction effects (i.e., loadings from adjacent foundations). Furthermore, the calculations assume that the areas beneath the foundations have been compacted to a density ratio of 95% modified compaction, MMDD, and are founded at least 0.5 m below final ground grading levels.

Table 5. Allowable Bearing Pressures for Typical Strip and Pad Footings

Embedment Depth (m)	Footing Type	Footing Width (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	Strip	0.5	100	5
		1	130	10
		1.5	150	15
		2	180	16
0.5	Pad	1	130	10
		2	180	15

6.10 Cut and Fill Batters

Temporary excavation up to 1 m depth can be conducted with a maximum dry slope angle of 1V: 2H. Cut and fill batters above groundwater table will be generally stable at 1V: 2H. Intermediate benches have to be created if excavation is deeper than 1m. However, batters constructed at 1V: 3H will enable re-establishment of vegetation and be less prone to damage from wetting, drying and erosion.

6.11 Site Classification

Provided earthworks are completed as per the recommendation in Section 6.8 of this report, based on the site soil profile and surrounding condition, the site can be classified as **"CLASS A"** in accordance with the definitions provided in Australian Standard AS2870 - 2011. The characteristics surface movement ***Ys*** is considered to be zero or negligible.

An assumption of soil suction change of 2.5 m is made in this case. General definition of 'Site Class' is shown in Table 6 (Source: AS 2870-2011).

Table 6. General Definition of Site Class (Source: AS 2870-2011)

Site Class	Soil Description	Characteristic Surface Movement (mm)
A	Most SAND and ROCK sites with little or no ground movement due to moisture content variation	little or no ground movement
S	Slightly reactive clayey or silty SAND, which will cause slight ground movement due to moisture content variation	0 < Ys ≤ 20
M	Moderately reactive clayey or silty soil which will cause moderate ground movement due to moisture content variation	20 < Ys ≤ 40
H1	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	40 < Ys ≤ 60
H2	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	60 < Ys ≤ 75
E	Extremely reactive clayey or silty soil which will cause extreme ground movement due to moisture content variation	Ys > 75
P	Problematic sites, sites consisted of soft soils, soft clay or silt or loose sand; landfills, mine subsidence, collapsing soils, very reactive soils, subjected to erosion and sites which cannot be classified as A to E.	-

6.12 Stormwater Drainage

Onsite disposal of roof runoff and stormwater via soak well is appropriate for this site. The drainage system must be designed by a qualified engineer as per requirements of the local government authority. Water table was observed at shallow depth at (TH3,TH4 and TH5) test holes during the investigation.

7.0 LIMITATION OF USE

The ground is a product of continuing natural and man-made processes and therefore exhibits characteristics and properties which may vary from place to place and can change with time. Geotechnical site investigation involves gathering and assimilating limited facts about these characteristics and properties in order to better understand or predict the behaviour of the ground at a particular site under certain conditions.

This site investigation has been carried out by inspection, using a limited amount of hole excavations, sampling, testing or other means of investigation. Achieving a full coverage of the site to ensure all variations is not practical and is seldom done due to cost constraints as well as the impracticality. It should be noted that the subsurface conditions encountered by the limited number of hole excavation as part of this geotechnical site investigation represents the ground conditions at the locations where the samples were taken and where tests have been undertaken and as such are an extremely small proportion of the site to be developed.

The facts reported in this document are directly relevant only to the ground at the place where, and time when, the investigation was carried out and are believed to be reported accurately. Given the limited number of test holes and limited field and laboratory testing carried out with respect to the overall site area, variations between investigation locations is likely and ground conditions different to those presented in this report may be present within the subject site area. The risk associated with this variability and the impact it will have on the proposed development should be carefully considered.

The level of geotechnical investigation that has been completed to date is considered appropriate for the project objectives. If the above mentioned client, its subcontractors, agents or employees use this factual information for any other purpose for which it was not intended, then the client, its subcontractors, agents or employees does so at its own risk and Local Geotechnics will not and cannot accept liability in respect of the advice, whether under law of contract, tort or otherwise.

Any interpretation or recommendation given in this report is based on judgement and experience and not on greater knowledge of the facts reported. Local Geotechnics does not represent that the information or interpretation contained in this report addresses completely the existing features, subsurface conditions or ground behaviour at the subject site.

8.0 REFERENCES

- Australian Standard AS1170.4-2007, *“Earthquake Actions in Australia”*.
- Australian Standard AS 1726-1993 *"Geotechnical Site Investigations".*
- Australian Standard AS 2870-2011, *"Residential Slabs and Footings".*
- Australian Standard AS 3798-2007, *"Guidelines on Earthworks for Commercial and Residential Developments".*
- CSIRO publication *“Guide to Home Owners on Foundation Maintenance and Footing Performance”* in Building Technology File Number 18.
- Environmental Geological Western Australia survey Map of Fremantle 1:50,000 (Part sheets 2033 I and 2033 IV)
- Standards Australia, Hand Book HB 160-2006 *"Soil Testing".*

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APPENDIX A

SITE SKETCH

Site Sketch : Test Hole (TH) and Perth Sand Penetrometer (PSP) Test Locations

Reference:	LG8122024GI
Client:	Strategic Property Group Pty Ltd
Project:	Geotechnical Site Investigation 116 Barfield Road, Hammond Park WA

LOCAL GEOTECHNICS
Unit 12, 8 Production Road Canning Vale WA 6155
PO Box 5050, Canning Vale South WA 6155
Phone: 08 9457 3517
E-mail: admin@localgeotechnics.com.au
Web: www.localgeotechnics.com.au

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APPENDIX B

TEST HOLE LOGS AND PSP TEST CERTIFICATES

ENGINEERING LOG

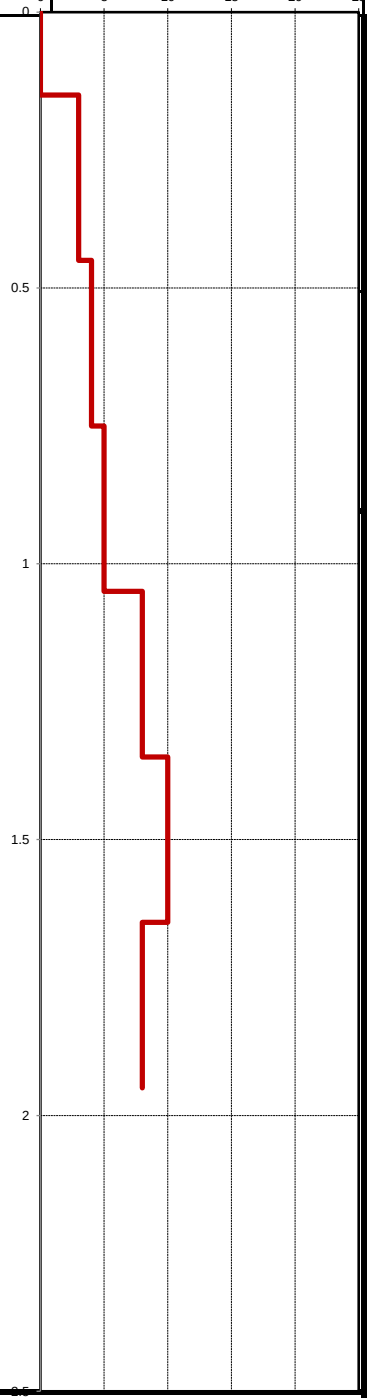
RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH1
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 167 Easting: 391 851	Water Table:	Not encountered

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, grey**,** with grass and roots, trace of silt, moist, loose	
0.3						SP	**SAND -** fine to medium grained, yellowish brown, slightly moist, loose	
0.5							becomes moist	
2.5							**Terminated at a target depth of 2.5 m**	

Perth Sand Penetrometer Test (Blows/300mm)



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

ENGINEERING LOG

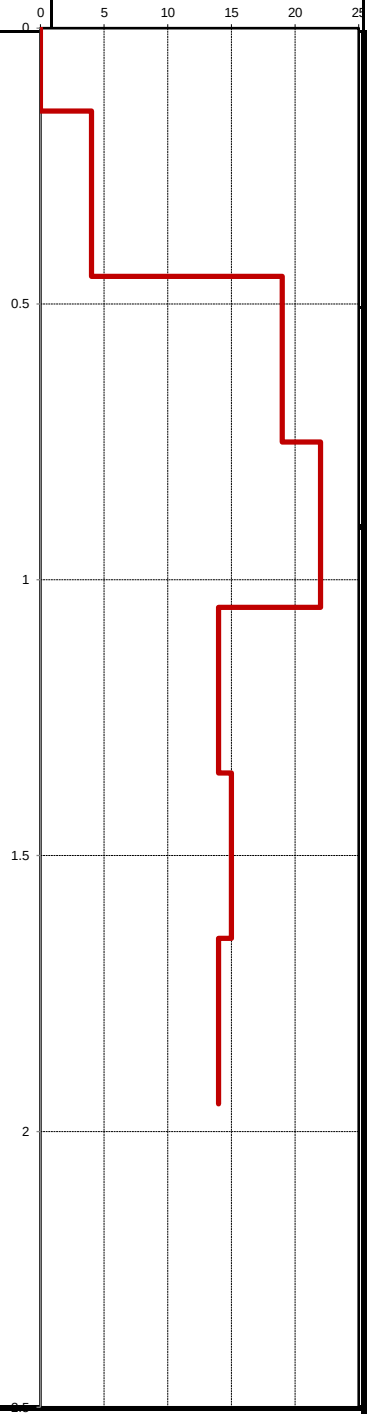
RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH2
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 127 Easting: 391 802	Water Table:	Not encountered

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, brown, with grass and roots, trace of silt, moist, loose	
0.2						SP	**SAND -** fine to medium grained, grey, trace of silt, slightly moist, very dense	
0.5							colour changes to dark grey	
0.9							colour changes to light grey, no silt	
1.0								
1.5								
1.7							colour changes to white with brown	
2.0								
2.5							**Terminated at a target depth of 2.5 m**	

Perth Sand Penetrometer Test (Blows/300mm)



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

ENGINEERING LOG

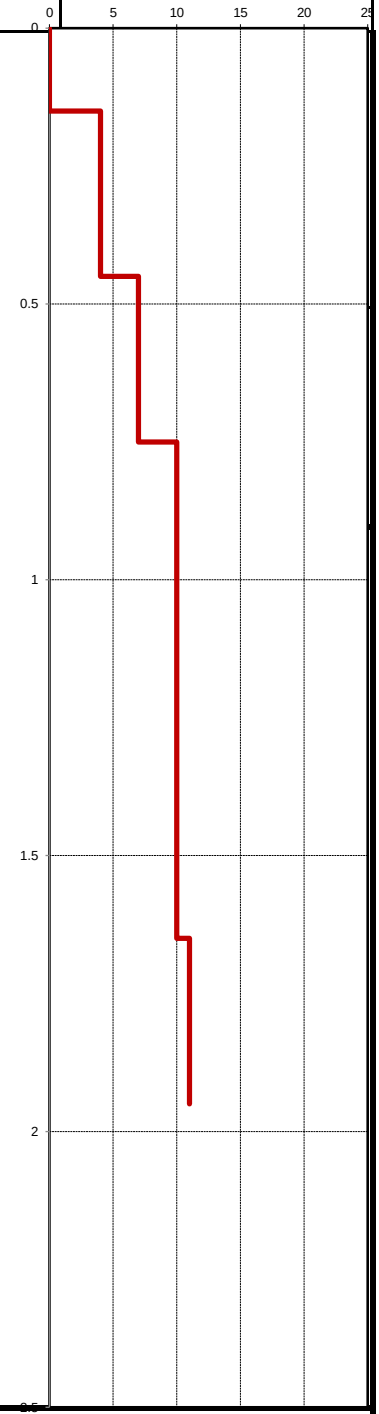
RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH3
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 177 Easting: 391 772	Water Table:	1.1 mbgl

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, dark grey, with grass and roots, trace of silt, moist, loose	
0.2						SP	**SAND -** fine to medium grained, grey, trace of silt, moist, medium dense	
0.3							colour changes to pale grey	
0.5								
0.75							becomes dense	
0.9							becomes wet	
1.0								
1.1							water table encountered	
1.3							**Terminated at a depth of 1.3 m due to hole collapsed**	
1.5								
2.0								
2.5								

Perth Sand Penetrometer Test (Blows/300mm)



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

ENGINEERING LOG

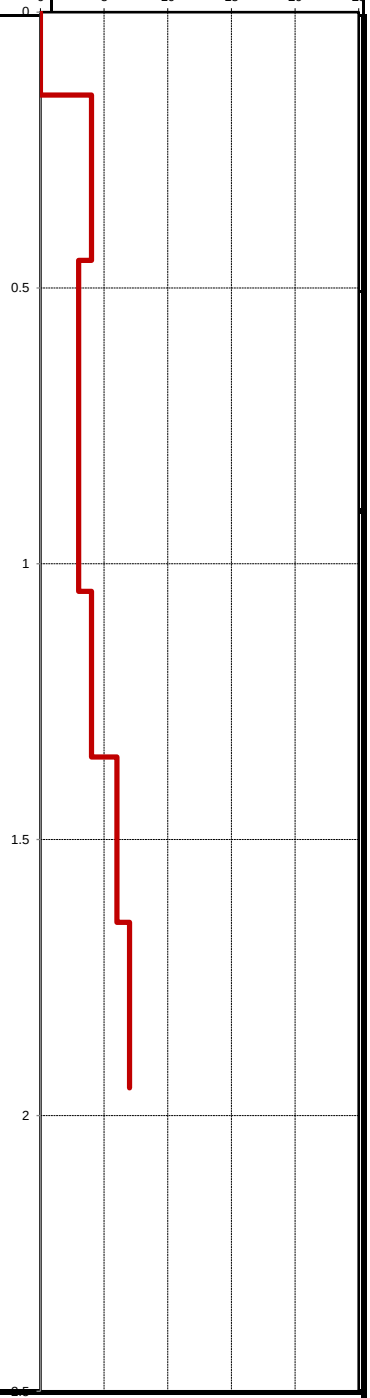
RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH4
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 132 Easting: 391 683	Water Table:	0.9 mbgl

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, dark grey, trace of silt, moist, loose	
0.2						SP	**SAND -** fine to medium grained, grey, moist, loose	
0.5								
0.8							becomes wet	
0.9							water table encountered	
1.0								
1.2							**Terminated at a depth of 1.2 m due to hole collapsed**	
1.5								
2.0								
2.5								

Perth Sand Penetrometer Test (Blows/300mm)



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

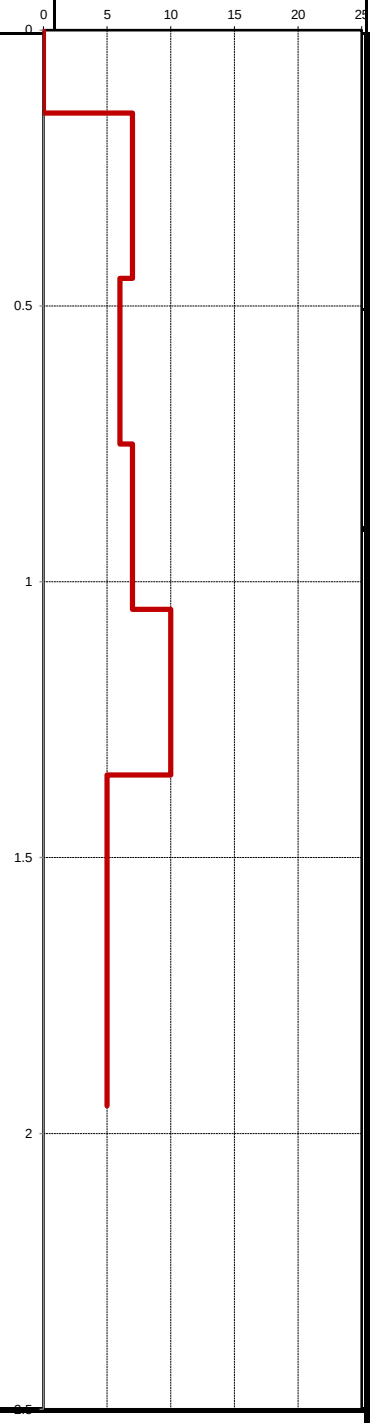
ENGINEERING LOG

RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH5
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 146 Easting: 391 628	Water Table:	1 mbgl

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, dark grey, trace of silt, moist, medium dense	
0.3						SP	**SAND -** fine to medium grained, grey, moist, medium dense	
0.5								
0.9							becomes wet	
1.0							water table encountered	
1.1							becomes dense	
1.2							**Terminated at a depth of 1.2 m due to hole collapsed**	
1.5								
2.0								
2.5								



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

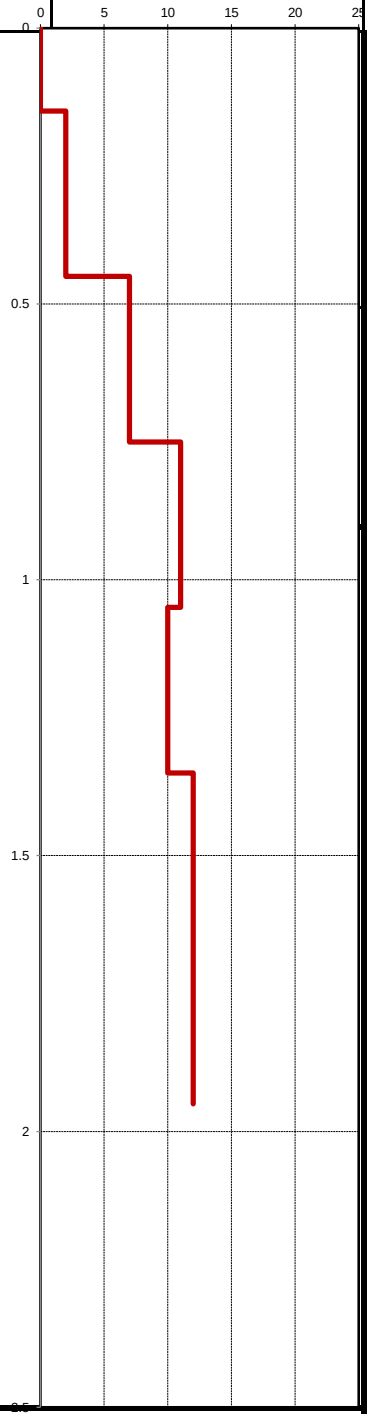
ENGINEERING LOG

RESULT OF TEST HOLES/PITS

LOCAL GEOTECHNICS
ABN:61 737 984 867
12/8 Production Road, Canning Vale WA 6155
PO Box 5050 Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	: LG8122024GI	Test Pit/BH No.:	TH6
Client	: Strategic Property Group Pty Ltd	Date Excavated:	19-Jul-2024
Project	: Geotechnical Site Investigation	Date completed:	19-Jul-2024
Location	: 116 Barfield Road, Hammond Park WA	Equipment Type:	HA and PSP
GPS Zone 50	: Northing: 6 440 154 Easting: 391 552	Water Table:	Not encountered

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations
0.0						SP	**Topsoil, SAND -** fine to medium grained, grey, with grass and roots, trace of silt, slightly moist, loose	
0.1							no grass and roots	
0.3						SP	**SAND -** fine to medium grained, grey, slightly moist, loose	
0.45							becomes medium dense	
0.5							becomes moist	
0.75							becomes dense	
0.9							colour changes to white	
1.0								
1.5								
1.7							colour changes to white and dark grey	
2.0								
2.5							**Terminated at a target depth of 2.5 m**	



Notes:

Sampling Type :
B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:
HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:
D - Dry
M - Moist
W - Wet

Symbols:
W_L - Plastic Limit
W_P - Plastic Limit

Logged : A Lai
Checked: H Meer

LOCAL GEOTECHNICS

ABN: 61 737 984 867
PO Box 5050
Canning Vale South, WA 6155

PERTH SAND PENETROMETER (PSP)
TEST CERTIFICATES

(AS 1289.6.3.3)

Density Correlation - Table 6.4.6.2 HB 160-2006

Reference	LG8122024GI	Test ID	PSP1-6
Client	Strategic Property Group Pty Ltd	Date Tested	19-Jul-24
Project	Geotechnical Site Investigation	Tested by	A Lai
Site	116 Barfield Road, Hammond Park WA	Checked by	H Meer

PSP No.	PSP1		PSP2		PSP3	
Depth (mm)	**Penetration Resistance - Blows/300mm I Density Classification**					
0 - 150	Seating		Seating		Seating	
150 - 450	3	L	4	L	4	L
450 - 750	4	L	19	VD	7	MD
750 - 1050	5	L	22	VD	10	D
1050 - 1350	8	D	14	D	10	D
1350 - 1650	10	D	15	VD	10	D
1650 - 1950	8	D	14	D	11	D

PSP No.	PSP4		PSP5		PSP6	
Depth (mm)	**Penetration Resistance - Blows/300mm I Density Classification**					
0 - 150	Seating		Seating		Seating	
150 - 450	4	L	7	MD	2	L
450 - 750	3	L	6	MD	7	MD
750 - 1050	3	L	7	MD	11	D
1050 - 1350	4	L	10	D	10	D
1350 - 1650	6	MD	5	L	12	D
1650 - 1950	7	MD	5	L	12	D

Remarks:

Density Correlation - Table 6.4.6.2 HB 160-2006

Very Loose (VL)	Loose (L)	Medium Dense(MD)	Dense(D)	Very Dense (VD)
≤ 2	2 - 6	6 - 8	8 - 15	≥ 15

APPENDIX C

SITE PHOTOS

Photo 1. General Site Condition

Photo 2. Site, View from Irvine Parade (Rear View)

Photo 3. Shed on Site (East)

Photo 4. Test Location 01 (TH1), Sub-surface Probing by Using a Hand Auger

Photo 5. Soil from Test Location 01 (TH1)

Photo 6. Test Location 02 (PSP2), Testing by Using a Perth Sand Penetrometer

Photo 7. Test Location 04 (TH4), Sub-surface Probing by Using a Hand Auger

Photo 8. Soil from Test Location 03 (TH3)

Photo 9. Test Location 05 (PSP5), Testing by using a Perth Sand Penetrometer

Photo 10. Test Location 06 (TH), Sub-surface Probing by Using a Hand Auger

Appendix F

TOPOGRAPHY PLAN

PARKS AND RECREATION

WATERWAYS

PUBLIC PURPOSE

Irvine Parade — STREET NAME

HAMOND PARK — SUBURB NAME

CITY OF COCKBURN — LOCAL GOVERNMENT NAME

STAGE BOUNDARY

CADASTRAL BOUNDARY

EXISTING CONTOURS (0.2M INTERVAL)

LEGEND

REV	DATE	AMENDMENT
B	21-07-2025	ISSUED FOR REVIEW
A	05-02-2025	ISSUED FOR REVIEW

PROJECT: No 116 Barfield Road, Hammond Park

TITLE: Topography Plan

DRAWING NUMBER: P003127 S04

DRAWN BY: J.S.

Premise

Appendix G

ENGINEERING DRAWINGS

LOT 100 (NO 116) BARFIELD ROAD, HAMMOND PARK
FOR STRATEGIC PROPERTY GROUP

GENERAL NOTES

1. ALL DIMENSIONS GIVEN ON THESE DRAWINGS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL NEW WORK AND MATERIALS SHALL COMPLY WITH THE PROJECT DRAWING SPECIFICATION AND CURRENT RELEVANT COUNCIL STANDARDS AND SPECIFICATIONS.
3. ALL WORK SHALL BE JOINED NEATLY TO EXISTING CONSTRUCTION.
4. THE CONTRACTOR IS TO LOCATE, IDENTIFY AND ESTABLISH THE CONNECTIVITY OF ALL EXISTING SERVICES WITHIN THE LIMITS OF PROPOSED WORKS AND CONFIRM THIS INFORMATION WITH THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL MEASURING DEVICES, SAFETY EQUIPMENT AND MACHINERY REQUIRED TO CARRY OUT INSPECTIONS/MEETINGS AS SPECIFIED OR REQUESTED BY THE ENGINEER.
6. PROOF ROLLING NOMINATED SHALL BE CARRIED OUT USING A SINGLE AXLE HIGHWAY TRUCK WITH A REAR AXLE LOAD NOT LESS THAN 10 TONNES AND TYRES INFLATED TO 550kPa OR APPROVED EQUIVALENT. EQUIPMENT LABOUR AND LOADING REQUIRED FOR PROOF ROLLING IS TO BE PROVIDED BY THE CONTRACTOR.
7. THESE NOTES SHALL APPLY TO ALL PORTIONS OF WORK.
8. THE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATIONS. ANY POINT OF CONFLICT WILL BE RESOLVED BY THE SUPERINTENDENT.

NOISE

ALL PLANT AND EQUIPMENT SHALL BE CONTROLLED TO MINIMISE NOISE EMISSION IN ACCORDANCE WITH AS2436 (GUIDE TO NOISE CONTROL ON CONSTRUCTION, MAINTENANCE AND DEMOLITION). THE SITE WORKING HOURS SHOULD BE IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS.

PRE-CONSTRUCTION & APPROVALS

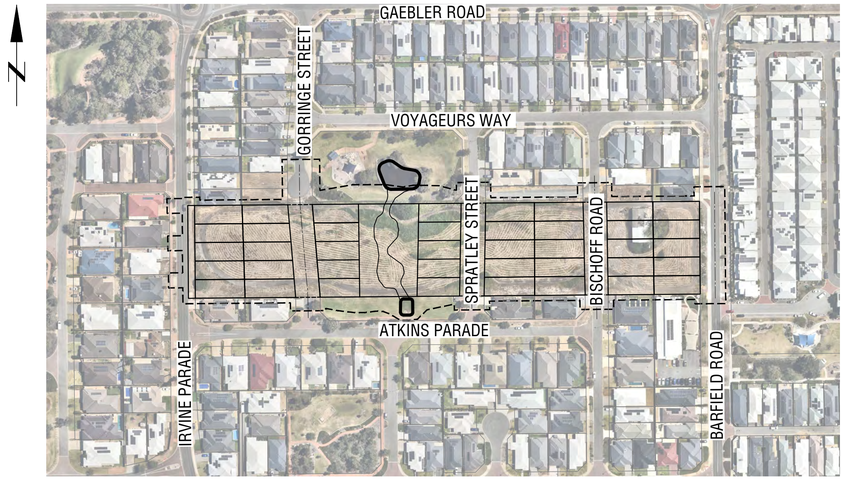
1. NO LOCATING/ POTHOLING OF EXISTING SERVICES HAS BEEN CARRIED OUT. THE CONTRACTOR IS TO DETERMINE THE LOCATION AND DEPTH OF ALL EXISTING SERVICES WHICH AFFECT THE WORKS AND REPORT ANY POTENTIAL CLASHES TO THE SUPERINTENDENT PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORKS.
2. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING WITH THE APPROPRIATE AUTHORITY FOR LOCATING EXISTING SERVICES AND FOR ANY MODIFICATIONS TO EXISTING SERVICES REQUIRED AS A RESULT OF THE WORKS.
3. THE CONTRACTOR IS RESPONSIBLE TO PROTECT ALL EXISTING SERVICES FROM DAMAGE.
4. ANY WORKS DAMAGED AS A RESULT OF CONSTRUCTION ARE TO BE REINSTATED TO RELEVANT AUTHORITY'S REQUIREMENTS AT THE CONTRACTORS COST.
5. FINISHED SURFACE LEVELS ARE TO BE GRADED UNIFORMLY BETWEEN LEVELS INDICATED ON THE DRAWINGS.

WORKPLACE HEALTH AND SAFETY

1. THE CONTRACTOR SHALL BE THE PRINCIPAL CONTRACTOR AS DESIGNATED BY THE WORK HEALTH AND SAFETY ACT (2011).
2. THE CONTRACTOR SHALL PREPARE AND IMPLEMENT A WORKPLACE HEALTH AND SAFETY PLAN AS REQUIRED BY THE WORK HEALTH AND SAFETY ACT (2011).

SETOUT NOTES

1. THE LEVEL DATUM FOR WORKS IS A.H.D (AUSTRALIAN HEIGHT DATUM).
2. SETOUT SHALL BE MADE BY DIGITAL ENGINEERING DATA AND CONFIRMED ONSITE PRIOR TO CONSTRUCTION BY A SURVEYOR.



LOCALITY PLAN
SCALE 1:2000

PREMISE

DRAWING NUMBER	DRAWING LIST
P003127-C000	COVER SHEET
P003127-C050	COMBINED SERVICES PLAN
P003127-C100	EARTHWORKS AND RETAINING WALLS PLAN
P003127-C110	RETAINING WALL PROFILE PLAN SHEET 1 OF 3
P003127-C111	RETAINING WALL PROFILE PLAN SHEET 2 OF 3
P003127-C112	RETAINING WALL PROFILE PLAN SHEET 3 OF 3
P003127-C200	SEWER RETICULATION PLAN
P003127-C201	SEWER DESIGN DATA PLAN
P003127-C300	ROAD LAYOUT AND PAVEMENT PLAN
P003127-C310	LONG SECTIONS SHEET 1 OF 4
P003127-C311	LONG SECTIONS SHEET 2 OF 4
P003127-C312	LONG SECTIONS SHEET 3 OF 4
P003127-C313	LONG SECTIONS SHEET 4 OF 4
P003127-C314	CROSS SECTIONS SHEET 1 OF 5
P003127-C315	CROSS SECTIONS SHEET 2 OF 5
P003127-C316	CROSS SECTIONS SHEET 3 OF 5
P003127-C317	CROSS SECTIONS SHEET 4 OF 5
P003127-C318	CROSS SECTIONS SHEET 5 OF 5
P003127-C350	STORMWATER & SUBSOIL DRAINAGE PLAN
P003127-C355	STORMWATER DRAINAGE CATCHMENT PLAN
P003127-C400	WATER RETICULATION PLAN
P003127-C900	STANDARD DETAILS - ROADWORKS
P003127-C906	TYPICAL ACCESS CHAMBER DETAILS
P003127-C950	LIMESTONE RETAINING WALL - SHEET 1 OF 6
P003127-C951	LIMESTONE RETAINING WALL - SHEET 2 OF 6
P003127-C952	LIMESTONE RETAINING WALL - SHEET 3 OF 6
P003127-C953	LIMESTONE RETAINING WALL - SHEET 4 OF 6
P003127-C954	LIMESTONE RETAINING WALL - SHEET 5 OF 6
P003127-C955	LIMESTONE RETAINING WALL - SHEET 6 OF 6

STANDARD DETAILS DRAWINGS:

CITY OF COCKBURN STANDARD DETAILS DRAWINGS

2423B03 - 01	ROAD PAVEMENT & KERBING DETAILS
2423B03 - 06	CYCLEWAY/ FOOTPATH DETAILS
2423B03 - 07	PRAM RAMP AND HANDRAIL DETAILS
2423B03 - 10	GULLY PIT AND COMBINATION SEP DETAILS
2423B03 - 11	COMBINATION SEP AND GULLY GRATE DETAILS
2423B03 - 12	JUNCTION PIT WITH 750 DIA PIPES OR GRETER WITH BICKWORKS DETAILS
2423B03 - 14	TYPICAL DRAINAGE SUMP DETAILS
2423B03 - 16	BUBBLE UP DRAINAGE STRUCTURE STANDARD DETAILS
2423B03 - 02	ROADWORK CROSSOVER KERBING DETAILS
2423B03 - 09	SINGLE AND DOUBLE SIDE ENTRY PITS
2423B03 - 13	DRAINAGE TRENCH DETAILS
2423B03 - 15	STANDARD COLORBOND FENCE DETAILS

INDEMNITY - EXISTING SERVICES

NOT WITHSTANDING THAT EXISTING SERVICES MAY OR MAY NOT BE SHOWN ON THESE DRAWINGS, NO RESPONSIBILITY IS TAKEN BY THE ENGINEER OR THE PRINCIPAL FOR THIS INFORMATION WHICH HAS BEEN SUPPLIED BY OTHERS. THE DETAILS ARE PROVIDED FOR INFORMATION ONLY. THE CONTRACTOR SHALL ASCERTAIN THE POSITION OF ALL UNDERGROUND SERVICES PRIOR TO EXCAVATION AND SHALL BE RESPONSIBLE FOR THE COST OF REPAIRS TO DAMAGES CAUSED AS A RESULT OF THE WORKS.

WAPC No. 200869

WATER CORP REF: 0W07

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

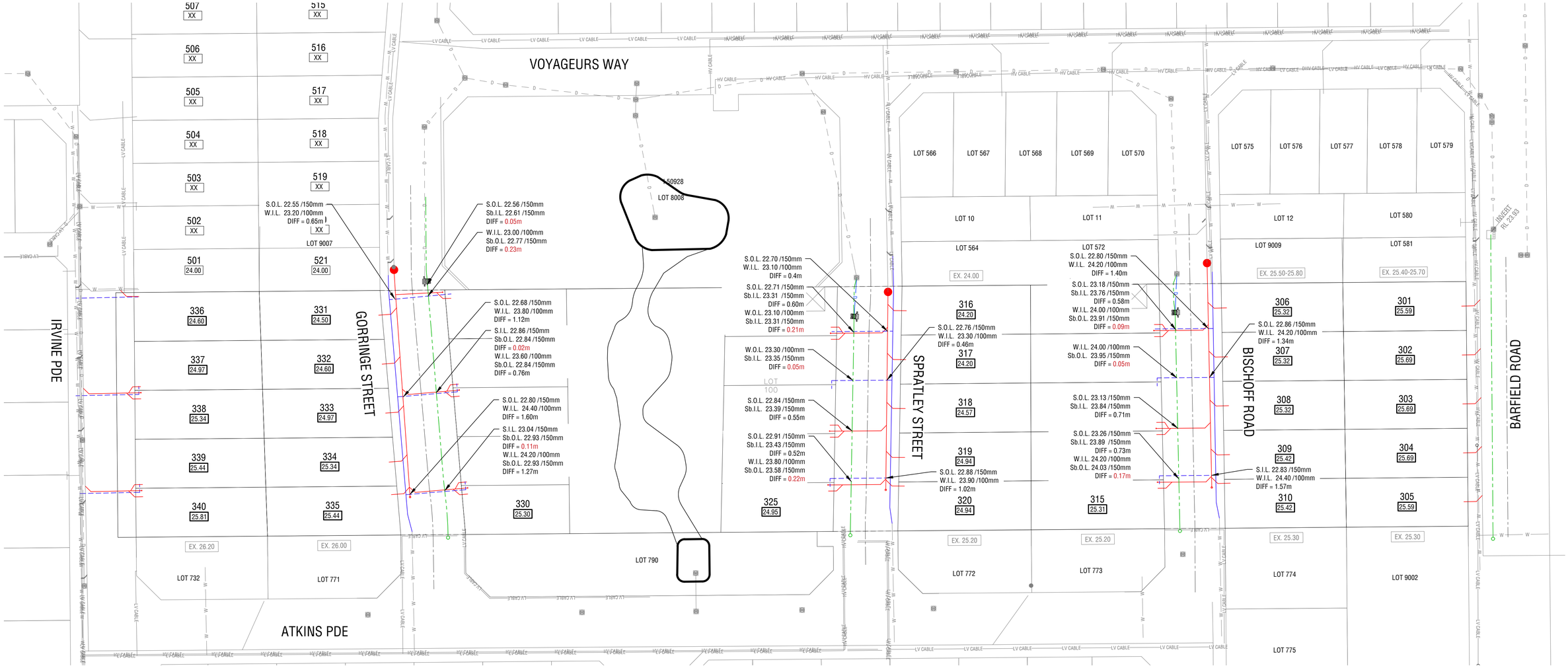
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 20 40 60m
SCALE 1:2000 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE COVER SHEET

JOB CODE P003127
SHEET NUMBER C000
REV C



COMBINED SERVICES PLAN

SCALE 1:500

NOTES

1. ALL PIPES CROSSING WITH LESS THAN 300mm CLEARANCE TO DRAINAGE ABOVE REQUIRE CONCRETE ENCASING LOCALLY.
2. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE SUPERINTENDENT OF ANY CLASHES BETWEEN PROPOSED OR EXISTING SERVICE PRIOR TO VARYING ANY WORKS.
3. THIS PLAN IS PROVIDED FOR INFORMATION PURPOSES FOR THE CONTRACTOR TO REVIEW ALL LOCATIONS FOR SERVICE PROVISION FOR WATER, SEWER, POWER, COMMS AND GAS. THIS PLAN HAS BEEN COMPLETED USING REV A POWER AND COMMS PLANS AS SUPPLIED BY THE POWER AND COMMS CONTRACTOR. AS WESTERN POWER AND NBN APPROVALS TIMEFRAMES ARE LONGER THAN APPROVALS PROCESSES WITH WATER CORPORATION AND THE CITY OF COCKBURN, IT IS THE ROLE AND RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE IFC SERVICES PLANS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. NO VARIATIONS WILL BE ACCEPTED FOR RELAYING SERVICES CONNECTIONS, UNLESS THE LOCATIONS OF CLASHES ARE CONFIRMED AND VERIFIED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF ANY SERVICE.

LEGEND

W — W	EXISTING WATER MAIN LAYOUT
S — S	EXISTING SEWER MAIN LAYOUT
D — D	EXISTING DRAINAGE
LV CABLE	EXISTING LOW VOLTAGE POWER LINE
HV CABLE	EXISTING HIGH VOLTAGE POWER LINE
	PROPOSED WATER MAIN LAYOUT
	PROPOSED SEWER MAIN LAYOUT
D — D	PROPOSED DRAINAGE MAIN LAYOUT
	PROPOSED SUBSOIL DRAIN LAYOUT
	PROPOSED SEWER PROPERTY CONNECTION
	PROPOSED WATER CONNECTION
	PROPOSED SIDE GULLY PIT
24 / 24.5	PROPOSED LOT NUMBER AND FINISHED LEVEL

S.I.L.	SEWER INVERT LEVEL
S.O.L.	SEWER OBVERT LEVEL
D.I.L.	DRAINAGE INVERT LEVEL
D.O.L.	DRAINAGE OBVERT LEVEL
Sb.O.L.	SUBSOIL OBVERT LEVEL
Sb.I.L.	SUBSOIL INVERT LEVEL
W.I.L.	WATER INVERT LEVEL
W.O.L.	WATER OBVERT LEVEL
DIFF	DIFF=DIFFERENCE BETWEEN TOP OF BOTTOM PIPE AND BOTTOM OF TOP PIPE IN m

BEFORE YOU DIG www.byda.com.au

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	D	ISSUED FOR UWMP AND LSP APPROVAL	CK	CK
31/07/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

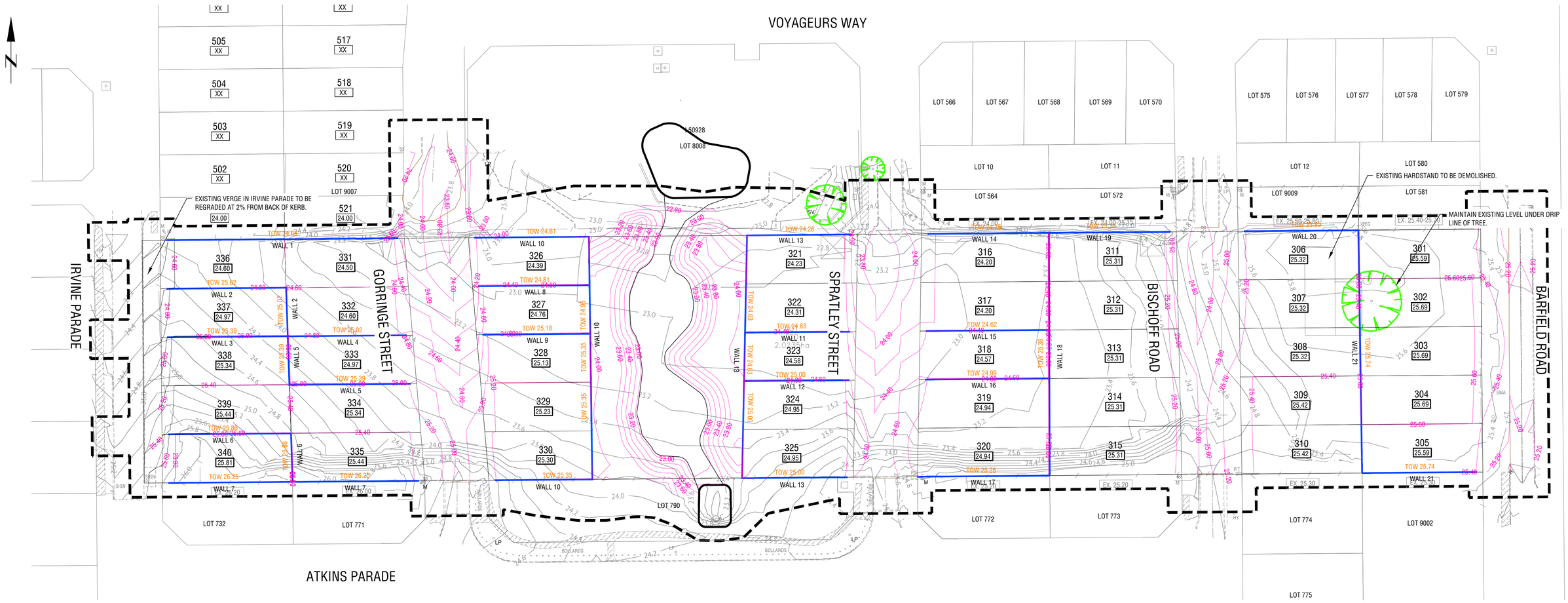
Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED M.DAVIS
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION C. KLEYWEG

SCALE 0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE COMBINED SERVICES PLAN

JOB CODE P003127
SHEET NUMBER C050
REV D



EARTHWORKS PLAN & RETAINING WALLS PLAN

SCALE 1:500

NOTES:

1. THE CONTRACTOR SHALL PROTECT ALL EXISTING KERBS, ROAD PAVEMENTS AND EXISTING INFRASTRUCTURE SERVICES AS PART OF THIS CONTRACT.
2. IT IS RECOMMENDED THE CONTRACTOR UNDERTAKES A ROAD DILAPIDATION SURVEY AND REPORT PRIOR TO THE COMMENCEMENT OF WORKS AND PROVIDES A COPY OF THIS TO THE SUPERINTENDENT AND THE CITY OF COCKBURN.
3. WHERE EXISTING TREES ARE TO BE PROTECTED, THE CONTRACTOR SHALL LOCALLY PROTECT ALL EXISTING EARTHWORKS NATURAL SURFACE LEVELS UNDER THE FOLIAGE DRIP LINE OF THAT TREE. WHERE THESE LEVELS VARY FROM THOSE SHOWN IN THESE DRAWINGS, THE CONTRACTOR SHALL LOCALLY BATTER DOWN TO SURFACE OUSTIDE OF THE DRIP LINE AT A BATTER OF 1 IN 3.
4. RETAINING WALLS ARE SHOWN ON THIS PLAN FOR INFORMATION PURPOSES ONLY. WHERE RETAINING WALLS ARE SHOWN, THE CONTRACTOR SHALL BATTER DOWN AT 1 IN 3 TYPICALLY BETWEEN THE LEVELS ENSURING THE BATTER IS OFFSET WITH THE TOP AND BOTTOM OF THE BATTER EQUIDISTANT FROM THE CENTRE OF THE WALL.
5. THE CONTRACTOR SHALL STRIP THE FIRST 100MM OF TOPSOIL AND STOCKPILE.

LEGEND

23.2	EXISTING CONTOURS (0.2m INTERVAL)
	EXISTING ROAD CENTRE LINE
	EXISTING ROAD EDGE
98	EXISTING LOTS
	EXISTING TREE TO BE PROTECTED
	EXISTING TREE TO BE REMOVED
23.2	DESIGN CONTOURS (0.2m INTERVAL)
	STAGE BOUNDARY
WALL X	PROPOSED RETAINING WALLS
24 / 24.5	PROPOSED LOT NUMBER AND FINISHED LEVEL

VOLUMES		
CUT	FILL	BALANCE
-1001.737m3	17008.005m3	16006.268m3

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

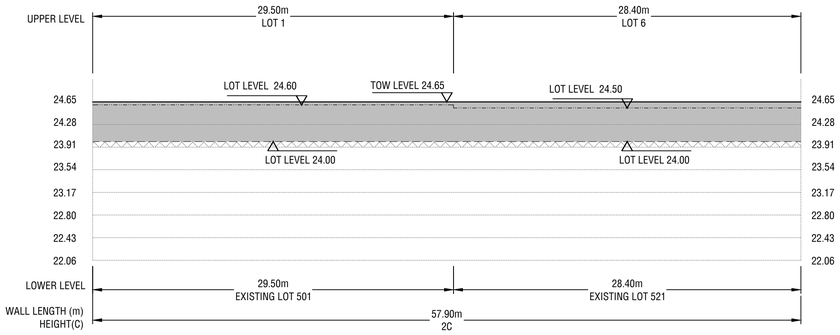
SCALE 0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE EARTHWORKS PLAN & RETAINING WALLS PLAN

JOB CODE P003127
SHEET NUMBER C100
REV C

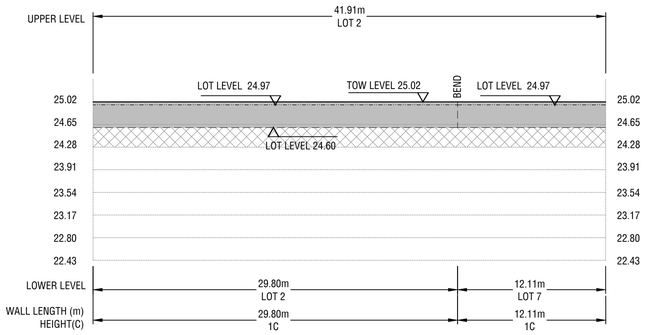
NOTES

1. DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
3. SOIL STABILISATION TO BE AS DIRECTED BY SUPERINTENDENT.
4. DUST CONTROL TO BE THE RESPONSIBILITY OF CONTRACTOR.
5. DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION.
6. THE CONTRACTOR SHALL ENSURE THAT ALL INTERCONNECTING WALL COURSES MATCH.
7. RETAINING WALL LONGITUDINAL SECTION DIRECTION IS VIEWED FROM LOW SIDE OF WALL.
8. SHADING FOR RETAINED FILL IS FOR INFORMATION ONLY. THE CONTRACTOR SHALL MAKE HIS OWN DETERMINATION OF THE AREA TO BE RETAINED. .
9. REFER DWG P003127 C950-C955 FOR RETAINING WALL DETAILS.



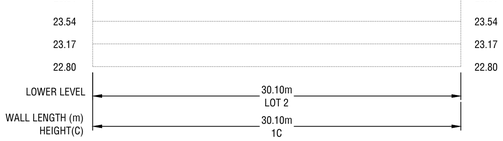
RETAINING WALL 1

Horizontal scale 1:250
Vertical scale 1:50



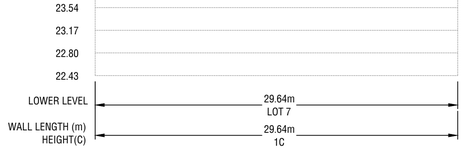
RETAINING WALL 2

Horizontal scale 1:250
Vertical scale 1:50



RETAINING WALL 3

Horizontal scale 1:250
Vertical scale 1:50



RETAINING WALL 4

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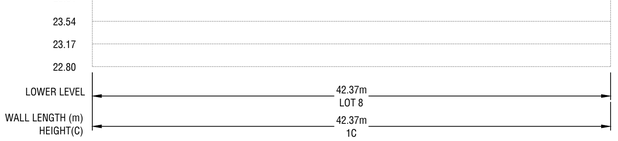

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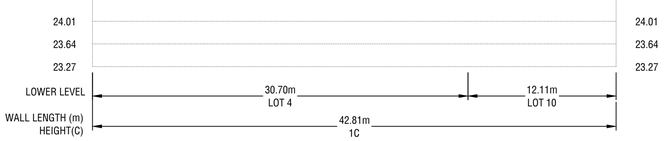

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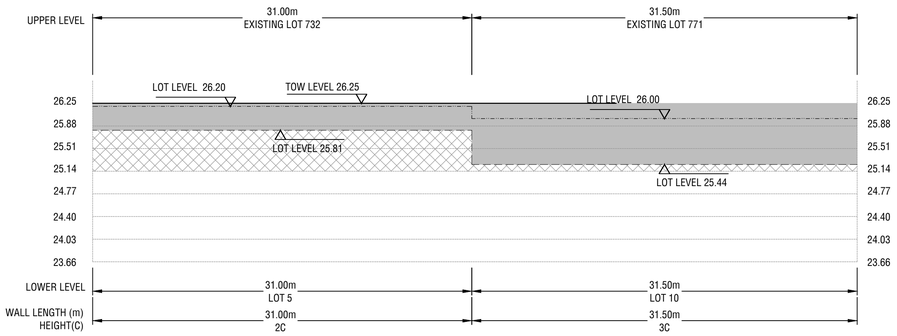

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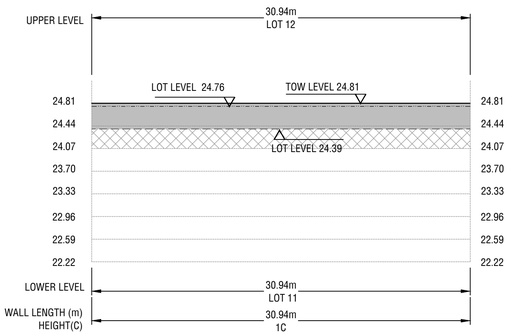

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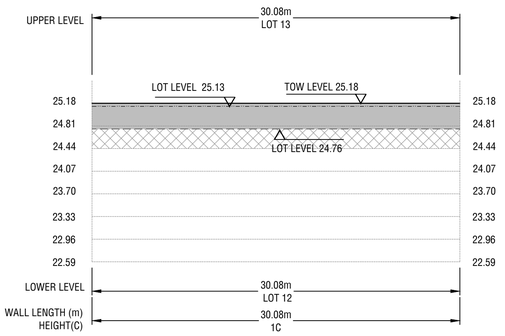


RETAINING WALL 9

Horizontal scale 1:250
Vertical scale 1:50

I, COLIN RYK KLEYWEG FIE AUST CPENG ENGEXEC NER APEC ENGINEER INTPE(AUS) M CIV ENG BE CIV ENG DIP ENG PRAC HEREBY CERTIFY THESE DRAWINGS.

DATE: _____

SIGNATURE: _____

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	ISSUED FOR APPROVAL	CK	CK
31/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

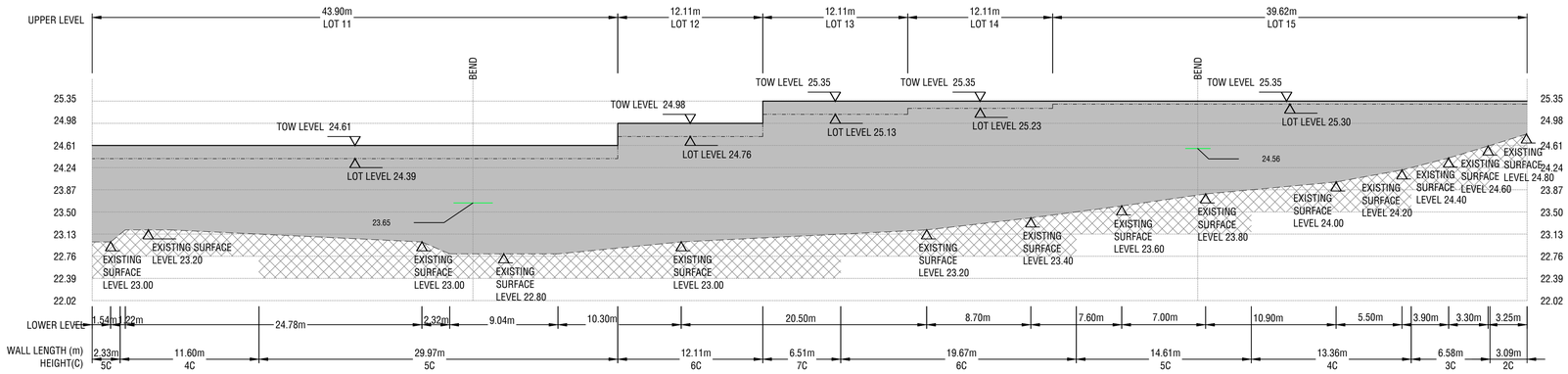
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE RETAINING WALL PROFILE PLAN SHEET 1 OF 3

JOB CODE P003127
SHEET NUMBER C110
REV C



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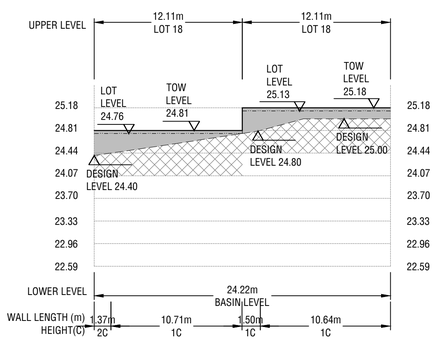
Horizontal scale 1:250
Vertical scale 1:50



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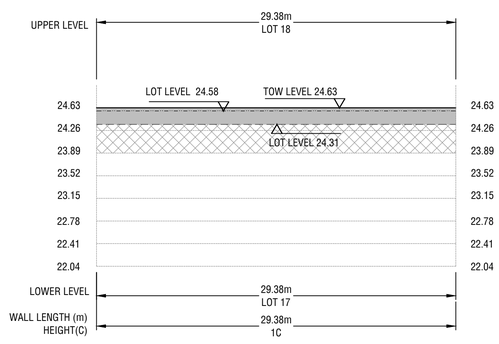
Horizontal scale 1:250
Vertical scale 1:50



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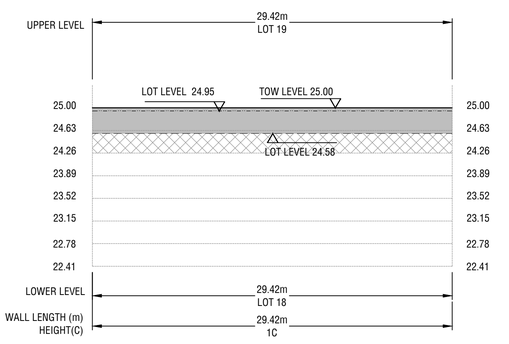

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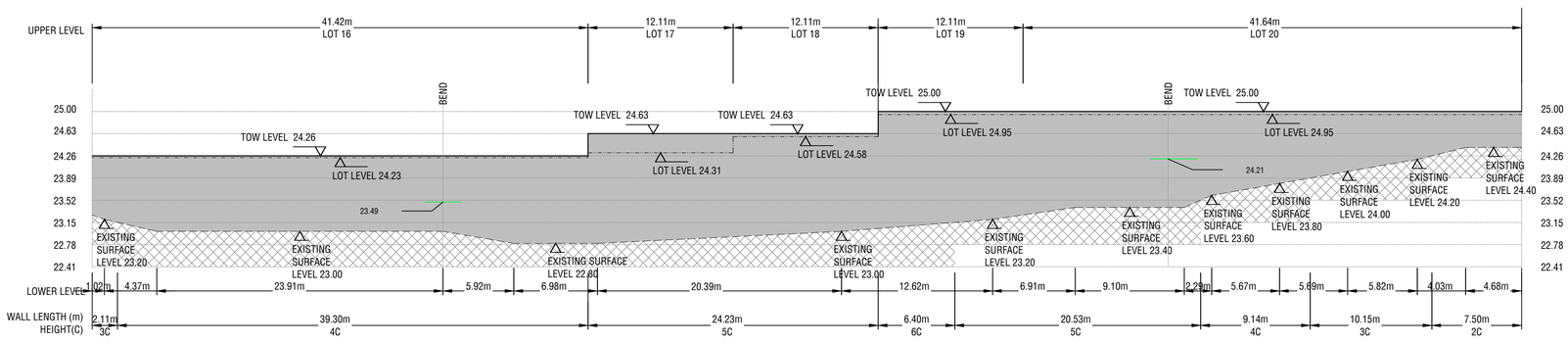
Horizontal scale 1:250
Vertical scale 1:50



RETAINING WALL 13

Horizontal scale 1:250
Vertical scale 1:50

I, COLIN RYK KLEYWEG FIE AUST CPENG ENGEXEC NER APEC ENGINEER INTPE(AUS) M CIV ENG BE CIV ENG DIP ENG PRAC HEREBY CERTIFY THESE DRAWINGS.

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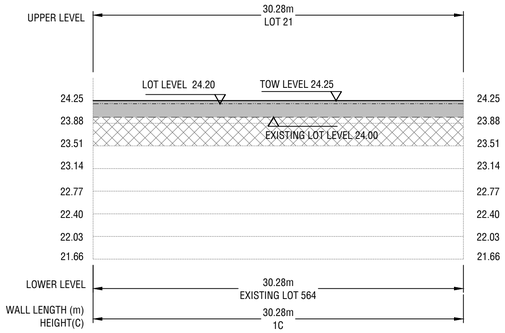
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

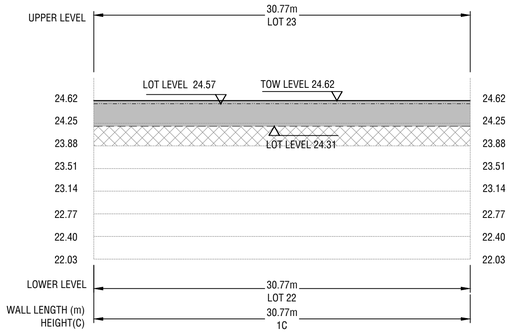
CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE RETAINING WALL PROFILE PLAN SHEET 2 OF 3

JOB CODE P003127
SHEET NUMBER C111
REV C



RETAINING WALL 14

Horizontal scale 1:250
Vertical scale 1:50



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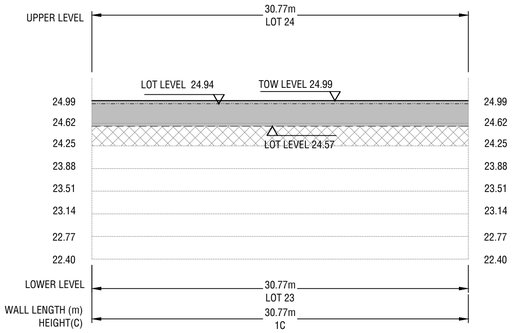
Horizontal scale 1:250
Vertical scale 1:50



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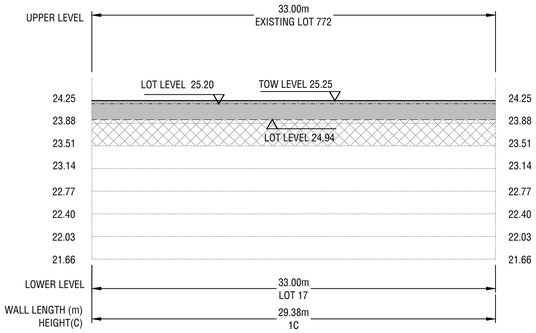

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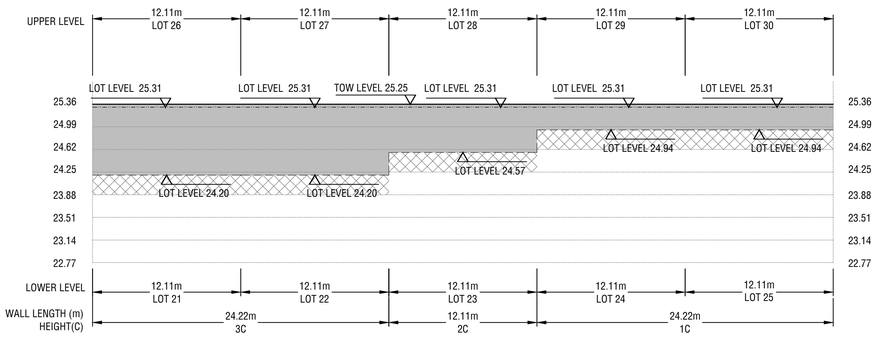

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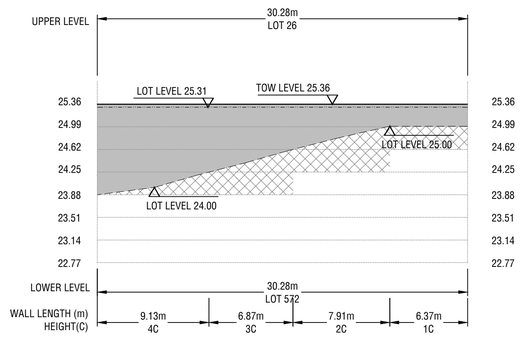

RETAINING WALL 19

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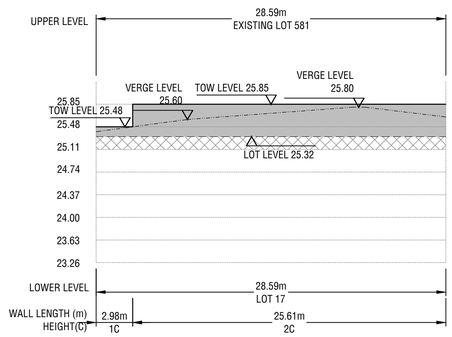
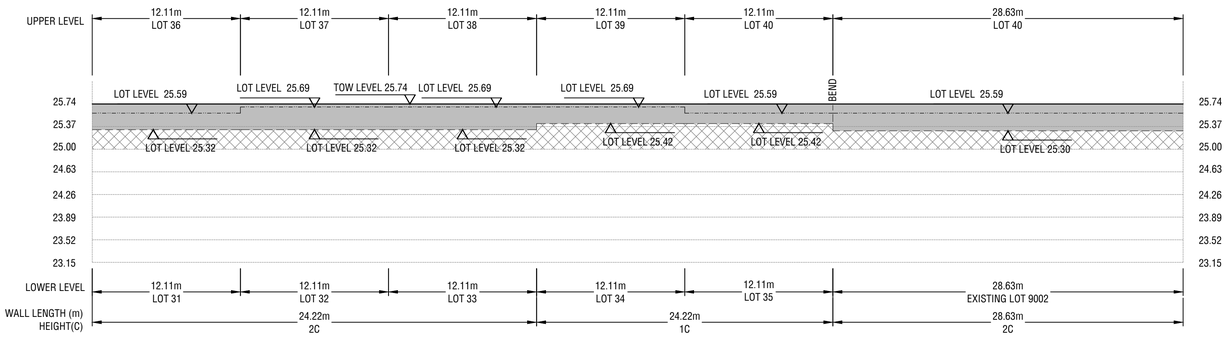
Vertical scale 1:50



RETAINING WALL 20

Horizontal scale 1:250
Vertical scale 1:50



RETAINING WALL 21

Horizontal scale 1:250
Vertical scale 1:50

I, COLIN RYK KLEYWEG FIE AUST CPENG ENGEXEC NER APEC ENGINEER INTPE(AUS) M CIV ENG BE CIV ENG DIP ENG PRAC HEREBY CERTIFY THESE DRAWINGS.

DATE: _____

SIGNATURE: _____

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Premise

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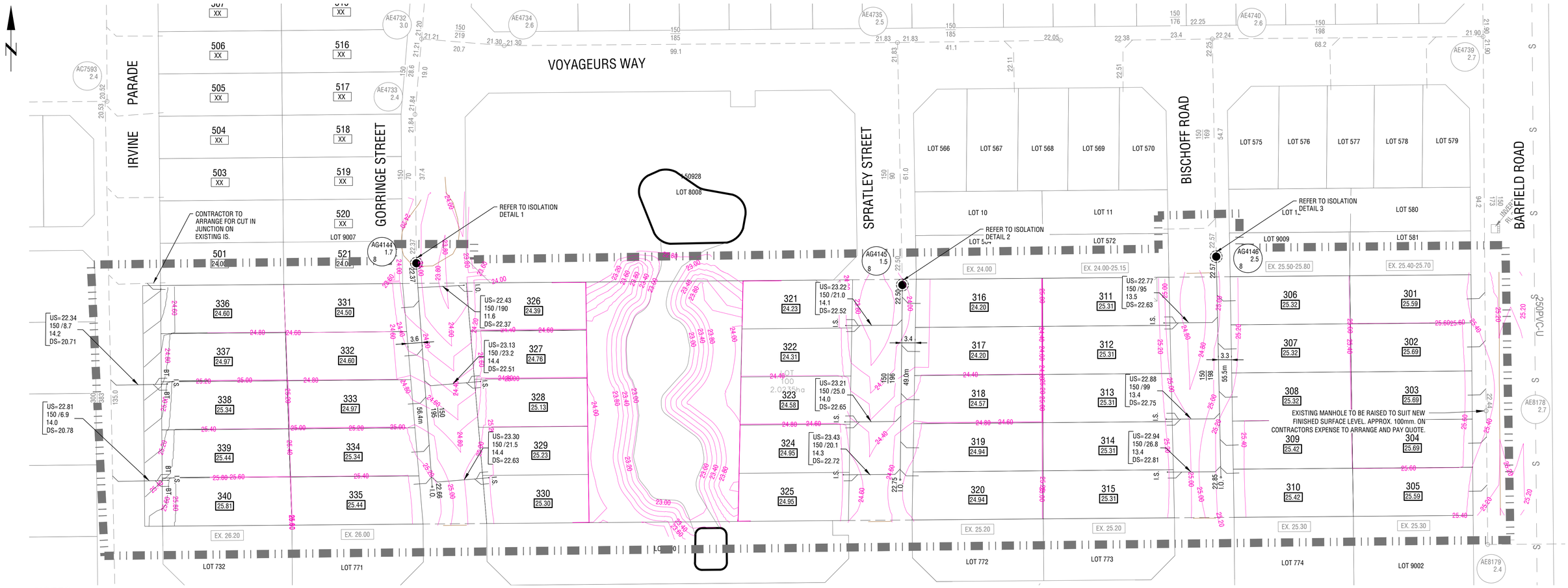
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED: S.NEDELJKOVIC
CHECKED: C. KLEYWEG
PROJECT MANAGER: C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT: STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT: NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION: BARFIELD ROAD, HAMMOND PARK
SHEET TITLE: RETAINING WALL PROFILE PLAN SHEET 3 OF 3

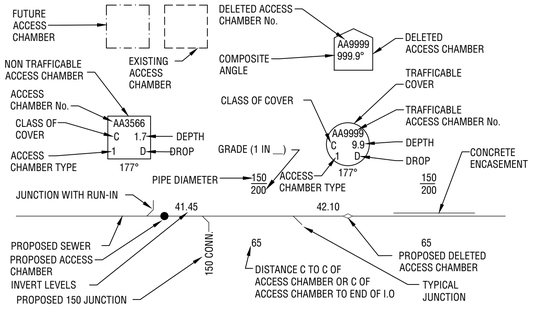
JOB CODE: P003127
SHEET NUMBER: C112
REV: C



NOTES

1. GENERAL
   - 1.1. CONTOUR INTERVAL IS 0.2m
   - 1.2. LEVELS ARE REDUCED FROM A.H.D.
   - 1.3. LEVEL INFORMATION HAS BEEN TAKEN FROM WATER CORPORATION BASE SHEETS AND SITE SURVEY
   - 1.4. CONTRACTORS SETOUT OF SEWER RETICULATION SHALL NOT TO BE DONE FROM SCALING OR DIGITAL DRAWING.
   - 1.5. ALL ACCESS CHAMBER DEPTHS ARE SHOWN FOR WATER CORPORATION INFORMATION ONLY. THE CONTRACTOR SHALL CONFIRM THE DEPTH OF THE ACCESS CHAMBER PRIOR TO MANUFACTURING.
2. GROUND WATER LEVELS
   - 2.1. FOR CONSTRUCTION PURPOSES THE TENDERER SHALL MAKE HIS OWN ASSESSMENT OF GROUND WATER AND ITS LIKELY AFFECT ON THE WORKS AND MAKE ALL DUE ALLOWANCE IN THE LUMP SUM TENDER.
3. PIPEWORK PIPES SHALL BE UPVC, CLASS SN 8, UNLESS OTHERWISE SHOWN.
4. ALL MAINS, ACCESS CHAMBERS AND INSPECTION OPENINGS SHALL BE LAID ON A 1.0m ALIGNMENT FROM BOUNDARIES WITHIN LOTS AND ON A 3.1m ALIGNMENT WITHIN ROAD RESERVES UNLESS OTHERWISE SHOWN.
5. ALL EARTHWORKS SHOWN ON THE DRAWINGS SHALL BE COMPLETED PRIOR TO ANY SEWER EXCAVATION.
6. EXISTING MAINS
   - 6.1. THE INVERT LEVEL OF ALL EXISTING MAINS SHALL BE CHECKED BY THE CONTRACTOR BEFORE CONSTRUCTION
   - 6.2. THE CONNECTION TO EXISTING MAINS SHALL BE MADE BY THE WATER CORPORATION AT THE CONTRACTORS
7. CONTRACTOR SHALL NOTIFY THE SUPERINTENDENT PRIOR TO CONSTRUCTION WHEN THE FOLLOWING COVER CAN NOT BE OBTAINED:
   - 7.1. 0.75m TO TOP OF SEWER WHERE NOT SUBJECT TO VEHICULAR TRAFFIC.
   - 7.2. 1.0m IN ROAD RESERVE AND R.O.W.'s AND OR NOT LESS THAN 0.75m BELOW CROWN OF ROAD.
   - 7.3. 1.5m WHERE DEVIATING FROM STANDARD ALIGNMENT IN A ROAD RESERVE CONSISTING OF A SERIES OF CHORDS AND WHEN CROSSING ROAD RESERVE AT AN ANGLE BETWEEN 45 AND 90 DEGREES.
8. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION ON SITE.
9. ALL JUNCTIONS SHALL BE 100mm DIA, BROUGHT IN A MINIMUM OF 0.5m INSIDE THE LOT, AND BROUGHT UP TO WITHIN 1.0m OF THE SURFACE.
10. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE COMMON TRENCH, EARTHWORKS AND ROADWORKS DRAWINGS, THE SPECIFICATION AND APPLICABLE WATER CORPORATION STANDARD DRAWINGS FOR THESE WORKS.
11. PROPOSED ACCESS CHAMBERS AND MAINTENANCE SHAFTS
    ACCESS CHAMBERS - TYPE 1- 0
    ACCESS CHAMBERS - TYPE 8- 3
    150mm DIAMETER = 313.9m
12. FILL LEVELS TO BE CERTIFIED BY LICENSED SURVEYOR.
13. ALL WORKS TO BE IN ACCORDANCE WITH THE WATER CORPORATIONS DESIGN STANDARDS 50 (DS50).

RETICULATION NOTATION

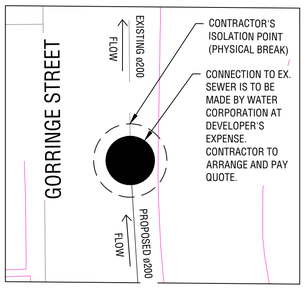


LEGEND

- PROPOSED SEWERS WITH ASSOCIATED ACCESS CHAMBER
- EXISTING SEWER MAIN WITH ASSOCIATED ACCESS CHAMBER
- LIMIT OF WORKS BOUNDARY
- 43.2 DESIGN FINISHED SURFACE CONTOUR (0.2m INTERVAL)

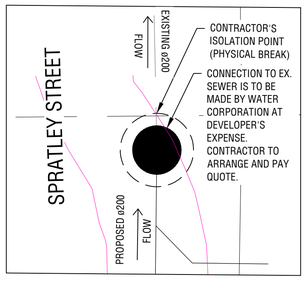
SEWER RETICULATION PLAN

SCALE 1:500



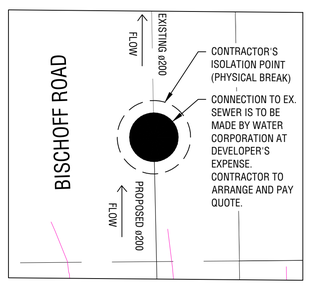
ISOLATION DETAIL 1

N.T.S.



ISOLATION DETAIL 2

N.T.S.



ISOLATION DETAIL 3

N.T.S.

THIS PLAN IS ACCEPTED AS COMPLYING WITH OVERALL SCHEME PLANNING.

COMPLIANCE WITH RELEVANT MANUALS REMAINS THE RESPONSIBILITY OF THE CONSULTING ENGINEER.

NO WORKS ARE TO COMMENCE ON SITE UNTIL STARTUP ARRANGEMENTS HAVE BEEN MADE WITH THE RELEVANT WORK INSPECTOR. SEE DEVELOPER'S MANUAL FOR CONTACT DETAILS.

..... FOR: MANAGER LAND SERVICING

OW07-203-001-01A

FILE No. 198217847

BEFORE YOU DIG www.byda.com.au

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	D	ISSUED FOR UWMP AND LSP APPROVAL	GK	CK
31/07/25	C	REISSUED TO WATER CORPORATION	GK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

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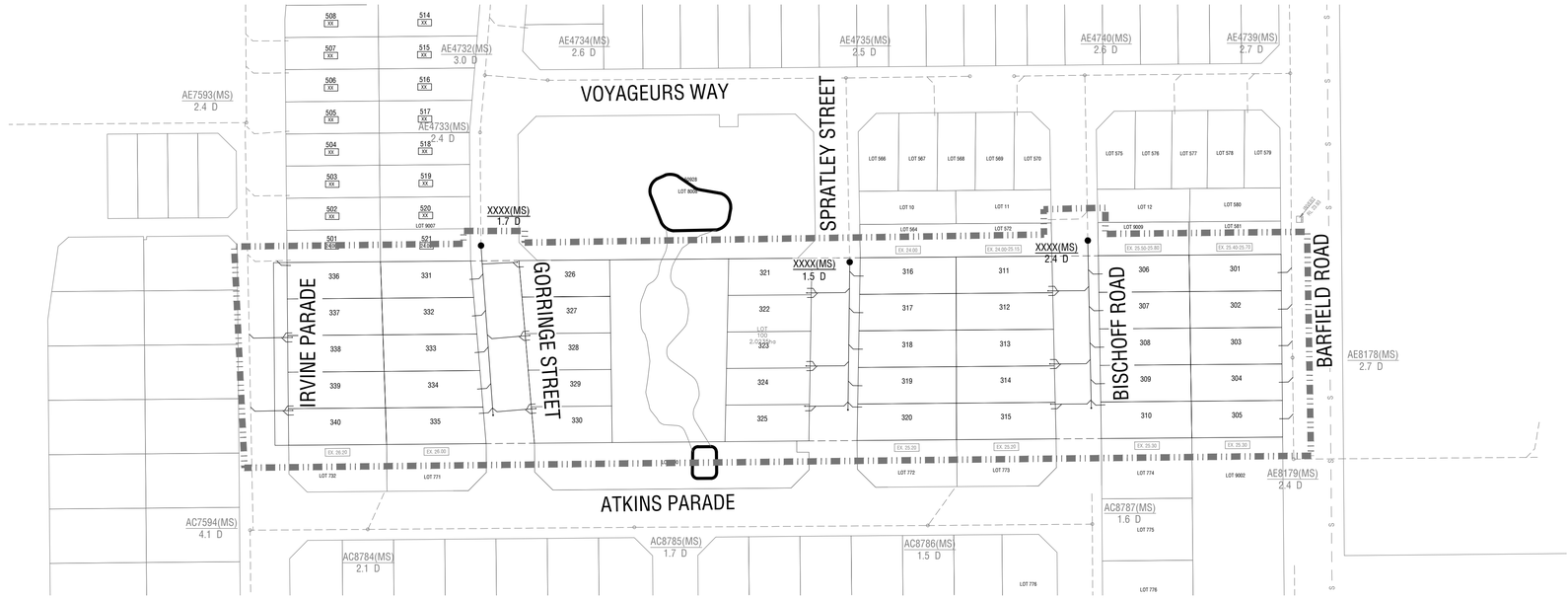
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION
C. KLEYWEG

SCALE
0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE SEWER RETICULATION PLAN

JOB CODE P003127
SHEET NUMBER C200
REV D



SITE PLAN
SCALE 1:1000

SEWER DESIGN DATA PLAN
SCALE 1:1000

NOTES

1. LOCAL AUTHORITY: CITY OF COCKBURN
2. LENGTH OF SEWERS 150Ø - 313.9m
3. NUMBER OF ACCESS CHAMBERS - 0
4. NUMBER OF MAINTENANCE SHAFTS - 3
5. NUMBER OF DELETED ACCESS CHAMBERS - 0
6. NUMBER OF LOTS BEING SERVED - 40
7. MAXIMUM GROUND WATER LEVEL = 22.5m A.H.D.
8. ALL WORKS TO BE IN ACCORDANCE WITH THE WATER CORPORATIONS DESIGN STANDARDS 50 (DS50).

TOTAL NET AREA TO BE SEWERED: 1.81ha
TOTAL PEAK FLOW = 0.3L/s

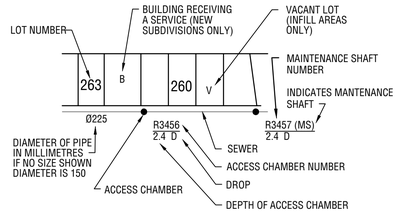
LEGEND

- PROPOSED SEWERS WITH ASSOCIATED ACCESS CHAMBER
- EXISTING SEWER MAIN WITH ASSOCIATED ACCESS CHAMBER
- PM — EXISTING SEWER PRESSURE MAIN
- SEWER MAIN WITH ASSOCIATED ACCESS CHAMBER BY OTHERS
- SUB CATCHMENT AREA BOUNDARY
- LIMIT OF WORKS BOUNDARY
- 1.04 ► FLOW IN LITRES PER SECOND

RESIDENTIAL

NET AREA (ha) — FLOW LITRES/PERSON/DAY
1.3 - 52.5 / 180 - 0.21
PERSONS PER NET HECTARE — GRAVITY SEWER DESIGN FLOW (L/s)

NOTATION



THIS PLAN IS ACCEPTED AS COMPLYING WITH OVERALL SCHEME PLANNING.

COMPLIANCE WITH RELEVANT MANUALS REMAINS THE RESPONSIBILITY OF THE CONSULTING ENGINEER.

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..... FOR: MANAGER LAND SERVICING

OW07-203-001-01A

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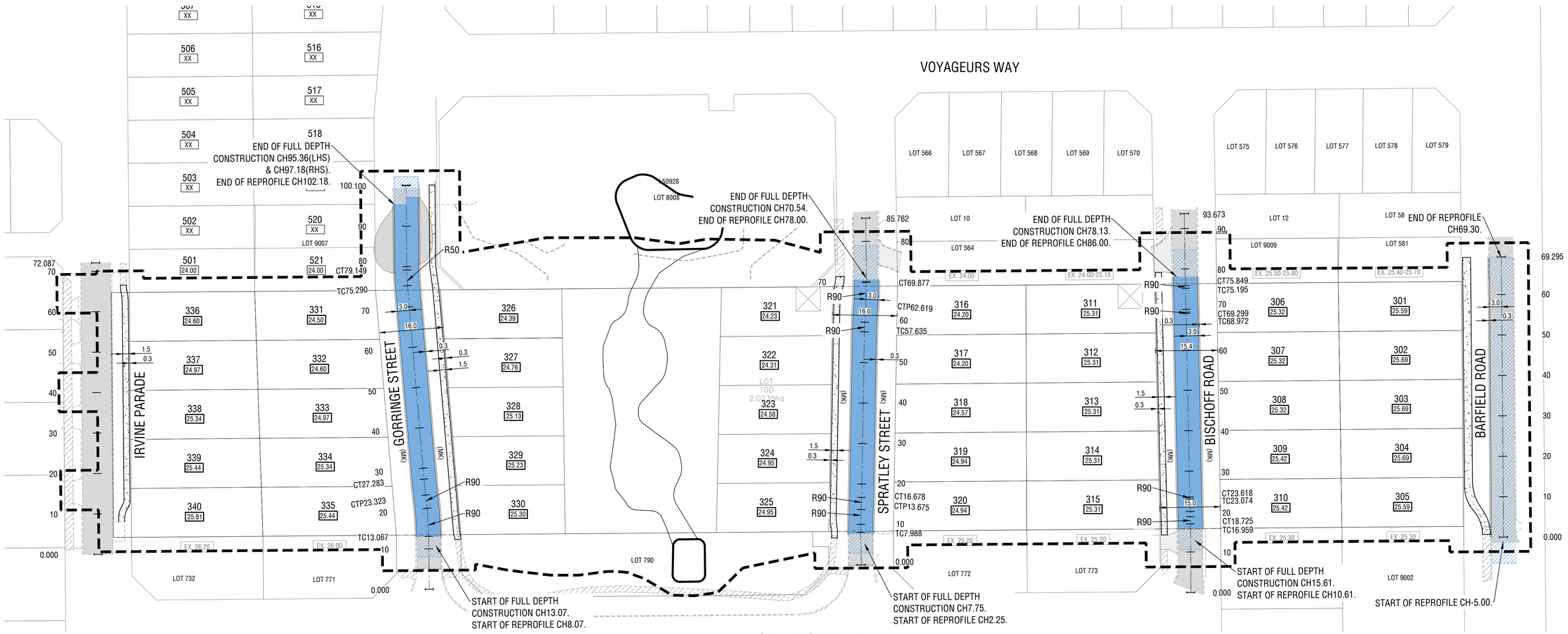
DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION C. KLEYWEG

SCALE 0 10 20 30m
SCALE 1:1000 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE SEWER DESIGN DATA PLAN

JOB CODE P003127
SHEET NUMBER C201
REV D



ROAD LAYOUT PLAN
SCALE 1:500

NOTES:

1. THE CONTRACTOR SHALL PROTECT ALL EXISTING KERBS, ROAD PAVEMENTS AND EXISTING INFRASTRUCTURE SERVICES AT THE PROPOSED CONNECTIONS TO EXISTING ROADS.
2. IT IS RECOMMENDED THE CONTRACTOR UNDERTAKES A ROAD DILAPIDATION SURVEY AND REPORT PRIOR TO THE COMMENCEMENT OF WORKS AND PROVIDES A COPY OF THIS TO THE SUPERINTENDENT AND THE CITY OF COCKBURN.

LEGEND

- EXISTING PAVEMENT
- EXISTING FOOTPATH
- EXISTING KERB
- PROPOSED MOUNTABLE KERB
- PROPOSED SEMI MOUNTABLE KERB
- PROPOSED CENTRELINE
- PROPOSED PAVEMENT
- PROPOSED MILL AND PROFILE EXISTING ASPHALT AND BASECOURSE. PRIMESEAL AND LAY 30mm AC10 ASPHALT TO SUIT HORIZONTAL GEOMETRY AND NEW KERBING
- PROPOSED FOOTPATH
- STAGE BOUNDARY
- NOMINATED GARAGE LOCATION

	A	B	C
1	FOOTPATH AREAS		
2	ROAD	100mm	150mm
3	IRVINE PARADE	89	0
4	GORRINGE STREET	132	0
5	SPRATLEY STREET	100	0
6	BISCHOFF ROAD	98	0
7	BARFIELD ROAD	140	0

TOTAL ROADS AREA AND KERB LENGTHS

ROAD	AREA (m2)	MK (m)	SMK (m)	FK (m)
IRVINE PARADE	0	0	0	0
GORRINGE STREET	565	166	0	0
SPRATLEY STREET	456	126	0	0
BISCHOFF ROAD	445	125	0	0
BARFIELD ROAD	449	70	20	0

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19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

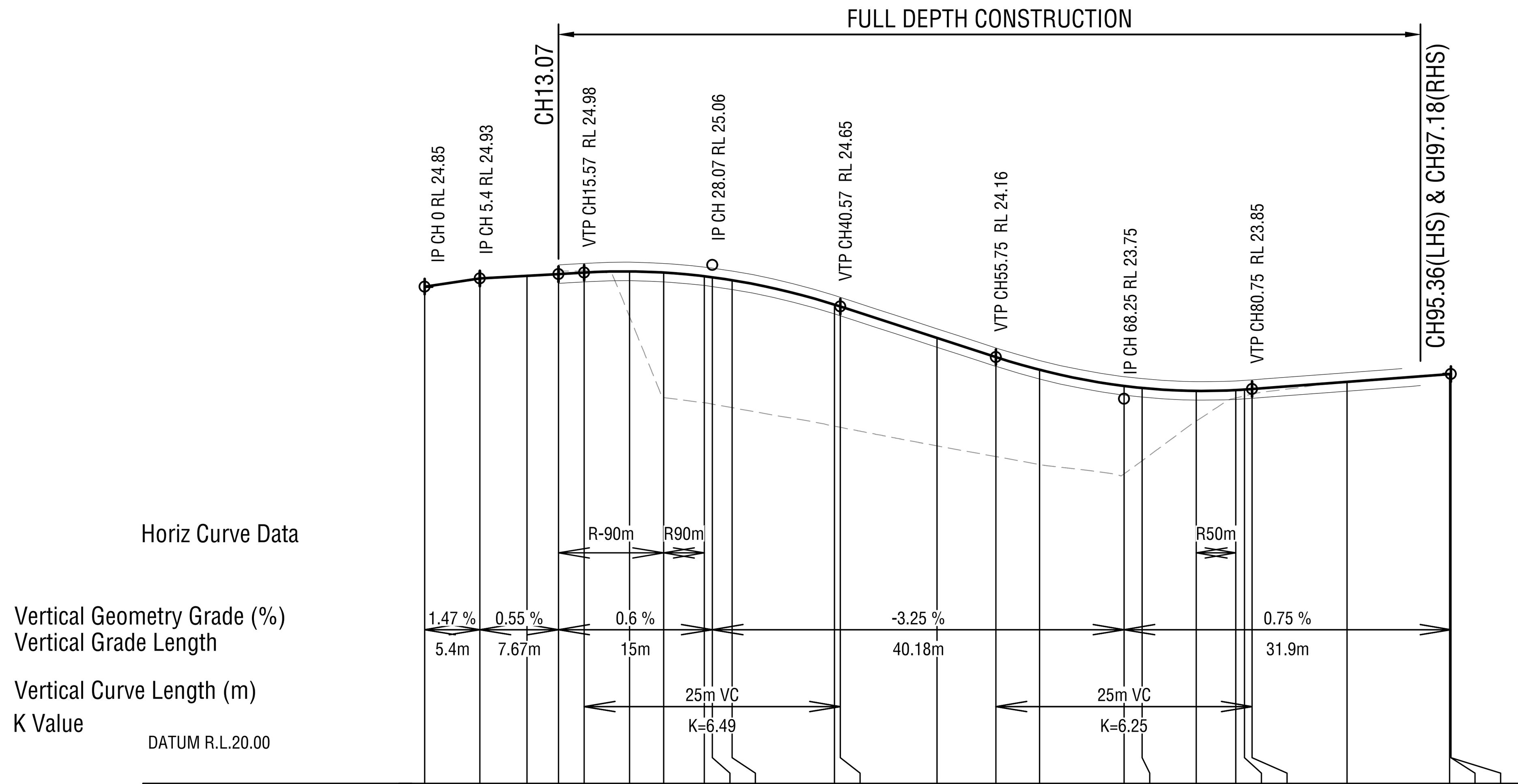
Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED M.DAVIS
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE 0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE ROAD LAYOUT AND PAVEMENT PLAN

JOB CODE P003127
SHEET NUMBER C300
REV C



DESIGNED LEVELS	24.85	24.93	24.95	24.97	24.98	25.00	24.99	24.95	24.94	24.91	24.67	24.65	24.35	24.16	24.04	23.88	23.86	23.83	23.84	23.84	23.85	23.92	23.99	23.99	23.99
Left Gutter					24.89	24.91	24.90	24.86	24.85	24.82	24.58	24.56	24.26	24.07	23.95	23.79	23.77	23.74	23.75	23.75	23.76	23.83			
Right Gutter					25.07	25.09	25.08	25.04	25.03	25.00	24.76	24.74	24.44	24.25	24.13	23.97	23.95	23.92	23.93	23.93	23.94	24.01			
Natural Surface	24.85	24.93	24.96	24.97	25.01	24.55	23.76	23.71	23.70	23.67	23.49	23.48	23.29	23.19	23.11	23.02	23.15	23.54	23.76	23.78	23.80	23.92	24.00		
Depths	-0.00	-0.00	-0.00	0.00	-0.02	0.44	1.22	1.24	1.24	1.24	1.19	1.18	1.05	0.97	0.92	0.86	0.71	0.30	0.08	0.06	0.05	-0.00	-0.00		
CHAINAGES	0.00	5.40	10.00	13.07	15.57	20.00	23.32	27.28	28.07	30.00	40.00	40.57	50.00	55.75	60.00	68.25	70.00	75.29	79.15	80.00	80.75	90.00	100.00	100.14	100.14
Super Elev.	LHS 3% / RHS -3%																								

14.000 94.000 97.177

LONGITUDINAL SECTION GORRINGE STREET

Scale horizontal 1:500
Scale vertical 1:50

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

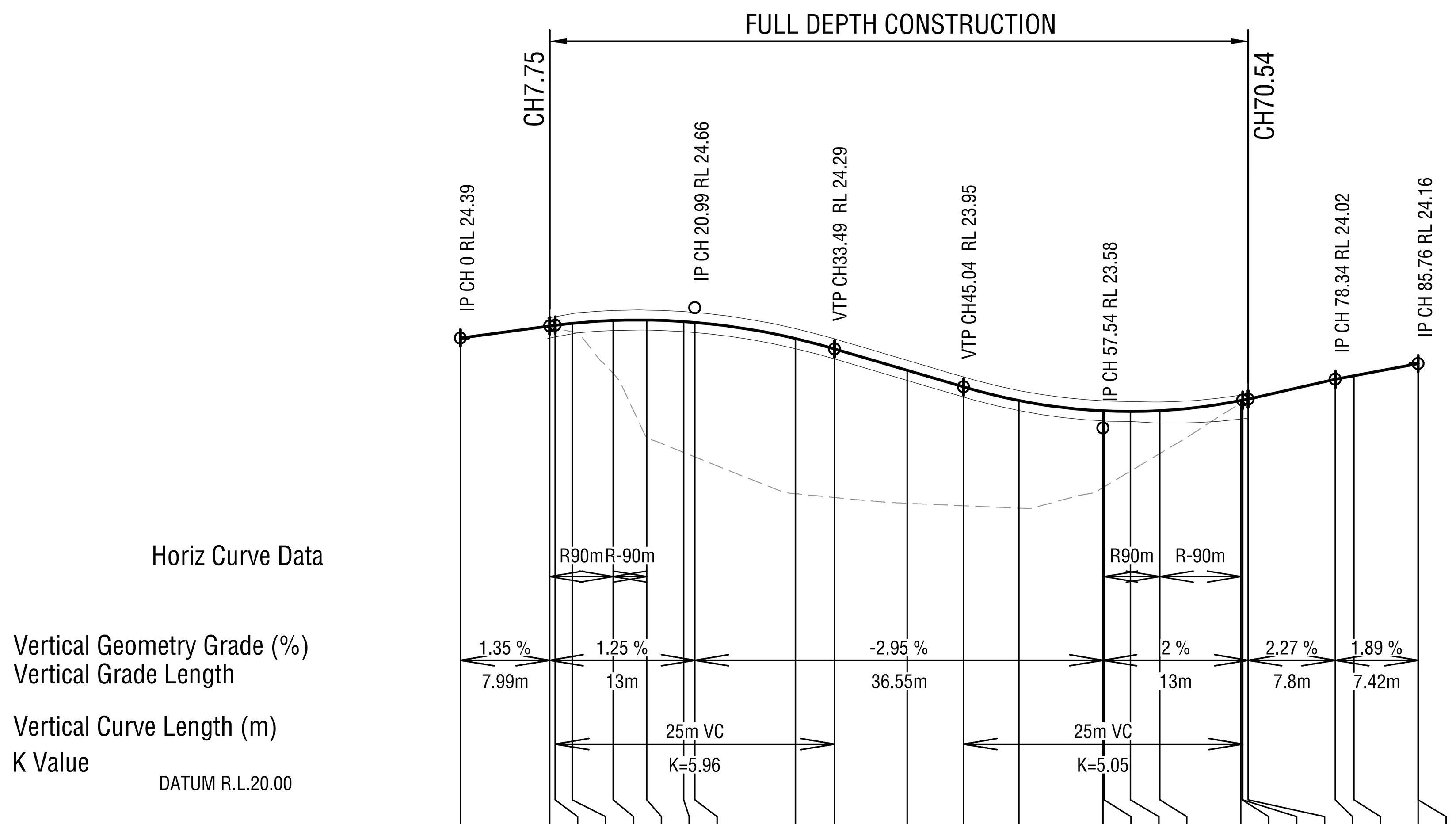
REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 5 10 15m
SCALE 1:500 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LONG SECTIONS SHEET 1 OF 4
JOB CODE P003127
SHEET NUMBER C310
REV C



DESIGNED LEVELS	24.39	24.49	24.50	24.52	24.54	24.55	24.53	24.53	24.38	24.29	24.10	23.95	23.83	23.73	23.73	23.73	23.74	23.83	23.83	23.83	23.84	24.02	24.05	24.16	24.16
Left Gutter		24.57	24.58	24.60	24.63	24.64	24.62	24.61	24.47	24.38	24.19	24.04	23.92	23.82	23.82	23.82	23.81	23.87	23.88	23.88					
Right Gutter		24.38	24.39	24.42	24.45	24.46	24.44	24.43	24.29	24.20	24.01	23.86	23.74	23.64	23.64	23.64	23.62	23.66	23.66	23.66					
Natural Surface	24.39	24.49	24.48	24.44	24.07	23.49	23.36	23.32	22.99	22.96	22.91	22.88	22.86	23.05	23.05	23.19	23.35	23.80	23.81	23.81	23.84	24.02	24.05	24.16	24.16
Depths	0.00	0.01	0.03	0.08	0.47	1.06	1.17	1.20	1.39	1.33	1.19	1.06	0.96	0.69	0.68	0.53	0.38	0.02	0.02	0.02	0.00	0.00	-0.00	0.00	-0.00
CHAINAGES	0.00	7.99	8.49	10.00	13.67	16.68	20.00	20.99	30.00	33.49	40.00	45.04	50.00	57.54	57.63	60.00	62.62	69.88	70.00	70.04	70.54	78.34	80.00	85.76	85.76

Super Elev.: RHS 2.44% / LHS -3.66% — RHS 3% / LHS -3% — RHS 2.67% — RHS 1.58% / LHS -5.55%

7.750 8.000 10.500 60.000 62.000 62.619 69.877 70.042 70.542

LONGITUDINAL SECTION SPRATLEY STREET

Scale horizontal 1:500
Scale vertical 1:50

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

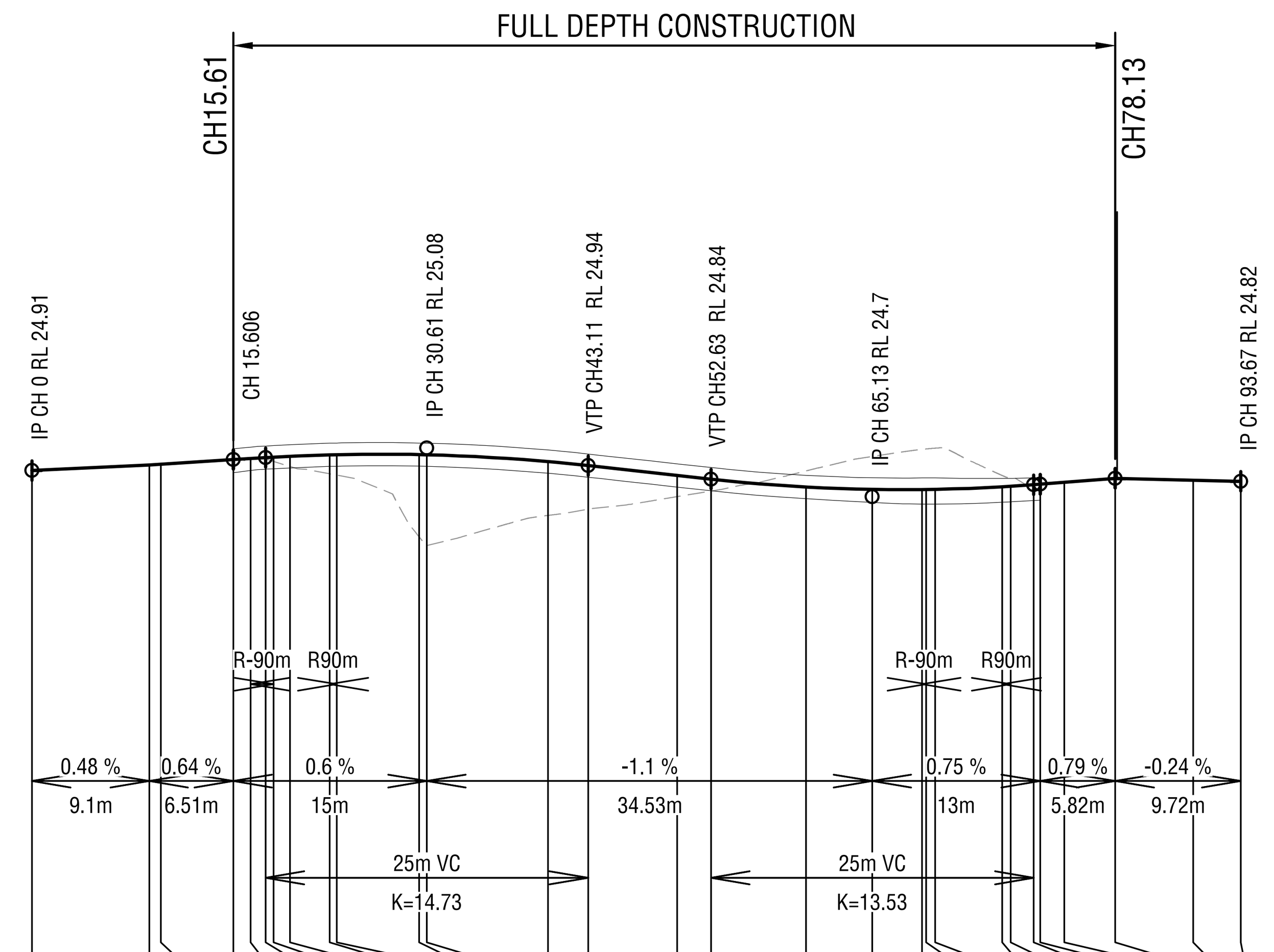
SCALE
0 5 10 15m
SCALE 1:500 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LONG SECTIONS SHEET 2 OF 4
JOB CODE P003127
SHEET NUMBER C311
REV C

Horiz Curve Data

Vertical Geometry Grade (%)
Vertical Grade Length

Vertical Curve Length (m)
K Value



CHAINAGES	DESIGNED LEVELS	Left Gutter	Right Gutter	Natural Surface	Depths
0.00	24.91				
9.10	24.95			24.95	0.00
10.00	24.96			24.95	0.00
15.61	24.99	25.07	24.89	24.99	0.00
16.96	25.00	25.09	24.91	25.00	-0.00
18.11	25.01	25.10	24.92	25.00	0.01
18.72	25.01	25.10	24.92	24.98	0.03
20.00	25.02	25.11	24.93	24.94	0.08
23.07	25.03	25.12	24.94	24.88	0.15
23.62	25.03	25.12	24.94	24.87	0.16
30.00	25.03	25.12	24.94	24.39	0.64
30.61	25.03	25.12	24.94	24.33	0.70
40.00	24.98	25.07	24.89	24.56	0.42
43.11	24.94	25.03	24.85	24.61	0.34
50.00	24.87	24.96	24.78	24.70	0.16
52.63	24.84	24.93	24.75	24.75	0.09
60.00	24.78	24.87	24.69	24.90	-0.12
65.13	24.76	24.85	24.66	25.02	-0.26
68.97	24.76	24.85	24.65	25.07	-0.31
69.30	24.76	24.85	24.65	25.07	-0.31
70.00	24.76	24.85	24.65	25.08	-0.32
75.19	24.78	24.85	24.66	24.87	-0.09
75.85	24.78	24.85	24.66	24.85	-0.06
77.63	24.80	24.85	24.67	24.79	0.01
78.13	24.80			24.80	0.00
80.00	24.81			24.81	0.00
83.95	24.85			24.83	0.01
90.00	24.83			24.83	0.00
93.67	24.82			24.82	0.00

Super Elev.: RHS 3% / LHS -3% / LHS -4.01%

17.500 60.000 70.000 75.849 76.000

LONGITUDINAL SECTION BISCHOFF ROAD

Scale horizontal 1:500
Scale vertical 1:50

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	ISSUED FOR APPROVAL	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

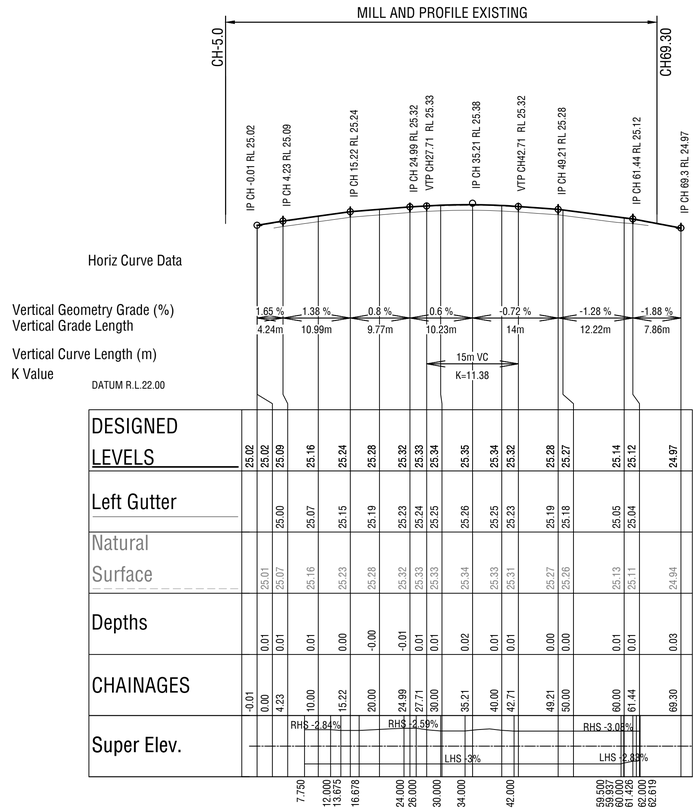
REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 5 10 15m
SCALE 1:500 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LONG SECTIONS SHEET 3 OF 4
JOB CODE P003127
SHEET NUMBER C312
REV C



LONGITUDINAL SECTION BARFIELD ROAD

Scale horizontal 1:500
Scale vertical 1:50

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

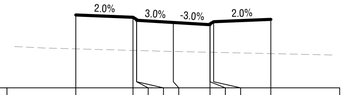
DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 5 10 15m
SCALE 1:500 (A3)
0 0.5 1 1.5m
SCALE 1:50 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LONG SECTIONS SHEET 4 OF 4

JOB CODE P003127
SHEET NUMBER C313
REV C

Centreline Data
X = 53174.74
Y = 239300.35
Z = 24.67

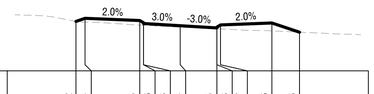


Datum 22.00

DESIGN LEVELS	24.98		24.88	24.79	24.76	24.67	24.58	24.61	24.70	24.80
NATURAL SURFACE	23.59		23.53	23.52	23.52	23.49	23.45	23.45	23.45	23.40
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.98

CHAINAGE 40.00

Centreline Data
X = 53171.57
Y = 239340.21
Z = 23.84

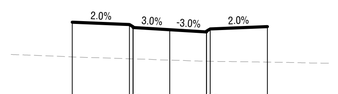


Datum 22.00

DESIGN LEVELS	24.02	24.14	24.05	23.96	23.93	23.84	23.75	23.78	23.87	23.96	23.58
NATURAL SURFACE	24.02	23.99	23.87	23.86	23.86	23.78	23.72	23.72	23.71	23.63	23.58
CENTRELINE OFFSET	-8.52	-7.78	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.49	9.76

CHAINAGE 80.00

Centreline Data
X = 53175.59
Y = 239290.38
Z = 24.91

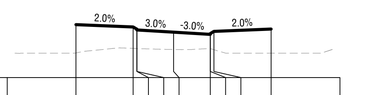


Datum 22.00

DESIGN LEVELS	25.21		25.12	25.03	25.00	24.91	24.82	24.85	24.94	25.03
NATURAL SURFACE	23.80		23.72	23.72	23.72	23.67	23.62	23.62	23.62	23.58
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.98

CHAINAGE 30.00

Centreline Data
X = 53172.20
Y = 239330.24
Z = 23.86

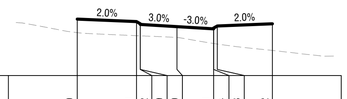


Datum 22.00

DESIGN LEVELS	24.16		24.07	23.98	23.95	23.86	23.77	23.80	23.89	23.98
NATURAL SURFACE	23.01		23.19	23.19	23.19	23.15	23.18	23.18	23.14	23.00
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.98

CHAINAGE 70.00

Centreline Data
X = 53176.61
Y = 239280.43
Z = 25.00

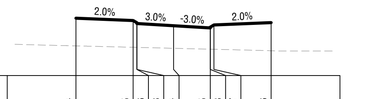


Datum 23.00

DESIGN LEVELS	25.30		25.21	25.12	25.09	25.00	24.91	24.94	25.03	25.12
NATURAL SURFACE	24.75		24.63	24.62	24.62	24.55	24.31	24.31	24.29	24.02
CENTRELINE OFFSET	-8.15		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.80

CHAINAGE 20.00

Centreline Data
X = 53173.05
Y = 239320.27
Z = 24.04

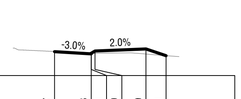


Datum 22.00

DESIGN LEVELS	24.34		24.25	24.16	24.13	24.04	23.95	23.98	24.07	24.16
NATURAL SURFACE	23.21		23.15	23.15	23.15	23.11	23.08	23.08	23.07	23.01
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.98

CHAINAGE 60.00

Centreline Data
X = 53171.44
Y = 239357.39
Z = 23.97

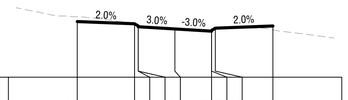


Datum 23.00

DESIGN LEVELS	23.97		23.88	23.91	24.00	24.09	23.81
NATURAL SURFACE	23.98		23.91	23.91	23.91	23.88	23.81
CENTRELINE OFFSET	0.00		3.00	3.00	3.30	7.48	9.12

CHAINAGE 97.18

Centreline Data
X = 53176.98
Y = 239273.51
Z = 24.97

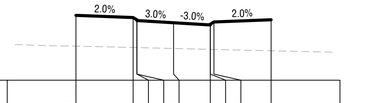


Datum 23.00

DESIGN LEVELS	25.27		25.18	25.09	25.06	24.97	24.88	24.91	25.00	25.09
NATURAL SURFACE	25.47		25.20	25.04	25.04	24.97	24.87	24.87	25.00	24.94
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.02

CHAINAGE 13.07

Centreline Data
X = 53173.90
Y = 239310.31
Z = 24.35

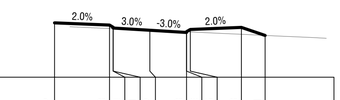


Datum 22.00

DESIGN LEVELS	24.65		24.56	24.47	24.44	24.35	24.26	24.29	24.38	24.47
NATURAL SURFACE	23.39		23.33	23.33	23.33	23.29	23.26	23.26	23.25	23.20
CENTRELINE OFFSET	-7.98		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.98

CHAINAGE 50.00

Centreline Data
X = 53171.49
Y = 239350.21
Z = 23.92



Datum 22.00

DESIGN LEVELS	24.22		24.13	24.04	24.01	23.92	23.83	23.86	23.95	24.03	23.71
NATURAL SURFACE			23.99	23.98	23.98	23.92	23.85	23.85	23.85	23.75	23.71
CENTRELINE OFFSET	-7.79		-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.48	9.43

CHAINAGE 90.00

CROSS SECTIONS GORRINGE STREET

Scale horizontal 1:250
Scale vertical 1:125

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

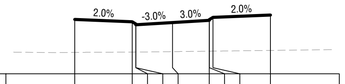
DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 1.25 2.5 3.75m
SCALE 1:125 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE CROSS SECTIONS SHEET 1 OF 5

JOB CODE P003127
SHEET NUMBER C314
REV C

Centreline Data
X = 53284.53
Y = 239306.47
Z = 24.10

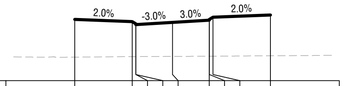


Datum 22.00

DESIGN LEVELS	24.22	24.13	24.04	24.01	24.10	24.19	24.22	24.31	24.40
NATURAL SURFACE	22.87	22.89	22.89	22.89	22.91	22.92	22.92	22.93	22.96
CENTRELINE OFFSET	-8.00	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.00

CHAINAGE 40.00

Centreline Data
X = 53284.36
Y = 239296.47
Z = 24.38

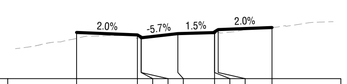


Datum 22.00

DESIGN LEVELS	24.50	24.41	24.32	24.29	24.38	24.47	24.50	24.59	24.68
NATURAL SURFACE	22.96	22.98	22.98	22.98	22.99	23.00	23.00	23.00	23.02
CENTRELINE OFFSET	-8.00	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.00

CHAINAGE 30.00

Centreline Data
X = 53285.29
Y = 239337.00
Z = 23.84

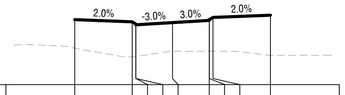


Datum 22.00

DESIGN LEVELS	23.89	23.79	23.70	23.67	23.84	23.88	23.91	24.00	24.09
NATURAL SURFACE	23.64	23.65	23.66	23.66	23.84	23.88	23.88	23.88	24.10
CENTRELINE OFFSET	-8.28	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.70

CHAINAGE 70.54

Centreline Data
X = 53284.19
Y = 239286.47
Z = 24.53

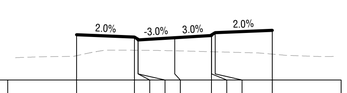


Datum 22.00

DESIGN LEVELS	24.66	24.56	24.47	24.44	24.53	24.62	24.65	24.74	24.84
NATURAL SURFACE	23.49	23.13	23.15	23.15	23.36	23.36	23.36	23.36	23.19
CENTRELINE OFFSET	-8.00	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.00

CHAINAGE 20.00

Centreline Data
X = 53284.91
Y = 239326.47
Z = 23.73

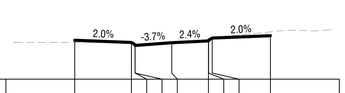


Datum 22.00

DESIGN LEVELS	23.85	23.76	23.67	23.64	23.73	23.82	23.85	23.94	24.03
NATURAL SURFACE	23.00	23.22	23.22	23.22	23.19	23.16	23.16	23.15	23.06
CENTRELINE OFFSET	-8.03	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 60.00

Centreline Data
X = 53283.93
Y = 239274.23
Z = 24.49

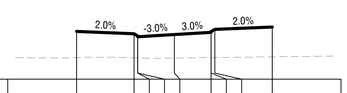


Datum 23.00

DESIGN LEVELS	24.59	24.50	24.41	24.38	24.49	24.56	24.59	24.68	24.78
NATURAL SURFACE	24.50	24.50	24.41	24.41	24.49	24.58	24.58	24.64	24.93
CENTRELINE OFFSET	-7.93	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.07

CHAINAGE 7.75

Centreline Data
X = 53284.71
Y = 239316.47
Z = 23.83



Datum 22.00

DESIGN LEVELS	23.95	23.86	23.77	23.74	23.83	23.92	23.95	24.04	24.13
NATURAL SURFACE	22.88	22.87	22.87	22.87	22.86	22.88	22.88	22.88	22.91
CENTRELINE OFFSET	-8.00	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	8.00

CHAINAGE 50.00

CROSS SECTIONS SPRATLEY STREET

Scale horizontal 1:250
Scale vertical 1:125

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

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PH: (08) 6263 9490
WEB: www.premise.com.au

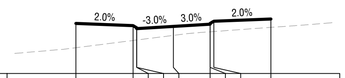
DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 1.25 2.5 3.75m
SCALE 1:125 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE CROSS SECTIONS SHEET 2 OF 5

JOB CODE P003127
SHEET NUMBER C315
REV C

Centreline Data
X = 53365.01
Y = 239299.65
Z = 24.93

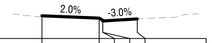


Datum 23.00

DESIGN LEVELS	25.05	24.96	24.87	24.84	24.93	25.02	25.05	25.14	25.23
NATURAL SURFACE	24.05	24.35	24.37	24.37	24.56	24.70	24.70	24.72	24.89
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 40.00

Centreline Data
X = 53364.05
Y = 239338.85
Z = 24.80

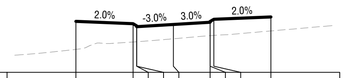


Datum 24.00

DESIGN LEVELS	24.93	24.84	24.75	24.72	24.80
NATURAL SURFACE	24.92	24.78	24.68	24.68	24.80
CENTRELINE OFFSET	-7.79	-3.12	-2.82	-2.82	0.00

CHAINAGE 79.21

Centreline Data
X = 53365.21
Y = 239289.65
Z = 24.96

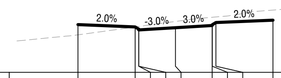


Datum 23.00

DESIGN LEVELS	25.08	24.99	24.90	24.87	24.96	25.05	25.08	25.17	25.26
NATURAL SURFACE	23.94	24.24	24.25	24.25	24.37	24.50	24.50	24.51	24.69
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 30.00

Centreline Data
X = 53364.41
Y = 239329.64
Z = 24.83

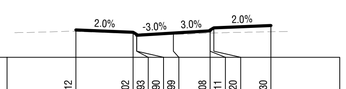


Datum 23.00

DESIGN LEVELS	24.95	24.86	24.77	24.74	24.83	24.92	24.95	25.04	25.13
NATURAL SURFACE	24.53	24.85	24.87	24.87	25.08	25.25	25.25	25.26	25.55
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 70.00

Centreline Data
X = 53365.40
Y = 239279.65
Z = 24.99

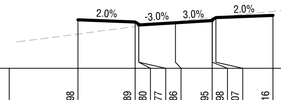


Datum 24.00

DESIGN LEVELS	25.12	25.02	24.93	24.90	24.99	25.08	25.11	25.20	25.30
NATURAL SURFACE	25.06	24.98	24.97	24.97	24.94	24.99	24.99	24.99	25.04
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 20.00

Centreline Data
X = 53364.61
Y = 239319.65
Z = 24.86

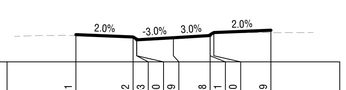


Datum 23.00

DESIGN LEVELS	24.98	24.89	24.80	24.77	24.86	24.95	24.98	25.07	25.16
NATURAL SURFACE	24.40	24.70	24.72	24.72	24.90	25.07	25.07	25.09	25.33
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 60.00

Centreline Data
X = 53365.49
Y = 239275.26
Z = 24.99

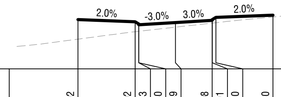


Datum 24.00

DESIGN LEVELS	25.11	25.02	24.93	24.90	24.99	25.08	25.11	25.20	25.29
NATURAL SURFACE	25.07	25.00	24.90	24.89	24.99	25.08	25.08	25.13	25.19
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 15.60

Centreline Data
X = 53364.81
Y = 239309.65
Z = 24.89



Datum 23.00

DESIGN LEVELS	25.02	24.92	24.83	24.80	24.89	24.98	25.01	25.10	25.20
NATURAL SURFACE	24.22	24.52	24.54	24.54	24.70	24.87	24.87	24.89	25.12
CENTRELINE OFFSET	-7.97	-3.30	-3.00	-3.00	0.00	3.00	3.00	3.30	7.97

CHAINAGE 50.00

CROSS SECTIONS BISCHOFF ROAD

Scale horizontal 1:250
Scale vertical 1:125

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ISSUED FOR APPROVAL

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19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
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REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 1.25 2.5 3.75m
SCALE 1:125 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE CROSS SECTIONS SHEET 3 OF 5

JOB CODE P003127
SHEET NUMBER C316
REV C

Centreline Data
X = 53442.74
Y = 239303.32
Z = 25.34

Datum 24.00

2.0% -3.0% -3.0%

DESIGN LEVELS	25.50		25.37	25.28	25.25	25.34	25.25			
NATURAL SURFACE	25.57		25.29	25.27	25.27	25.33	25.25			
CENTRELINE OFFSET	-9.86		-3.30	-3.00	-3.00	0.00	2.95			

CHAINAGE 30.00

Centreline Data
X = 53442.47
Y = 239337.26
Z = 25.07

Datum 24.00

3.5% -2.2% -3.1%

DESIGN LEVELS	25.36		25.13	25.04	25.01	25.07	24.98			
NATURAL SURFACE	25.37		25.09	25.01	25.01	25.06	24.98			
CENTRELINE OFFSET	-9.77		-3.16	-2.86	-2.86	0.00	2.92			

CHAINAGE 63.94

Centreline Data
X = 53442.82
Y = 239293.32
Z = 25.28

Datum 24.00

2.0% -3.0% -2.8%

DESIGN LEVELS	25.44		25.31	25.22	25.19	25.28	25.19	25.25	25.35	25.35
NATURAL SURFACE	25.50		25.23	25.21	25.21	25.28	25.19	25.19	25.27	
CENTRELINE OFFSET	-9.85		-3.30	-3.00	-3.00	0.00	2.96	2.96	3.11	3.21

CHAINAGE 20.00

Centreline Data
X = 53442.50
Y = 239333.32
Z = 25.14

Datum 24.00

2.3% -2.8% -3.1%

DESIGN LEVELS	25.33		25.17	25.08	25.05	25.14	25.05			
NATURAL SURFACE	25.36		25.08	25.07	25.07	25.13	25.05			
CENTRELINE OFFSET	-9.86		-3.27	-2.97	-2.97	0.00	2.92			

CHAINAGE 60.00

Centreline Data
X = 53442.90
Y = 239283.32
Z = 25.16

Datum 24.00

2.0% -3.0% -2.9%

DESIGN LEVELS	25.33		25.19	25.10	25.07	25.16	25.08	25.13	25.23	25.23
NATURAL SURFACE	25.40		25.10	25.08	25.08	25.16	25.08	25.08	25.16	
CENTRELINE OFFSET	-9.84		-3.30	-3.00	-3.00	0.00	2.97	2.98	3.12	3.22

CHAINAGE 10.00

Centreline Data
X = 53442.58
Y = 239323.32
Z = 25.27

Datum 24.00

2.0% -3.0% -3.1%

DESIGN LEVELS	25.43		25.30	25.21	25.18	25.27	25.18			
NATURAL SURFACE	25.50		25.20	25.20	25.20	25.26	25.18			
CENTRELINE OFFSET	-9.88		-3.30	-3.00	-3.00	0.00	2.92			

CHAINAGE 50.00

Centreline Data
X = 53442.95
Y = 239276.05
Z = 25.06

Datum 24.00

2.0% -3.0% -2.9%

DESIGN LEVELS	25.22		25.09	25.00	24.97	25.06	24.97			
NATURAL SURFACE			25.11	24.98	24.98	25.05	24.97			
CENTRELINE OFFSET	-9.83		-3.30	-3.00	-3.00	0.00	2.99			

CHAINAGE 2.73

Centreline Data
X = 53442.66
Y = 239313.32
Z = 25.34

Datum 24.00

2.0% -3.0% -2.9%

DESIGN LEVELS	25.50		25.37	25.28	25.25	25.34	25.25			
NATURAL SURFACE	25.51		25.28	25.27	25.27	25.33	25.25			
CENTRELINE OFFSET	-9.87		-3.30	-3.00	-3.00	0.00	2.94			

CHAINAGE 40.00

CROSS SECTIONS BARFIELD ROAD

Scale horizontal 1:250
Scale vertical 1:125

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DESIGNED F. BOROVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 1.25 2.5 3.75m
SCALE 1:125 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE CROSS SECTIONS SHEET 4 OF 5

JOB CODE P003127
SHEET NUMBER C317
REV C

Centreline Data
X = 53094.95
Y = 239299.07
Z = null

Datum 24.00

2.0%

DESIGN LEVELS		24.95	25.04	
Natural Surface	24.67	24.95	25.01	
CENTRELINE OFFSET	0.00	3.98	8.31	

CHAINAGE 30.00

Centreline Data
X = 53095.04
Y = 239289.07
Z = null

Datum 24.00

2.0%

DESIGN LEVELS		25.20	25.29	
Natural Surface	24.93	25.20	25.47	
CENTRELINE OFFSET	0.00	3.98	8.31	

CHAINAGE 20.00

Centreline Data
X = 53095.13
Y = 239279.07
Z = null

Datum 24.00

2.0%

DESIGN LEVELS		25.43	25.52	
Natural Surface	25.19	25.43	25.64	
CENTRELINE OFFSET	0.00	3.95	8.31	

CHAINAGE 10.00

Centreline Data
X = 53095.18
Y = 239273.21
Z = null

Datum 24.00

6.1% 2.0%

DESIGN LEVELS		25.55	25.71	25.75	
Natural Surface	25.35	25.55	25.71	25.79	
CENTRELINE OFFSET	0.00	4.01	6.63	8.31	

CHAINAGE 4.14

Centreline Data
X = 53094.65
Y = 239333.07
Z = null

Datum 23.00

2.0%

DESIGN LEVELS		24.10	24.18	
Natural Surface	23.83	24.10	24.19	
CENTRELINE OFFSET	0.00	3.99	8.31	

CHAINAGE 64.00

Centreline Data
X = 53094.68
Y = 239329.07
Z = null

Datum 23.00

2.0%

DESIGN LEVELS		24.20	24.29	
Natural Surface	23.94	24.20	24.30	
CENTRELINE OFFSET	0.00	3.98	8.31	

CHAINAGE 60.00

Centreline Data
X = 53094.77
Y = 239319.07
Z = null

Datum 23.00

2.0%

DESIGN LEVELS		24.47	24.56	
Natural Surface	24.21	24.47	24.53	
CENTRELINE OFFSET	0.00	3.96	8.31	

CHAINAGE 50.00

Centreline Data
X = 53094.86
Y = 239309.07
Z = null

Datum 23.00

2.0%

DESIGN LEVELS		24.70	24.78	
Natural Surface	24.45	24.70	24.76	
CENTRELINE OFFSET	0.00	3.96	8.31	

CHAINAGE 40.00

CROSS SECTIONS IRVINE PARADE

Scale horizontal 1:250
Scale vertical 1:125

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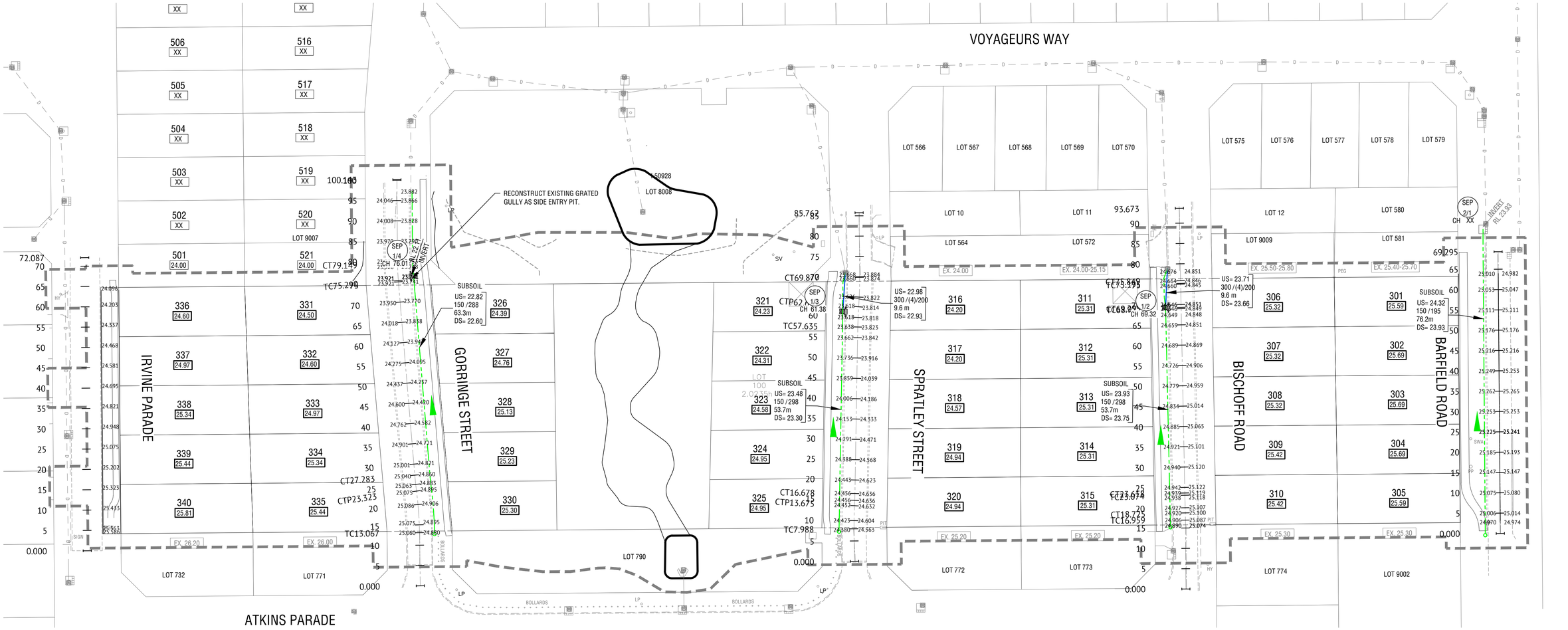
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 2.5 5 7.5m
SCALE 1:250 (A3)
0 1.25 2.5 3.75m
SCALE 1:125 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE CROSS SECTIONS SHEET 5 OF 5

JOB CODE P003127
SHEET NUMBER C318
REV C



NOTES

1. GENERAL
   - 1.1. LEVELS ARE REDUCED FROM A.H.D.
   - 1.2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL KC01943.000 DRAWINGS AND THE SPECIFICATION.
   - 1.3. THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND MANPOWER TO THE MINIMUM AREA NECESSARY AND PROTECT ALL VEGETATION ON SITE.
   - 1.4. ALL PIPES CROSSING WITH LESS THAN 300MM CLEARANCE REQUIRE CONCRETE ENCASING LOCALLY.
   - 1.5. ALL DRAINAGE PIPES AND STRUCTURES SHALL COMPLY WITH THE SPECIFICATION OF THE CITY OF COCKBURN.
   - 1.6. ALL PIPES SIZE SHOWN ARE IN MILLIMETRES, DISTANCES AND LEVELS ARE SHOWN IN METRES.
   - 1.7. EXISTING SERVICES SHOWN ARE INDICATIVE ONLY. THE CONTRACTOR SHALL LIAISE WITH ALL RELEVANT AUTHORITIES TO LOCATE ALL EXISTING SERVICES WITHIN THE SITE, PRIOR TO COMMENCING WORKS. WHERE PROPOSED WORKS CLASH WITH EXISTING THE CONTRACTOR SHALL SUPPLY LEVELS TO THE SUPERINTENDENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUPPORT OF ALL EXISTING SERVICES. WHERE SERVICES CROSS, THE UPPER SERVICE SHALL BE PROVIDED WITH A SUITABLE SUPPORT AS REQUIRED, BY THE RELEVANT SERVICE AUTHORITY MANUAL.
   - 1.8. THE CONTRACTOR SHALL NOT SCALE OFF OF THESE DRAWINGS. WHERE A DISCREPANCY EXISTS BETWEEN THE MODEL, THE DRAWINGS, THE BOQ, THE SPECIFICATION OR ANY OTHER DOCUMENT OR INSTRUCTION, THE CONTRACTOR SHALL BRING THIS / THESE DISCREPANCIES TO THE IMMEDIATE ATTENTION OF THE SUPERINTENDENT. SCALING QUANTITIES FROM THESE DRAWINGS IS NOT AN ACCEPTABLE METHOD OF CALCULATING QUANTITIES.
2. DRAINAGE
   - 2.1. DRAINAGE PIPE SHALL BE CLASS 4 UNLESS OTHERWISE NOTED.
   - 2.2. ALL TRENCHING, PIPE BEDDING AND BACKFILLING SHALL BE IN ACCORDANCE WITH AS3725.
   - 2.3. ALL MANHOLES AND ENTRY PITS SHALL BE LOCATED AS SHOWN IRRESPECTIVE OF PIPE LENGTHS SHOWN ON THE DRAWINGS.
   - 2.4. THE MANHOLE AND ENTRY PIT LIDS SHALL BE SET TO SUIT THE VERGE SLOPE, NOMINALLY 2% UPWARDS FROM THE TOP OF BACK OF KERB.
   - 2.5. THE CONTRACTOR SHALL IMMEDIATELY REPORT ANY DISCREPANCY OR CLASH WITH OTHER SERVICES TO THE SUPERINTENDENT.
   - 2.6. ALL DRAINAGE PIPE CONNECTIONS TO BE CLOSED JOINTED WITH RUBBER RINGS.
   - 2.7. FOR TEMPORARY CAPS ON RCP, BRICK UP AT END OF PIPE WITHIN PIT.
   - 2.8. ALL DRAINAGE PIT LIDS AND GRATES LOCATED WITHIN A ROAD RESERVE AREA SHALL BE CLASS D (TRAFFICABLE).
   - 2.8.1. PIPE DISTANCES ARE MEASURED BETWEEN PIT CENTRES (U.N.O.).
   - 2.9. THE LOCATION OF ALL MANHOLES / PITS SHALL BE POSITIONED AS SHOWN IN THE DRAWING AND THE STATED POSITION ON THE SCALE DRAWING IS TO TAKE PRECEDENCE OVER ANY STATED PIPE LENGTHS.
   - 2.10. AS CONSTRUCTED DRAWINGS SHALL BE PROVIDED TO THE SUPERINTENDENT UPON COMPLETION OF THE WORKS, CLEARLY INDICATING DIMENSIONS, DEPTHS AND TYPES OF THE RECENTLY INSTALLED PIPE WORK AND STRUCTURES.

LEGEND

- 23.2 — EXISTING CONTOUR LEVEL (0.2m INTERVAL)
- EXISTING KERB
- EXISTING DRAINAGE
- 24.337 — GUTTER LEVELS
- PROPOSED KERBING
- PROPOSED DRAINAGE
- PROPOSED SUBSOIL DRAIN LAYOUT
- STAGE BOUNDARY
- TRAPPED / MH 158 — DENOTES TRAPPED MANHOLE PIT NUMBER, TYPE (CHAINAGE)
- CH 23.0 CSEP — COMBINED SIDE ENTRY
- PROPOSED DRAINAGE MANHOLE
- SIDE ENTRY PIT
- PROPOSED BUBBLE-UP PIT
- U/S 25.00 / 300 (4)/ 16.5 / 16.5 / D/S 24.00 — UPSTREAM INVERT LEVEL; PIPE DIA (PIPE CLASS) / GRADE; LENGTH; DOWNSTREAM INVERT LEVEL

STORMWATER & SUBSOIL DRAINAGE PLAN

SCALE 1:500

ULTIMATE DRAINAGE BASIN DETAILS - POS

ITEM	PREMISE LWMS CALCULATIONS
SIDE SLOPES	1 IN 6
BASE I.L.	22.60m AHD
BASE AREA	575m2
1% AEP TWL (DESIGN)	23.184m AHD *
18.1% AEP TWL (DESIGN)	22.969m AHD *
63.2% AEP TWL (DESIGN)	22.700m AHD *

Barfield Hammond Park Drainage												
	Harmonie Park (North) Catchment						Atkins Park (South) Catchment					
Event	Depth	Existing Base Area (m2)	Existing TWL Area (m2)	Total TWL Area Required (m2)	Subject Site Base Area (m2)	Subject Site TWL Area (m2)	Depth	Existing Base Area (m2)	Existing TWL Area (m2)	Total TWL Area Required (m2)	Subject Site Base Area Required (m2)	Subject Site TWL Area Lost (m2)
63.2% AEP	0.316 m	361	550	550	0	0	0.314 m	80	159	327	120	168
20% AEP	0.472 m	361	654	654	0	0	0.461 m	80	159	397	120	238
	Combined Catchment											
Event	Depth	Existing Base Area (m2)	Existing TWL Area (m2)	Total TWL Area Required (m2)	Subject Site Base Area (m2)	Subject Site TWL Area (m2)						
1% AEP	0.939	441	777	2114	1200	1337						

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21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
14/08/24	A	ISSUED FOR INFORMATION	GK	CK

REVISIONS

Premise

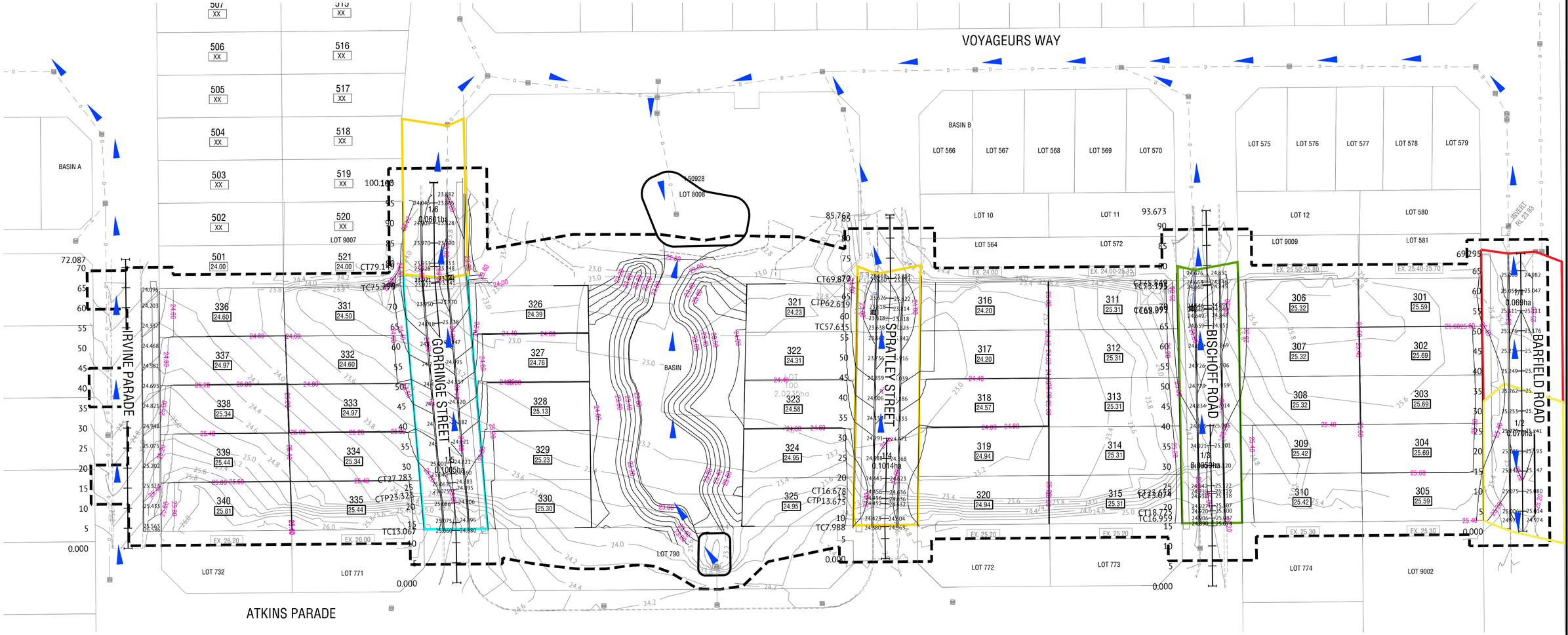
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE STORMWATER & SUBSOIL DRAINAGE PLAN

JOB CODE P003127
SHEET NUMBER C350
REV C



LEGEND

- EXISTING CONTOUR LEVEL (0.2m INTERVAL)
- EXISTING DRAINAGE
- DESIGN FINISHED SURFACE CONTOUR (0.2m INTERVAL)
- STAGE BOUNDARY
- CATCHMENT AREAS (DIFFERENT COLOURS)
- PROPOSED DRAINAGE
- PROPOSED DRAINAGE OVERLAND FLOW
- 1/4 0.2088ha — CATCHMENT NAME AND AREA

DRAINAGE CATCHMENT PLAN

SCALE 1:500

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21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
14/08/24	A	ISSUED FOR INFORMATION	GK	CK

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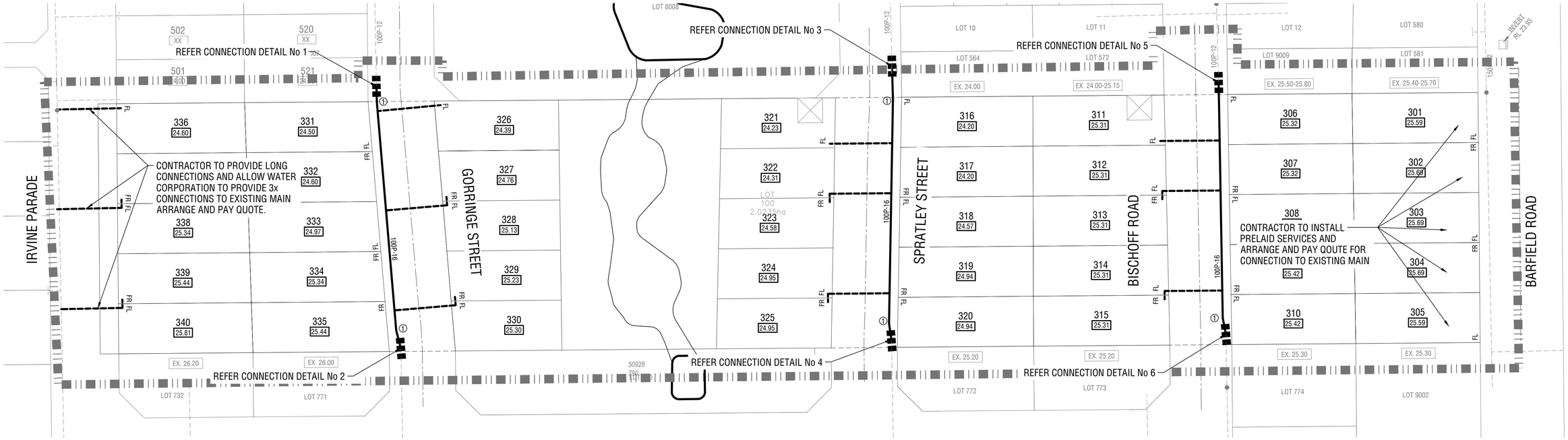
Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE 0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE STORMWATER DRAINAGE CATCHMENT PLAN

JOB CODE P003127
SHEET NUMBER C355
REV C



WATER RETICULATION PLAN

SCALE 1:500

NOTES

1. PIPES
   1.1. ALL RETICULATION PIPES SHALL BE PVC CLASS 16 OR MDPE TO WATER CORPORATION MATERIAL SPECIFICATION, UNLESS OTHERWISE NOTED.
   1.2. ALL CONNECTIONS TO EXISTING RETICULATION TO BE DONE BY THE WATER CORPORATION. THE CONTRACTOR SHALL CONTACT THE WATER CORPORATION AT LEAST SEVEN DAYS PRIOR TO THE DATE WHEN CONNECTION IS REQUIRED.

2. ALIGNMENT
   2.1. ALL PIPES SHALL BE LAID ON A 2.1m ALIGNMENT FROM THE ROAD RESERVE BOUNDARY, UNLESS OTHERWISE SHOWN. ALL THRUST BLOCKS SHALL BE CONTAINED WITHIN THE WATER ALIGNMENT.

3. EXISTING MAINS
   3.1. THE CONTRACTOR SHALL ACCURATELY LOCATE EXISTING MAINS AT POINTS OF CONNECTION.
   3.2. NEW MAINS SHALL BE CONSTRUCTED ON ALIGNMENT AND ON A LEVEL WITH EXISTING MAINS TO ENSURE EASE OF CONNECTION AND SHALL BE TERMINATED BETWEEN 2.0m AND 4.0m OF EXISTING MAINS AND CAPPED WITH A THRUSTED BLANK GIBAULT.

4. DETAILS
   4.1. DETAILS SHALL BE AS SHOWN ON THIS DRAWING, THE APPLICABLE WATER CORPORATION STANDARD DRAWINGS AND AS3500 FOR ALL INTERNAL WATER MAINS.

5. SERVICES
   5.1. FULLY PRELAID SERVICES TO BE LAID IN ACCORDANCE WITH WATER CORPORATION WATER RETICULATION MANUAL.
   5.2. SERVICE PIPES SHOULD BE LOCATED AT RIGHT ANGLES TO THE FRONT BOUNDARY OF THE LOT, NOT THE MAIN.
   5.3. FL(FULLY LEFT) OR FR(FULLY RIGHT) INDICATES THE SIDE OF A LOT AS VIEWED FROM THE ROAD, WHICH IS SELECTED FOR THE SERVICE LOCATION.
   5.4. DEFERRED SERVICES WILL BE INSTALLED AT A LATER DATE; WHEN BUILDING. APPLICATIONS ARE APPROVED.

6. NUMBER OF FULLY PRELAID SERVICES ON STAGE

SHORT DUAL	- 8
SHORT SINGLE	- 4
LONG DUAL	- 8
LONG SINGLE	- 4

7. TOTAL LOTS SERVED = 40
   100P-16 - 191m

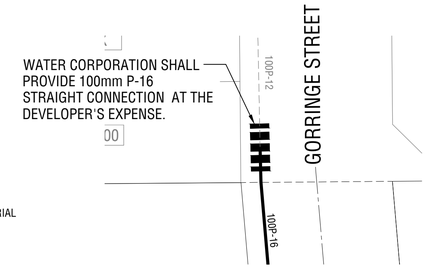
8. ALL WORKS TO BE IN ACCORDANCE WITH THE WATER CORPORATIONS DESIGN STANDARDS 63 (DS63).

LEGEND

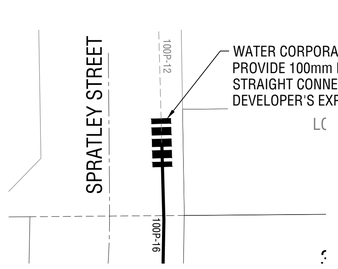
(100P-12)	SIZE & TYPE CLASS EXISTING MAINS
(100P-12)	EXISTING VALVES
100P-12	PROPOSED MAINS
	PROPOSED SLUICE VALVE
	PROPOSED HYDRANT
TBE	TEMPORARY BLANK END
	CHANGE IN PIPE DIAMETER / MATERIAL
	EXTENT OF WORKS
	LONG WATER SERVICE PRE-LAY

BENDS

①	6° BEND
②	11.25° BEND
③	22.5° BEND
④	45° BEND
⑤	90° BEND



CONNECTION DETAIL NO 1



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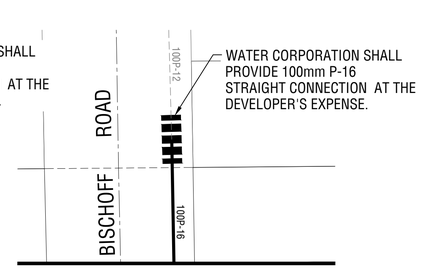

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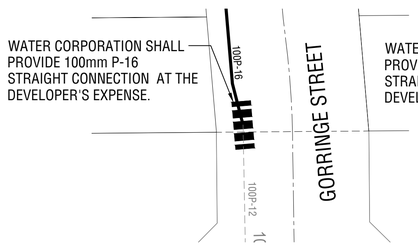

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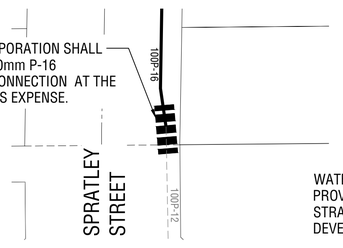

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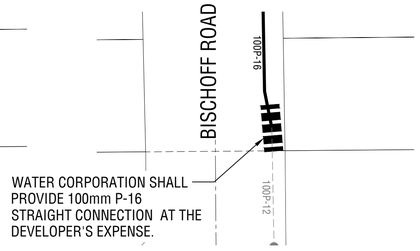

CONNECTION DETAIL NO 6

THIS PLAN IS ACCEPTED AS COMPLYING WITH OVERALL SCHEME PLANNING. COMPLIANCE WITH RELEVANT STANDARDS AND MANUALS REMAINS THE RESPONSIBILITY OF THE DESIGN ENGINEER.

NO WORKS ARE TO COMMENCE ON SITE UNTIL STARTUP MEETING REQUIREMENTS HAVE BEEN MADE WITH THE RELEVANT ASSET INSPECTOR. SEE THE DEVELOPER'S MANUAL FOR CONTACT DETAILS.

OW07-103-001-01A

FILE No. 198219529

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DATE	REV	DESCRIPTION	REC	APP
08/08/25	D	REISSUED TO WATER CORPORATION	GK	CK
31/07/25	C	REISSUED TO WATER CORPORATION	GK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION C. KLEYWEG

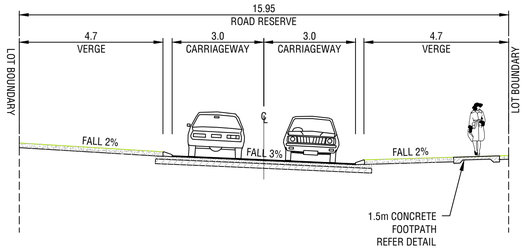
SCALE 0 5 10 15m
SCALE 1:500 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE WATER RETICULATION PLAN

JOB CODE P003127
SHEET NUMBER C400
REV D

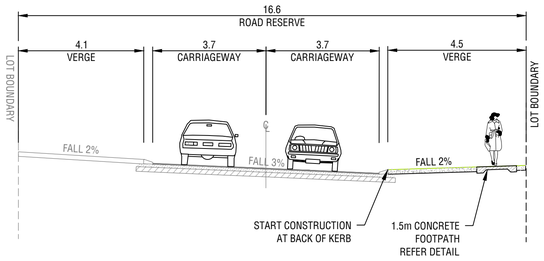
NOTES:

1. CONCRETE SHALL BE 32Mpa CONCRETE IN ACCORDANCE WITH AS1379 WITH POLIMERE FIBRE (GRACE FIBRES OR EQUIVALENT)REINFORCMENT AT THE MIXING RATE OF 0.9 kg/m3
2. CONTRACTION JOINTS SHALL BE CONSTRUCTED EVERY 2.5m RUN OF KERBING AND SHALL BE 5mm WIDE.
3. EXPANSION JOINTS SHALL BE CUT AT 5m INTERVALS AND SHALL BE 10mm WIDE.
4. EXPANSION JOINTS TO BE FILLED WITH AN APPROVED BUTYL MASTIC COMPOUND FILLER AND FOAM OR POLYURETHANE BACKING SHALL BE PLACED IN EACH EXPANSION JOINT.
5. TRANSITIONING FROM ONE KERB TYPE TO ANOTHER MUST BE CONSTRUCTED OVER A MINIMUM OF 1.0m.
6. ALL BRICKPAVING SHALL BE INTERLOCKING PAVERS.



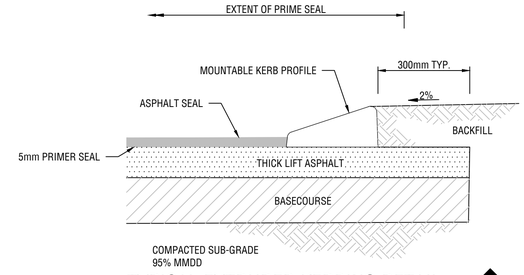
TYPICAL CROSS SECTION - GORRINGE STREET

SCALE 1:100



TYPICAL CROSS SECTION - IRVINE ROAD

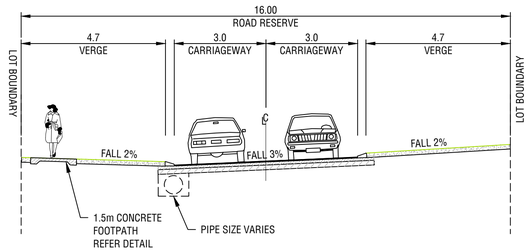
SCALE 1:100



TYPICAL EXTRUDED KERBING DETAIL

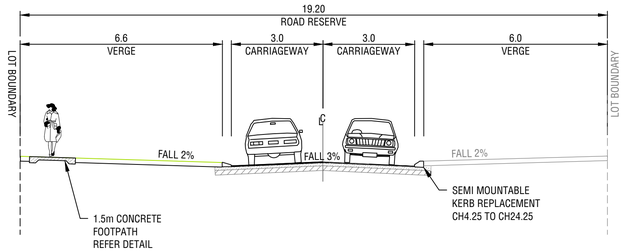
SCALE 1:20

1 / -



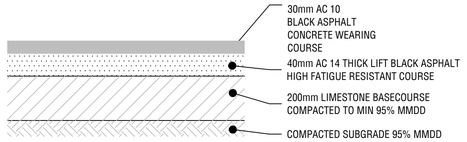
TYPICAL CROSS SECTION - SPRATLEY STREET

SCALE 1:100



TYPICAL CROSS SECTION - BARFIELD ROAD

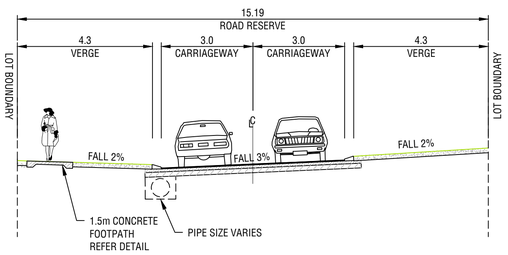
SCALE 1:100



TYPICAL PAVEMENT DETAIL

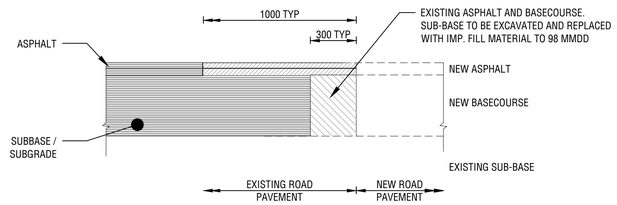
N.T.S.

2 / -



TYPICAL CROSS SECTION - BISCHOFF ROAD

SCALE 1:100



TYPICAL BLEND DETAIL

N.T.S.

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08/08/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise

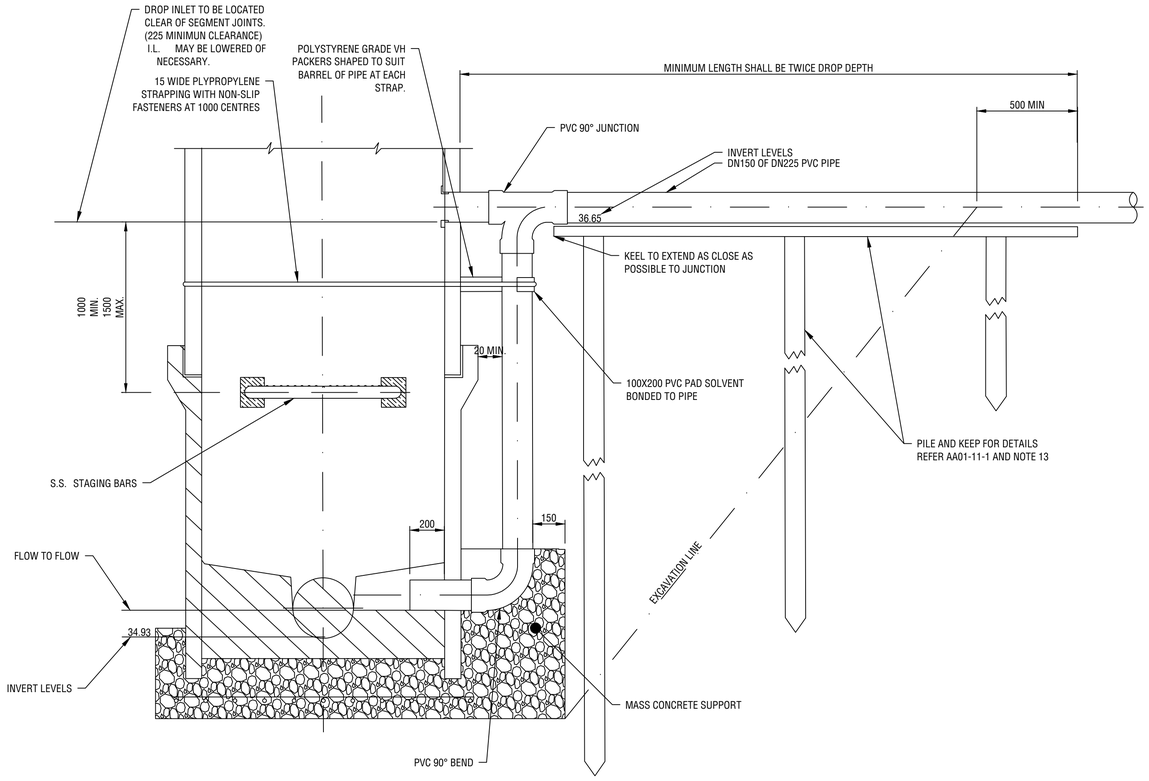
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED: F. BOROVIC
CHECKED: C. KLEYWEG
PROJECT MANAGER: C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 1 2 3m
SCALE 1:100 (A3)
ORIGINAL SHEET SIZE A1

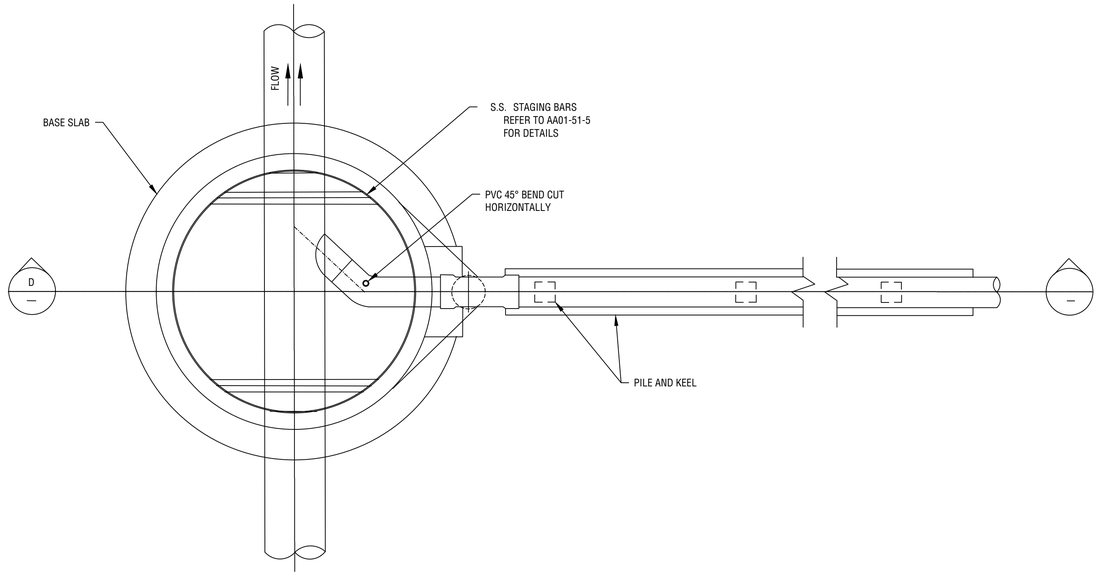
CLIENT: STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT: NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION: BARFIELD ROAD, HAMMOND PARK
SHEET TITLE: STANDARD DETAILS - ROADWORKS

JOB CODE: P003127
SHEET NUMBER: C900
REV: C



SECTION D / DROP INLET (AG415)

N.T.S.



SECTION D / PLAN (AG415)

N.T.S.

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Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
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DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE

ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP

WAPC NO. 200869

PROJECT NO 116 BARFIELD ROAD HAMMOND PARK

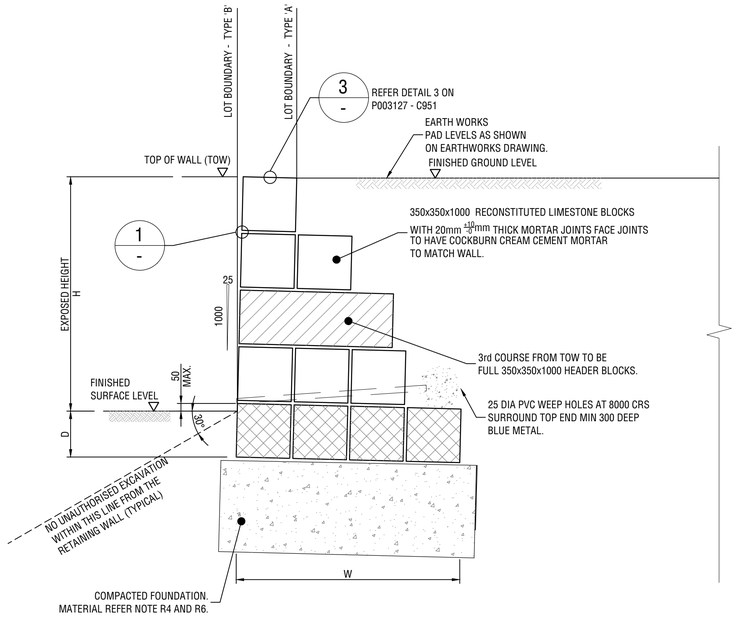
LOCATION BARFIELD ROAD, HAMMOND PARK

SHEET TITLE TYPICAL ACCESS CHAMBER DETAILS

JOB CODE P003127

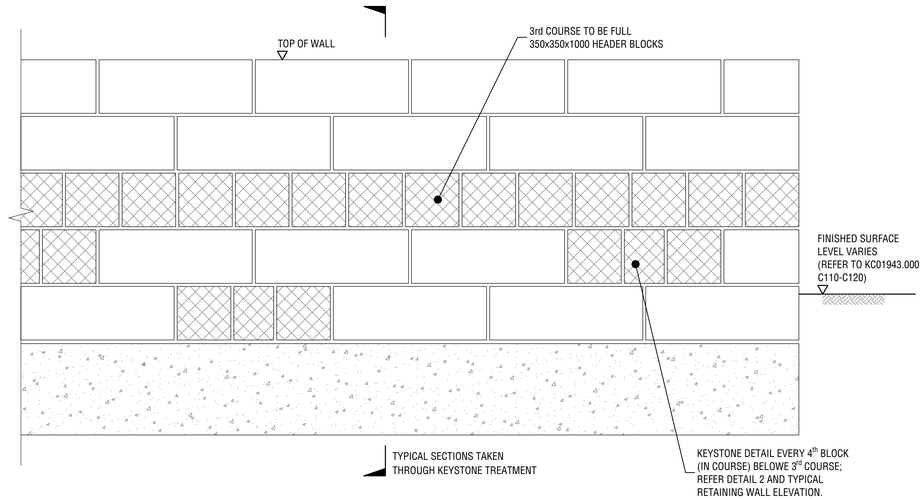
SHEET NUMBER C906

REV C



TYPICAL SECTION THROUGH RETAINING WALL (1)

SCALE 1 : 25



TYPICAL SECTION RETAINING WALL ELEVATION

SCALE 1 : 25

NOTES

FOR ALL NOTES REFER TO DRAWING P003127 - C955

BACKFILL COMPACTION TABLE *

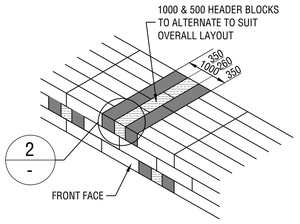
PENETROMETER DEPTH (mm)	MINIMUM ACCETABLE No OF BLOWS PER 300mm
150 TO 450	8
450 TO 750	10
750 TO 1050	11
1050 TO 1350	12
1350 TO 1650	13
1650 TO 1950	13
1950 TO 2250	14
2250 TO 2550	14
2550 TO 2850	15

* AN ALTERNATIVE SITE SPECIFIC BACKFILL COMPACTION TABLE MAY BE ACCEPTABLE TO THE SUPERINTENDENT IF IT CAN BE DEMONSTRATED THAT COMPACTION EQUIVALENT TO 95% MODIFIED MAXIMUM DRY DENSITY IS ACHIEVED.

RETAINING WALL DIMENSIONS

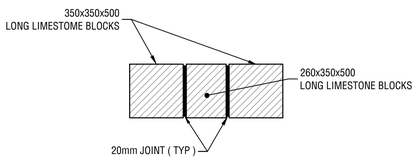
TOTAL No. COURSES	H (EXPOSED)	D (MIN)	W (MIN)
3	420 - 790	300	1000
4	791 - 1160	300	1000
5	1161 - 1530	300	1460
6	1531 - 1900	300	1460
7	1901 - 2270	300	1830
8	2271 - 2640	300	2200
9	2641 - 3010	300	2570
10	3011 - 3380	300	2940
11	3381 - 3750	300	2940
12	3751 - 4120	300	3310

I, Colin Ryk Kleyweg FIE Aust CPEng EngExec NER APEC Engineer IntPE(Aus) M Civ Eng BE Civ Eng Dip Eng Prac hereby certify these Drawings.
Date:
Signature:



TYPICAL HEADER BLOCK DETAIL BELLOW 3rd COURSE

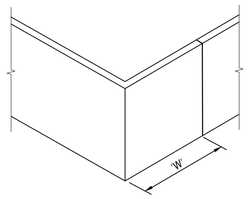
NOT TO SCALE



INTERLOCKING BLOCK DETAIL

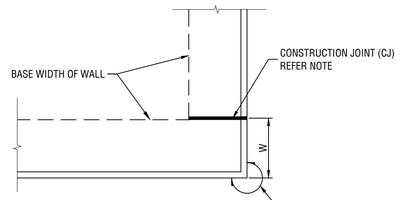
NOT TO SCALE

DETAIL 2 - NOT TO SCALE



TYPICAL DETAIL OF CONTROL JOINT AT A CHANGE OF DIRECTION

NOT TO SCALE



CONSTRUCTION JOINT DETAIL AT CHANGE OF DIRECTION - PLAN

NOT TO SCALE

DANGER
DO NOT WALK ON OR NEAR THE RETAINING WALLS.
YOU DO SO AT YOUR OWN RISK.
RISK OF SERIOUS INJURY MAY OCCUR FOR WHICH THE OWNER, DEVELOPERS AND CONTRACTORS WILL NOT ACCEPT LIABILITY.

BEFORE YOU DIG www.byda.com.au

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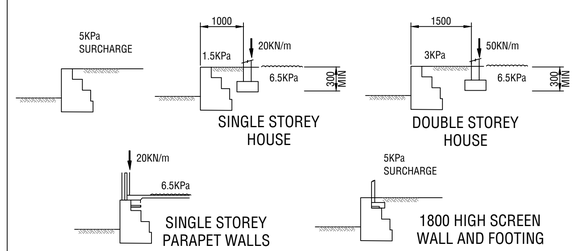

FOR OTHER LOAD CASES, CERTIFICATION MUST BE OBTAINED FROM AN INDEPENDENT PRACTICING STRUCTURAL ENGINEER.

BLOCKS MAY NOT BE ADDED TO THE TOP OF RETAINING WALLS AND GROUND LEVELS MAY NOT BE ALTERED IN THE VICINITY OF THE WALLS FOLLOWING THEIR COMPLETION WITHOUT THE APPROVAL OF AN INDEPENDENT PRACTICING STRUCTURAL ENGINEER.

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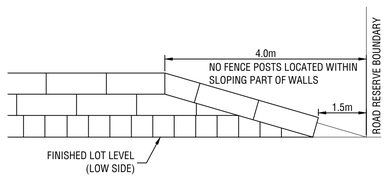
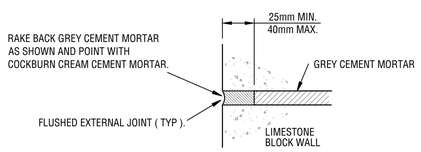
CERTIFIED NER ENGINEER | COMPANY | DATE



TYPICAL LOT END WALL

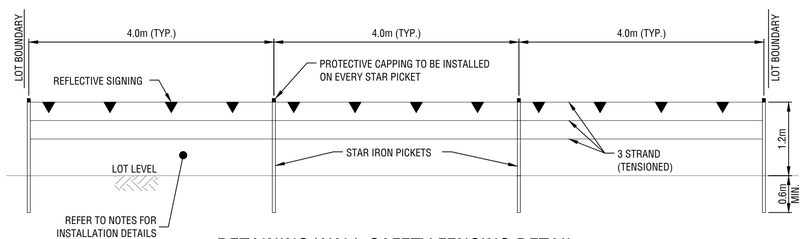
SCALE 1 : 40



BLOCK WALL JOINT DETAIL

NOT TO SCALE

DETAIL 1 - NOT TO SCALE



RETAINING WALL SAFETY FENCING DETAIL

NOT TO SCALE

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
11/09/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

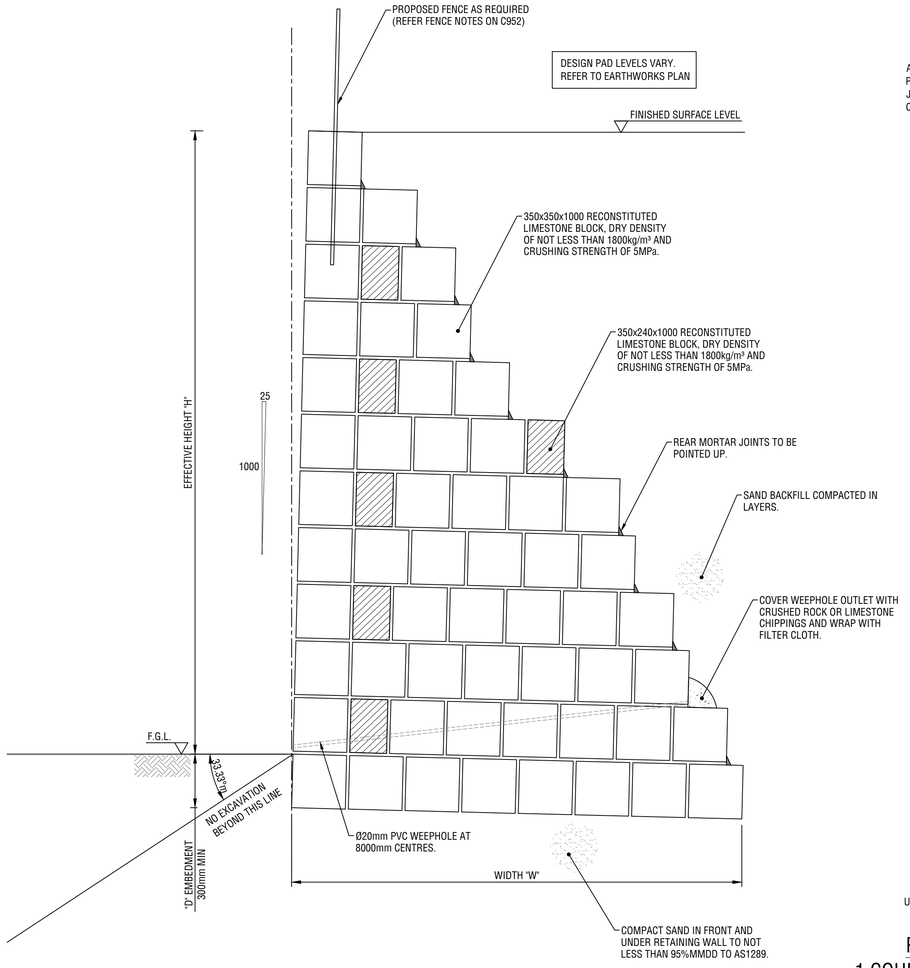
Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

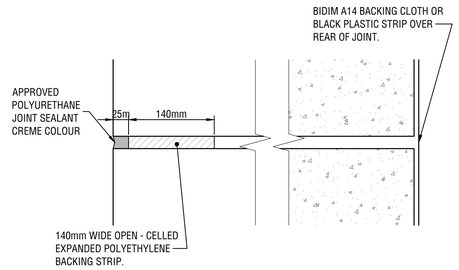
SCALE
0 0.4 0.8 1.2m
SCALE 1:40 (A3)
0 0.25 0.5 0.75m
SCALE 1:25 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 1 OF 6

JOB CODE P003127
SHEET NUMBER C950
REV C

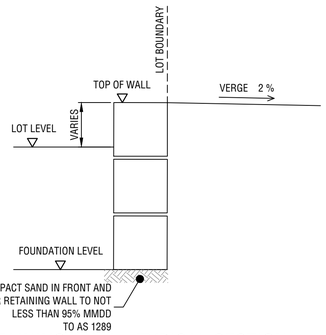


TYPICAL SECTION THROUGH RETAINING WALL (2)

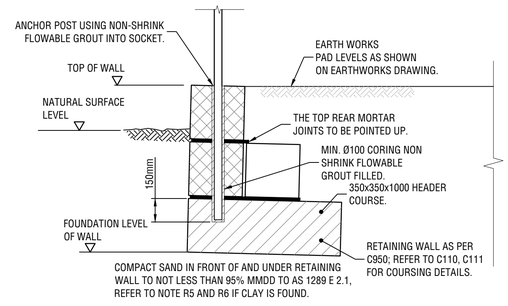


CONTROL JOINT DETAIL

DETAIL 2 / NOT TO SCALE -

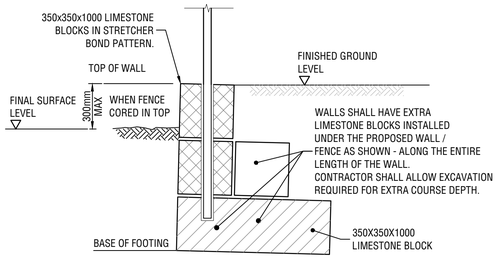


RETAINING WALL - TYPICAL SECTION
1 COURSE EXPOSED (WHERE NOMINATED ONLY)



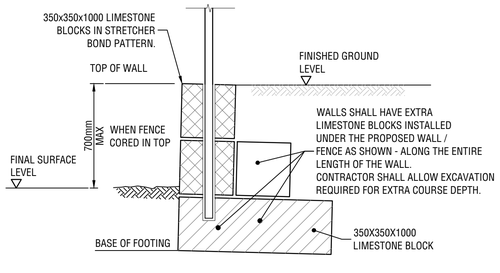
TYPICAL FENCE POST CORING DETAIL

DETAIL 3 / NOT TO SCALE -



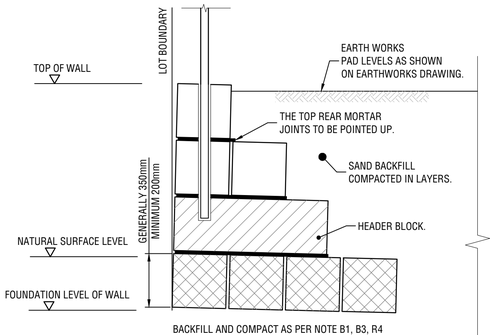
ONE COURSE EXPOSED HIGH WALL
FOR CORED FENCING

3 COURSE REQUIREMENT FOR FENCE POST CORED.



TWO COURSE EXPOSED HIGH WALL
FOR CORED FENCING

3 COURSE REQUIREMENT FOR FENCE POST CORED.



THREE COURSE WALL PROFILE
FOR CORED FENCING

SCALE 1 : 25

NOTES

FOR ALL NOTES REFER TO DRAWING P003127 - C955

BACKFILL COMPACTION TABLE *

PENETROMETER DEPTH (mm)	MINIMUM ACCETABLE No OF BLOWS PER 300mm
150 TO 450	8
450 TO 750	10
750 TO 1050	11
1050 TO 1350	12
1350 TO 1650	13
1650 TO 1950	13
1950 TO 2250	14
2250 TO 2550	14
2550 TO 2850	15

* AN ALTERNATIVE SITE SPECIFIC BACKFILL COMPACTION TABLE MAY BE ACCEPTABLE TO THE SUPERINTENDENT IF IT CAN BE DEMONSTRATED THAT COMPACTION EQUIVALENT TO 95% MODIFIED MAXIMUM DRY DENSITY IS ACHIEVED.

RETAINING WALL DIMENSIONS

TOTAL No. COURSES	H (EXPOSED)	D (MIN)	W (MIN)
3	420 - 790	300	1000
4	791 - 1160	300	1000
5	1161 - 1530	300	1460
6	1531 - 1900	300	1460
7	1901 - 2270	300	1830
8	2271 - 2640	300	2200
9	2641 - 3010	300	2570
10	3011 - 3380	300	2940
11	3381 - 3750	300	2940
12	3751 - 4120	300	3310

I, Colin Ryk Kleyweg FIE Aust CPEng EngExec NER APEC Engineer IntPE(Aus) M Civ Eng BE Civ Eng Dip Eng Prac hereby certify these Drawings.
Date:
Signature:

DANGER
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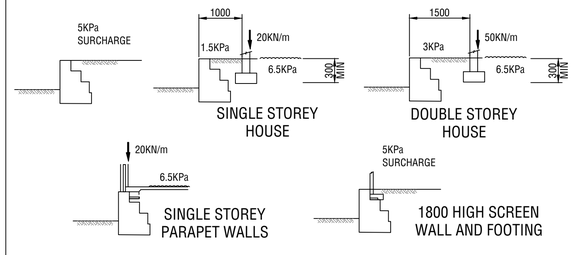

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CERTIFIED NER ENGINEER _____ COMPANY _____ DATE _____

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DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
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11/09/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise
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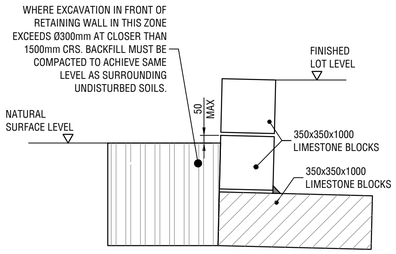
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE
0 0.4 0.8 1.2m
SCALE 1:40 (A3)
0 0.25 0.5 0.75m
SCALE 1:25 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 2 OF 6

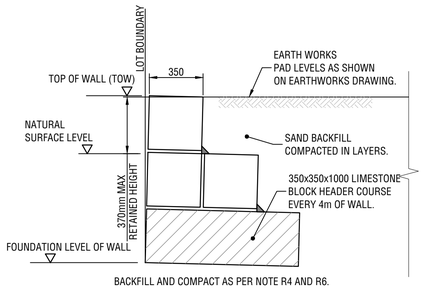
JOB CODE P003127
SHEET NUMBER C951
REV C



BACKFILL AND COMPACT AS PER NOTE R4 AND R6.

EXCAVATION IN FRONT OF RETAINING WALL

SCALE 1 : 25

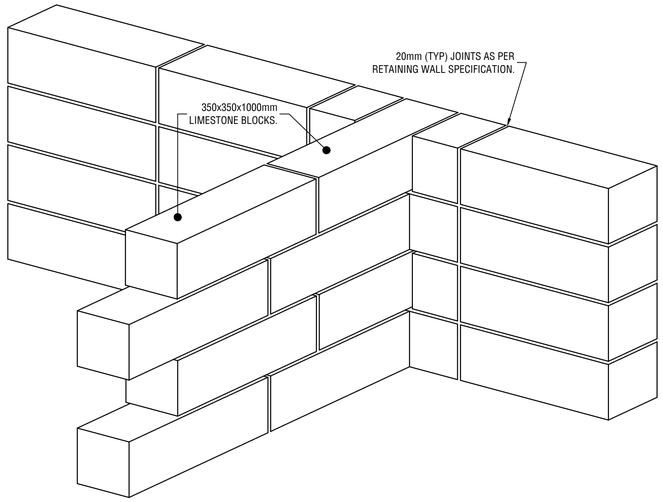


BACKFILL AND COMPACT AS PER NOTE R4 AND R6.

ONE COURSE EXPOSED WALL PROFILE

(370 MAX. RETAINED HEIGHT)

SCALE 1 : 25



NOTES

FOR ALL NOTES REFER TO DRAWING P003127 - C955

BACKFILL COMPACTION TABLE *

PENETROMETER DEPTH (mm)	MINIMUM ACCETABLE No OF BLOWS PER 300mm
150 TO 450	8
450 TO 750	10
750 TO 1050	11
1050 TO 1350	12
1350 TO 1650	13
1650 TO 1950	13
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RETAINING WALL DIMENSIONS

TOTAL No. COURSES	H (EXPOSED)	D (MIN)	W (MIN)
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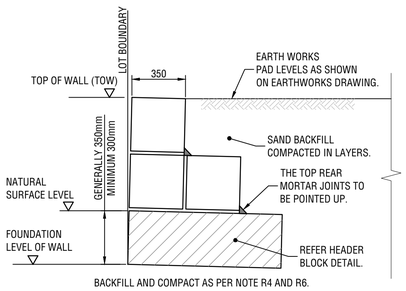
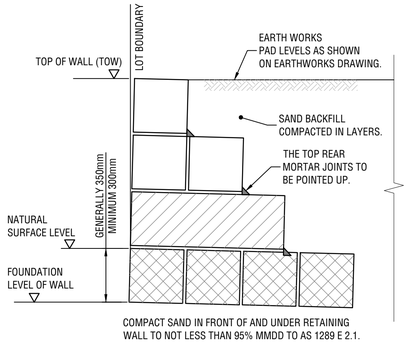


BACKFILL AND COMPACT AS PER NOTE R4 AND R6.

TWO COURSE EXPOSED WALL PROFILE

(890 MAX. RETAINED HEIGHT)

SCALE 1 : 25

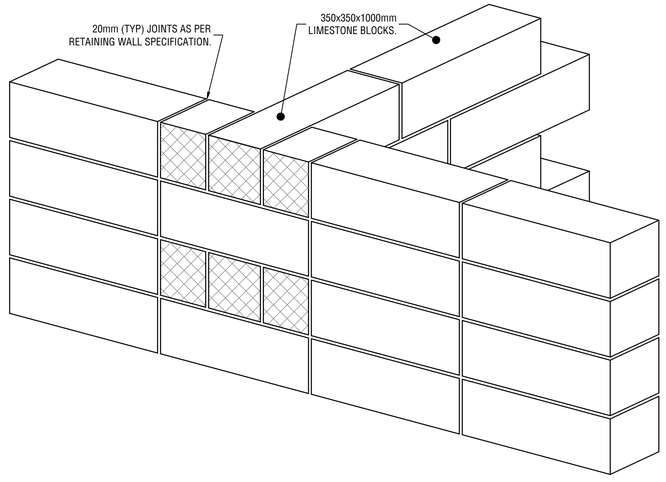


COMPACT SAND IN FRONT OF AND UNDER RETAINING WALL TO NOT LESS THAN 95% MMDD TO AS 1289 E 2.1.

THREE COURSE EXPOSED WALL PROFILE

(1260 MAX. RETAINED HEIGHT)

SCALE 1 : 25



RETAINING WALL INTERLOCK DETAIL

NOT TO SCALE

I, Colin Ryk Kleyweg FIE Aust CPEng EngExec NER APEC Engineer IntPE(Aus) M Civ Eng BE Civ Eng Dip Eng Prac hereby certify these Drawings.
Date:
Signature:

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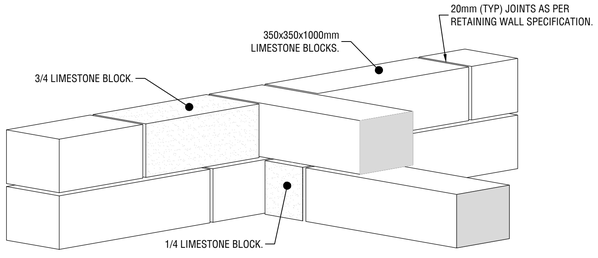
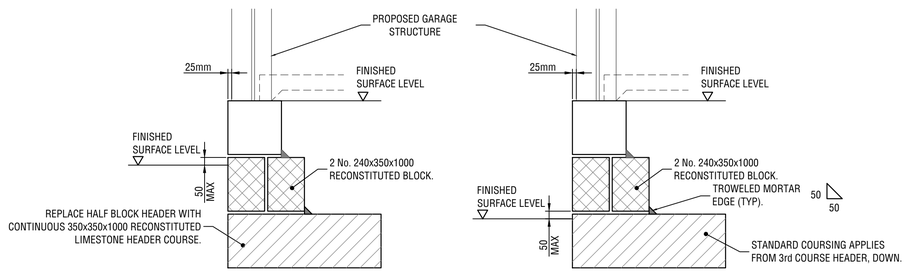


TYPICAL EDGE OF PLANTER BOX INTERLOCK DETAIL

NOT TO SCALE



1 COURSE EXPOSED

2+ COURSE EXPOSED

ZERO LOT LINE - BUILDING ADJACENT TO TOP OF RETAINING WALL

SCALE 1 : 25

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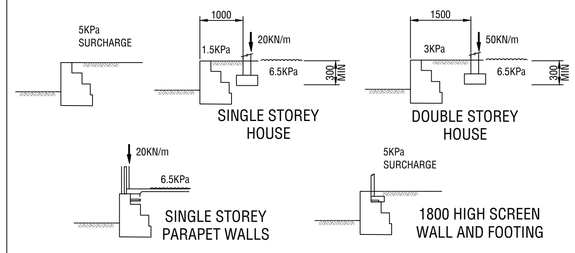

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CERTIFIED NER ENGINEER | COMPANY | DATE

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
11/09/24	A	ISSUED FOR INFORMATION	CK	CK

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WEB: www.premise.com.au

DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

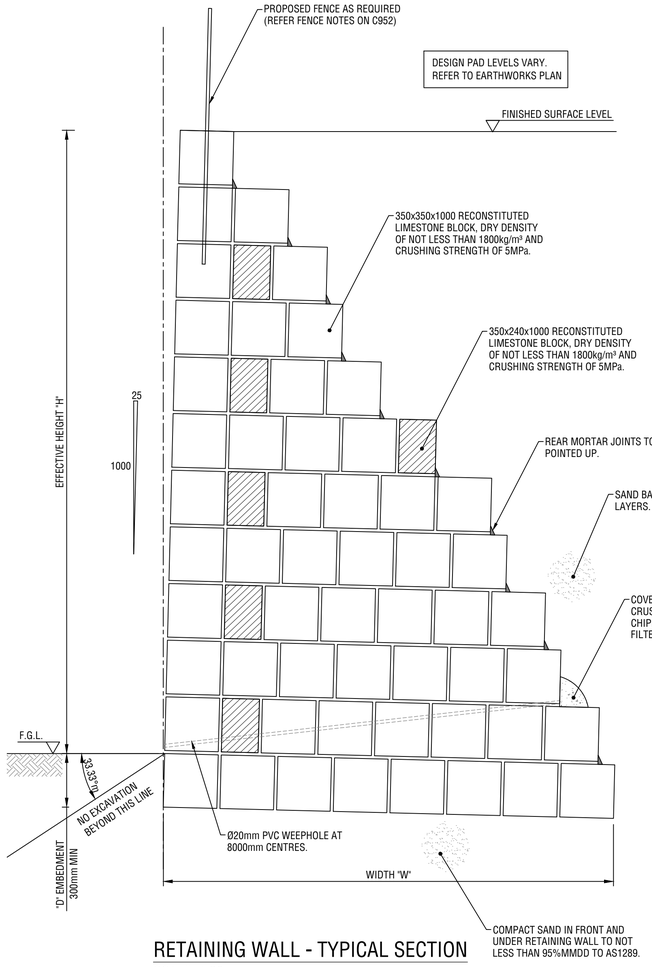
SCALE
0 0.4 0.8 1.2m
SCALE 1:40 (A3)
0 0.25 0.5 0.75m
SCALE 1:25 (A3)
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 3 OF 6

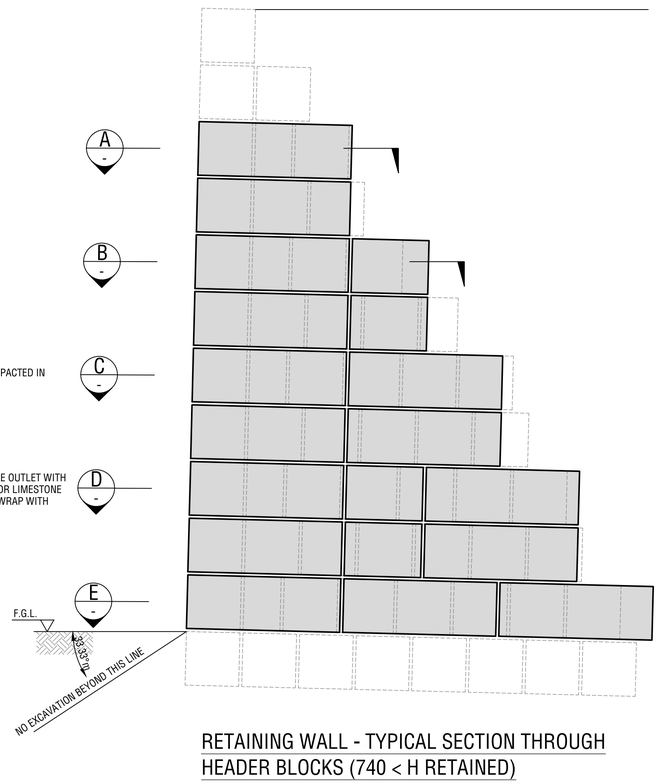
JOB CODE P003127
SHEET NUMBER C952
REV C

NOTES

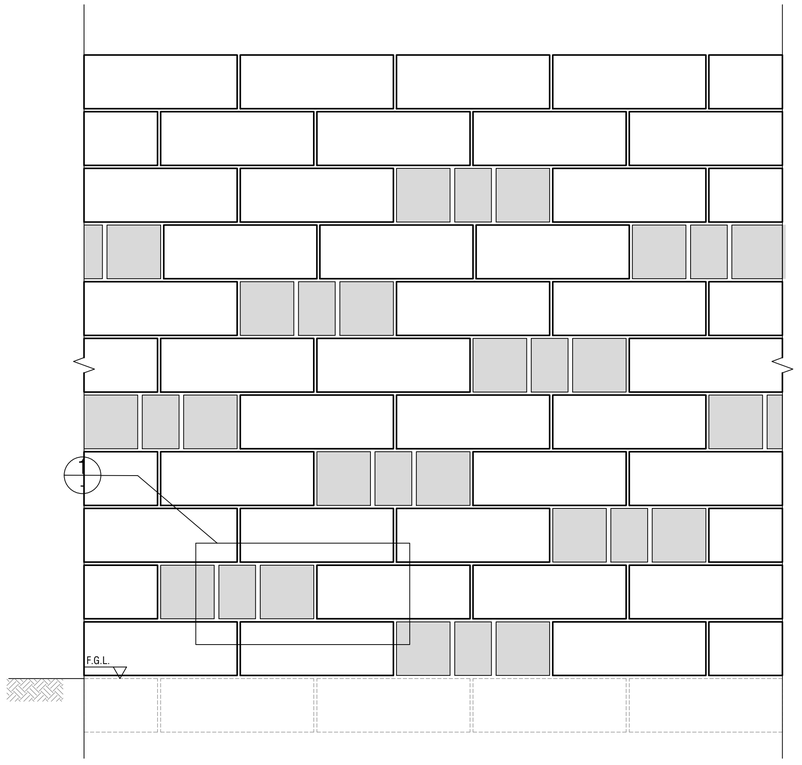
FOR ALL NOTES REFER TO DRAWING P003127 - C955



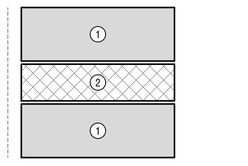
RETAINING WALL - TYPICAL SECTION
SCALE 1:20



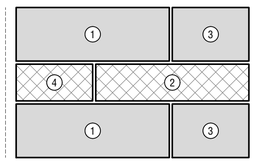
RETAINING WALL - TYPICAL SECTION THROUGH HEADER BLOCKS (740 < H RETAINED)
SCALE 1:20



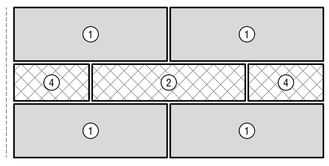
RETAINING WALL - TYPICAL ELEVATION
SCALE 1:20



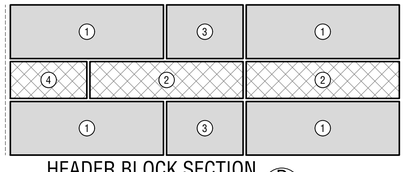
HEADER BLOCK SECTION A
SCALE 1:20



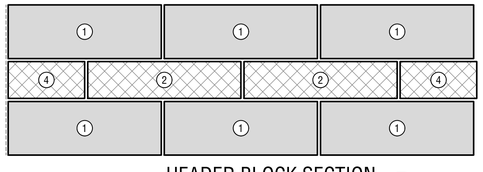
HEADER BLOCK SECTION B
SCALE 1:20



HEADER BLOCK SECTION C
SCALE 1:20



HEADER BLOCK SECTION D
SCALE 1:20



HEADER BLOCK SECTION E
SCALE 1:20

HEADER BLOCK TYPES

1. 350x350x1000
2. 350x240x1000
3. 350x350x500
4. 350x240x500

*ALL BLOCKS RECONSTITUTED LIMESTONE WITH DRY DENSITY ≥ 1800kg/m³ CRUSHING STRENGTH=5mPa.

HEADER BLOCK NOTES

HEADER BLOCKS SHALL BE PROVIDED IN EVERY COURSE IN THE RETAINING WALL BELOW. THE 3RD COURSE FROM TOP (INCLUDING 3RD COURSE), SPACED AT 4000 CTRS (MAX). HEADER BLOCK SHALL BE AS PER DETAIL 2 AND STAGGERED AS SHOWN IN TYPICAL ELEVATION.

RETAINING WALL DIMENSIONS

	A TOTAL No. COURSES	B H (EXPOSED)	C D (MIN)	D W (MIN)
2	3	810	300	1090
3	4	1180	300	1350
4	5	1550	300	1720
5	6	1920	300	2090
6	7	2290	300	2200
7	8	2660	300	2460
8	9	3300	300	2570
9	10	3400	300	2830
10	11	3770	300	2940

BACKFILL COMPACTION TABLE *

PENETROMETER DEPTH (mm)	MINIMUM ACCETABLE No OF BLOWS PER 300mm
150 - 450	8
450 - 750	10
750 - 1050	11
1050 - 1350	12
1350 - 1650	13
1650 - 1950	13
1950 - 2250	14
2250 - 2550	14
2550 - 2850	15

* AN ALTERNATIVE SITE SPECIFIC BACKFILL COMPACTION TABLE MAY BE ACCEPTABLE TO THE SUPERINTENDENT IF IT CAN BE DEMONSTRATED THAT COMPACTION EQUIVALENT TO 95% MODIFIED MAXIMUM DRY DENSITY IS ACHIEVED.

I, Colin Ryk Kleyweg FIE Aust CPEng EngExec NER APEC Engineer IntPE(Aus) M Civ Eng BE Civ Eng Dip Eng Prac hereby certify these Drawings.
Date:
Signature:

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ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
11/09/24	A	ISSUED FOR INFORMATION	CK	CK

REVISIONS

Premise
PERTH OFFICE
SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
WEB: www.premise.com.au

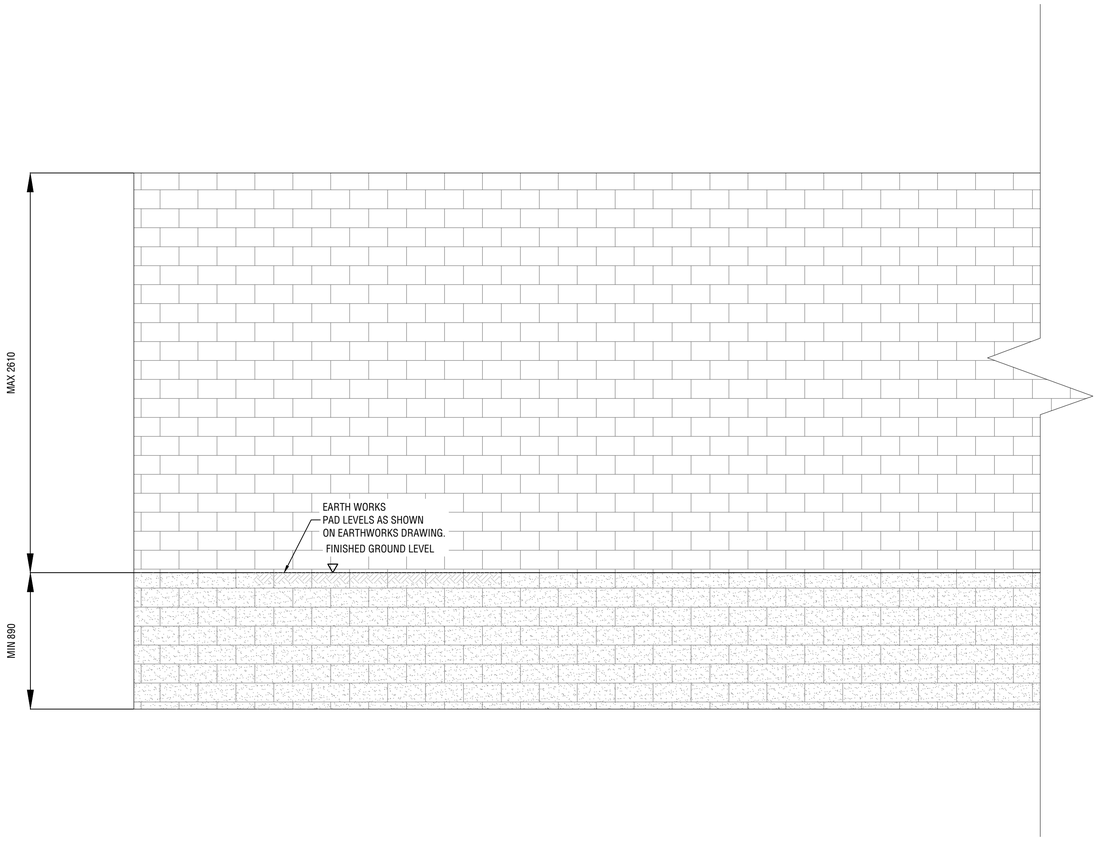
DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION
SCALE
ORIGINAL SHEET SIZE A1

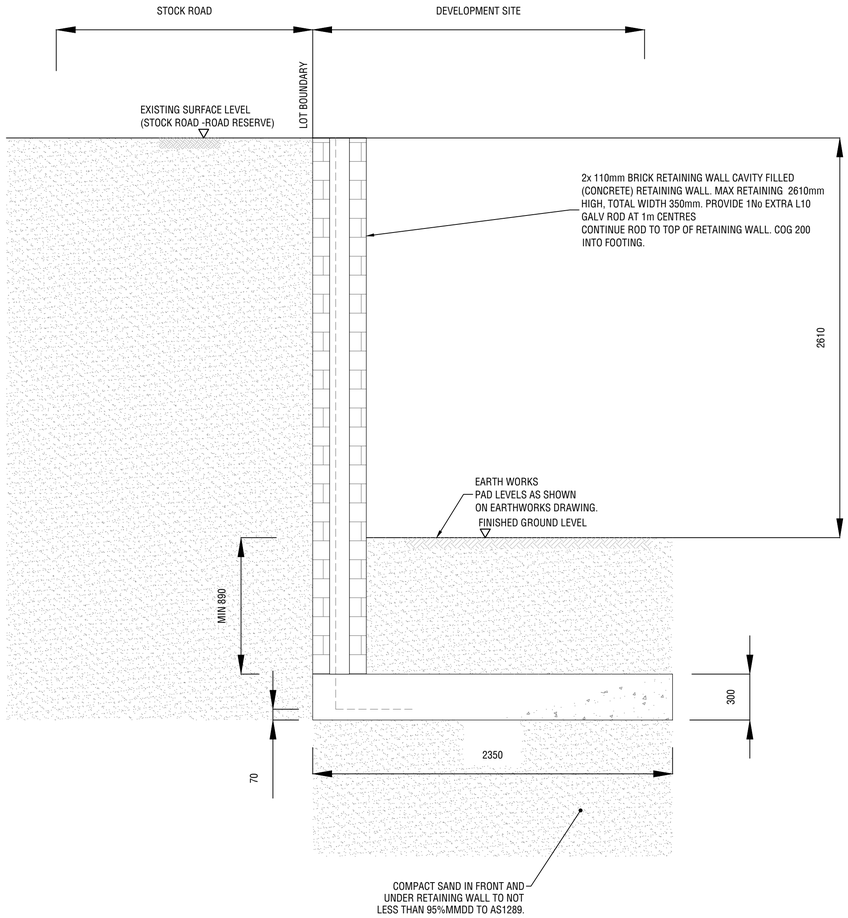
CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 4 OF 6

JOB CODE P003127
SHEET NUMBER C953
REV C

NOTES

FOR ALL NOTES REFER TO DRAWING P003127 - C955





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Date:
Signature:

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DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
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Premise

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SUITE 6, 110 ERINDALE ROAD
BALCATTA WA 6021
PH: (08) 6263 9490
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DESIGNED S.NEDELJKOVIC
CHECKED C. KLEYWEG
PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION

SCALE

ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 5 OF 6

JOB CODE P003127
SHEET NUMBER C954
REV C

RETAINING WALL NOTES

GENERAL NOTES:

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE OTHER RELEVANT CONTRACT DRAWINGS AND SPECIFICATIONS.
G2. ALL WORK SHALL COMPLY WITH THE LATEST AUSTRALIAN STANDARDS AND ADDENDUMS. ALL DISCREPANCIES SHALL BE REFERRED TO THE SUPERINTENDENT FOR DECISION BEFORE PROCEEDING WITH THE WORK.
G3. DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MATERIALS FOR CONSTRUCTION SUCH THAT NO DEFECTS ARE INCURRED PRIOR TO CONSTRUCTION ACTIVITIES.
G4. DO NOT SCALE DRAWINGS, ALL DIMENSIONS TO BE CHECKED ON SITE.
G5. THE CONTRACTOR SHALL KEEP A COPY OF THE DRAWINGS ON SITE DURING THE CONSTRUCTION PERIODS.
G6. THE CONTRACTOR SHALL OBTAIN 'DIAL BEFORE YOU DIG' SERVICE INFORMATION ON THE AREA AFFECTED BY THE WORKS PRIOR TO ANY CONSTRUCTION.
G7. LEVELS ARE RELATIVE TO AHD.
G8. THE CONTRACTOR SHALL REINSTATE ALL PUBLIC OR PRIVATE PROPERTY THAT HAS BEEN AFFECTED BY THE WORKS TO AN ORIGINAL OR SUPERIOR CONDITION OF ITS ORIGINAL STATE.

RETAINING WALL DESIGN NOTES:

RW1. RETAINING WALLS HAVE BEEN DESIGNED IN ACCORDANCE WITH AS4678 EARTH-RETAINING STRUCTURES AND ULTIMATE LOAD DESIGN AND PARTIAL LOAD FACTORS CONSISTENT WITH AS1170.1. DESIGN ALSO ACCOUNTS FOR THE FOLLOWING PARAMETERS:

- STRUCTURE CLASSIFICATION = 1
- DESIGN LIFE = 25YRS
- EARTHQUAKE CATEGORY = 1

RETAINING WALL DESIGN LOADS

RD1. THE DESIGN WIND CRITERIA AS1170.2-2011 IS AS FOLLOWS:

- REGION = PERTH METROPOLITAN REGION A1
- BASIC WIND SPEED V_u = 148 KPH
- TERRAIN CATEGORY 1
- TOPOGRAPHIC MULTIPLIER M_t = 1.1

RD2. RETAINING WALLS TYPE 'A' AND 'B' HAVE BEEN DESIGNED FOR THE FOLLOWING CONDITIONS:

1. 5KPA SURCHARGE PLUS WIND LOAD ON FENCE REGION A1
2. 4 KPA CONSTRUCTION SURCHARGE WITH A 10KN POINT LOAD 1M FROM WALL. WIND LOAD ON THE WALL SHEETING DURING CONSTRUCTION HAS NOT BEEN TAKEN INTO ACCOUNT. WALL SHEETING SHALL NOT BE PLACED UNTIL AFTER BACKFILLING TO THE RETAINING WALL & COMPACTION OF BACKFILL HAS OCCURRED.
3. ALL RETAINING WALLS FOR THIS PROJECT ARE TO BE TYPE 'B' WALLS. THESE RETAINING WALLS HAVE ALSO BEEN DESIGNED FOR ADDITIONAL LOADS ARISING FROM SINGLE OR DOUBLE STOREY DWELLING FOOTINGS ADJACENT TO THE WALL. THESE LOAD CASES ARE ILLUSTRATED IN THIS DRAWING.

DESIGN PARAMETERS:

RETAINED SOIL: NOTE, THIS INFORMATION SHALL BE VERIFIED BY THE GEOTECHNICAL ENGINEER.

D1. BACKFILL MATERIAL IS TO BE IMPORT PERTH SAND, MEDIUM DENSE. THE USE OF ALTERNATIVE BACKFILL MATERIALS WILL REQUIRE THE APPROVAL FROM THE SUPERINTENDENT.
D2. EFFECTIVE SOIL FRICTION ANGLE = 34 degrees
D3. DENSITY OF BACKFILL MATERIAL = 18 kN/m^3
D4. SOIL BEARING CAPACITY = 150 KPa. IF AN ALLOWABLE BEARING PRESSURE OVER 150 KPa IS REQUIRED, SEPARATE TESTING AND VERIFICATION WILL BE NECESSARY.

OTHER:

D5. ANY IMPORTED STRUCTURAL FILL TO SUPPORT FOOTINGS SHALL COMPLY WITH THE REQUIREMENTS IN NOTE B3.
D6. FOOTINGS SHALL BE TAKEN DOWN TO THE DEPTHS INDICATED IN P003127-C950-C952 BELOW UNDISTURBED GROUND LEVEL.

BACKFILLING NOTES:

B1. STABILIZED IMPORT FILL SHALL CONSIST OF EARTH WORKING SAND (CLEAN AND POROUS); FREE FROM CLAY AND ORGANIC MATERIAL; BOUND WITH 5% CEMENT (PORTLAND CEMENT OR APPROVED EQUIVALENT BY SUPERINTENDENT) PERCENTAGE BASED ON VOLUME.
B2. STRUCTURAL IMPORT FILL SHALL HAVE A PLASTICITY INDEX LESS THAN 5%.
B3. IN ALL CASES, THE BACKFILL AND COMPACTION SHALL BE SELECTED SUCH THAT, ONCE COMPACTED, THE STANDARD OF COMPACTION CAN BE MEASURED USING A STANDARD PERTH PENETROMETER. MIN 95% MMDD FOR COHESIVE SOILS AND 70% MIN DENSITY INDEX FOR COHESION-LESS SOILS.
B4. BACKFILLING BEHIND THE RETAINING WALLS IS NOT PERMITTED UNTIL 4 DAYS AFTER THE WALLS HAVE BEEN BUILT.
B5. COMPACTION OF BACKFILL SHALL BE DONE USING A STEEL PLATE COMPACTOR TO ACHIEVE THE COMPACTION REQUIREMENTS STATED IN NOTE B3.
B6. TESTING OF COMPACTED BACKFILL SHALL BE CARRIED OUT BY A NATA REGISTERED LABORATORY AT THE RATE OF ONE TEST PER 200 CUBIC METRES PLACED RANDOMLY THROUGHOUT THE LENGTH AND DEPTH.

DRAINAGE:

D1. SUBSOIL DRAINAGE PIPE MATERIAL AND GEOFABRIC MATERIAL SHALL COMPLY WITH THE CONTRACT SPECIFICATION DOCUMENTS FOR THIS PROJECT.
D2. METAL BEDDING FOR THE SUBSOIL DETAIL SHALL COMPLY WITH THE CONTRACT SPECIFICATION DOCUMENTS AND BE APPROVED BY THE SUPERINTENDENT PRIOR TO INSTALLATION.

ANTI-GRAFFITI REQUIREMENTS:

A1. RETAINING WALLS TO BE ANTI-GRAFFITI COATED (NON-SACRIFICIAL).
A2. AS-CONSTRUCTED OF ANTI-GRAFFITI COATING SHALL BE PROVIDED TO THE SUPERINTENDENT.
A3. CLEANING SPECIFICATION SHALL BE PROVIDED PRIOR TO THE APPLICATION OF THE ANTI-GRAFFITI COATING.

LIMESTONE RETAINING WALL NOTES:

R1. REMOVE ALL DEBRIS FROM EXISTING SOIL AND USE ONLY CLEAN SAND FILL REFER TO NOTE D1 FOR SUITABLE BACKFILL MATERIAL AND R4 FOR FOUNDATION COMPACTION.
R2. RUBBLE SHALL NOT BE USED TO FILL VOIDS OR FOR USE AS MATERIAL FOR CONSTRUCTION WITHOUT THE WRITTEN APPROVAL FROM THE SUPERINTENDENT.
R3. NO HEAVY CONSTRUCTION OR COMPACTION EQUIPMENT SHALL BE ALLOWED OR OPERATED WITHIN HEIGHT 'H' FROM THE REAR OF WALL OR 1000mm (WHICHEVER IS GREATER), UNLESS THE LOADS ARE COMPLIANT WITH NOTE RD2.
R4. COMPACTION OF SOIL UNDERNEATH FOUNDATIONS BLOCKS SHALL BE 95% MAX MOD DRY DENSITY (COHESIVE SOILS) THROUGH A MINIMUM DEPTH OF 600mm; PLACED IN LAYERS OF 300mm. FLOOR LOADINGS UP TO 120 KPa AND ISOLATED PAD OR STRIP FOOTING LOADINGS UP TO 100 KPa SHALL BE 98% MAX MOD DRY DENSITY (COHESIVE SOILS).
R5. IF CLAY OR SUB-SOIL CONDITION OTHER THAN SAND IS ENCOUNTERED IN THE LOCATION IN WHICH FOUNDATION BLOCKS / FOOTINGS ARE TO BE PLACED; THE CONTRACTOR SHALL REFER TO NOTE R6 AND DETAIL P003127-C952.
R6. WHERE CLAYEY MATERIAL IS FOUND IN THE PROPOSED LOCATION FOR FOUNDATION / FOOTING PLACEMENT, THE CONTRACTOR SHALL EXCAVATE 600MM AND REPLACE THE CLAYEY MATERIAL WITH 5% STABILIZED IMPORT FILLAS PER NOTE B1.
R7. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE COMPACTION WILL NOT HAVE ADVERSE EFFECT OF THE RETAINING WALLS.
R8. A LICENSED SURVEYOR SHALL BE USED BY THE CONTRACTOR TO SETOUT ALL WORKS ASSOCIATED WITH RETAINING WALL CONSTRUCTION.
R9. ALL BLOCKS FOR RETAINING WALLS SHALL BE RECONSTITUTED LIMESTONE BLOCKS WITH A MINIMUM DRY DENSITY OF 1.8t/m^3. THE STANDARD BLOCK SIZE SHALL BE 350mmX350mmX1000mm (WxHxL) WITH A MINIMUM COMPRESSIVE STRENGTH OF 5MPa.
R10. ALL BLOCKS SHALL BE SOLID, WHOLE CUT OR SAW CUT.
R11. ALL VISIBLE LIMESTONE BLOCKS (INCLUDING THE FRONT, TOP AND REAR) SHALL BE OF CRÈME COLOUR, HIDDEN STONES SHALL BE GREY OR CRÈME IN COLOUR. VISIBLE LIMESTONE BLOCKS SHALL BE POINTED WITH CREME COLOURED MORTAR AS SHOWN IN DETAIL1 IN P003127-C950.
R12. THE CONTRACTOR SHALL PLACE INTERLOCKING KEYSTONES THROUGHOUT THE WALLS AS SHOWN IN P003127-C950.
R13. MORTAR MIX TO BE 1:1:6, CEMENT:LIME:SAND FOR BOTH TYPE A AND B WALLS. ALL LIMESTONE BLOCKS SHALL BE FULLY CEMENTED IN PLACE IN ACCORDANCE WITH THE DETAILS SHOWN IN P003127-C950.
R14. ALL BED AND PERPENDICULAR JOINTS ARE TO BE FULLY MORTARED INCLUDING CREAM MORTAR TO FOOTING BLOCKS AND BACK OF THE TOP COURSE.
R15. CONTROL JOINTS (CJ) SHALL BE CONSTRUCTED WITHIN THE RETAINING WALL WHEN THE ANGLE BETWEEN FACES OF TWO WALLS EXCEEDS 180 degrees. THE CJ IS TO BE LOCATED ON ONE SIDE OF THE CHANGE OF DIRECTION, AT A DISTANCE AWAY FROM THE DIRECTION OF CHANGE EQUAL TO THE WIDTH OF THE WALL AND SHALL BE 20mm WIDE. SUITABLE FILLING MATERIALS AS PER NOTE R17.
R16. FILLING MATERIALS FOR CJ SHALL BE 250mm DIA. FOAM CLOSED CELL BACKING ROD COVERED WITH A 25mm DEEP MASTIC OF COLOUR TO MATCH WALL MORTAR OR A POLYSTYRENE SHEETING OR EXPANDED POLYTHRYENE COVERED WITH A 25mm DEEP MASTIC COLOUR TO MATCH WALL MORTAR. DRAPE A 1000mm WIDE STRIP OF BIDUM FILTER CLOTH OVER THE REAR OF THE JOINTS FOR THE FULL HEIGHT OF THE WALL.
R17. THE CONTROL JOINTS SHALL PROPERLY FORMED IN A STRAIGHT WALL AT 20m CENTERS MAX, AT CORNER LOCATIONS AS PER CORNER CONTROL JOINT DETAIL AS SHOWN P003127-C950, AND AT SIGNIFICANT CHANGES IN WALL HEIGHT (> 700mm STEP). REQUIREMENT FOR A CONTROL JOINT SHALL BE DETERMINED ON SITE IN EACH CASE. THE CONTRACTOR SHALL FORM THE VERTICAL JOINT TO BE FORMED THROUGH THE FULL HEIGHT AND WIDTH OF THE WALL. NO BRIDGING ACROSS THE FORMED JOINT IS PERMITTED. PROVIDE BACKING STRIP AND SEAL AS PER CONTROL JOINT DETAIL AND REMAINDER OF JOINT TO BE CLEAR.
R18. ALL WALLS EXCEEDING A STRAIGHT LENGTH OF 20m SHALL HAVE CONTROL JOINTS SPACED AT DISTANCES NO GREATER THAN 20m.
R19. FENCE POSTS TO BE LOCATED MIN 1000mm FROM A CJ. IF A POST IS REQUIRED WITHIN 1000mm OF A CJ, INSTALL POST TO BOTH SIDES OF A CJ WITHIN 350mm.
R20. ALL LOOSE MATERIAL IS TO BE REMOVED FROM THE BLOCKS AND WETTED DOWN PRIOR TO BEDDING IN MORTAR.
R21. THE MAX VOID RATIO IS TO BE 20%.
R22. ALL DIMENSIONS ARE SHOWN AS WIDTH X HEIGHT X DEPTH (LENGTH).
R23. THE CONTRACTOR SHALL INFORM THE SUPERINTENDENT UPON COMPLETION OF THE CONSTRUCTION AND BACKFILL. WRITTEN CERTIFICATION SHALL VERIFY THE COMPLETED WORKS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.
R24. UPON COMPLETION OF THE RETAINING WALLS AND LOT LEVELLING, FENCING SHALL BE ERECTED. IN AREAS WHERE THE EXPOSED WALL HEIGHT EXCEEDS 900mm, AND NO OTHER FENCING IS PRESCRIBED, SAFETY FENCING SHALL BE PLACED IN ACCORDANCE WITH P003127-C950.
R25. IN AREAS WHERE THE WALL HEIGHT EXCEEDS 900mm, 'WARNING' SIGNS SHALL BE INSTALLED WITH WORDING AS PER EXAMPLE BELOW. THE CONTRACTOR SHALL INSTALL ONE SIGN PER FIVE LOTS WITH BLACK LETTERING ON A YELLOW BACKGROUND.

DANGER
DO NOT WALK ON OR NEAR THE RETAINING WALLS.
YOU DO SO AT YOUR OWN RISK.
RISK OF SERIOUS INJURY MAY OCCUR FOR WHICH THE OWNER, DEVELOPERS AND CONTRACTORS WILL NOT ACCEPT LIABILITY.

NOTES:

1. TYPE 'A' WALLS ARE THOSE WHERE THE LOT BOUNDARYIS ON REAR OF THE TOP OF THE BLOCK (AS SHOWN).
2. TYPE 'B' WALLS ARE THOSE THAT ARE CONTAINEDWHOLY WITHIN THE LOT.
3. REFER DETAIL ON P003127 - C952 FOR FENCING DETAILS.

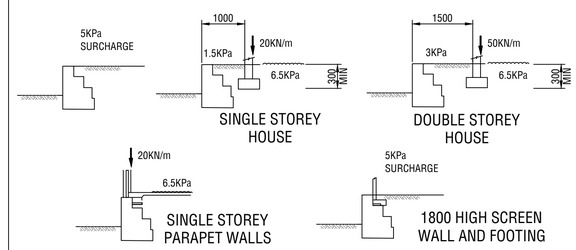
FENCE NOTES:

1. FENCE FOOTINGS INTEGRAL WITH WALL
2. 1.8m HIGH FENCE FIXED TO POSTS AND PIERS TO MANUFACTURERS SPECIFICATION.

I, Colin Ryk Kleyweg FIE Aust CPEng EngExec NER APEC Engineer IntPE(Aus) M Civ Eng BE Civ Eng Dip Eng Prac hereby certify these Drawings.
Date:
Signature:

BEFORE YOU DIG www.byda.com.au

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS IT HAS BEEN CERTIFIED BY A PRACTICING STRUCTURAL ENGINEER.
I/WE CERTIFY THAT THE WALLS SHOWN HAVE BEEN DESIGNED TO SUPPORT EFFECTIVE HEIGHT H PLUS THE LOAD CASES SHOWN BELOW.



FOR OTHER LOAD CASES, CERTIFICATION MUST BE OBTAINED FROM AN INDEPENDENT PRACTICING STRUCTURAL ENGINEER.

BLOCKS MAY NOT BE ADDED TO THE TOP OF RETAINING WALLS AND GROUND LEVELS MAY NOT BE ALTERED IN THE VICINITY OF THE WALLS FOLLOWING THEIR COMPLETION WITHOUT THE APPROVAL OF AN INDEPENDENT PRACTICING STRUCTURAL ENGINEER.

FENCES AND WALLS MAY NOT BE ADDED TO THE TOP OF RETAINING WALLS WITHOUT CERTIFICATION FROM AN INDEPENDENT PRACTICING STRUCTURAL ENGINEER, TO ENSURE AMONGST OTHER THINGS THAT THE LOADING CAUSED BY THE FENCE OR WALL IS SATISFACTORILY TRANSMITTED TO THE RETAINING WALL WITHOUT COMPROMISING THE INTEGRITY OF THE RETAINING WALL.

CERTIFIED NER ENGINEER _____ COMPANY _____ DATE _____

ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REC	APP
19/08/25	C	UPDATED PRECAL	CK	CK
21/07/25	B	INITIAL SUBMISSION FOR COMMENTS	CK	CK
11/09/24	A	ISSUED FOR INFORMATION	CK	CK

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PROJECT MANAGER C. KLEYWEG
ENGINEERING CERTIFICATION
SCALE
ORIGINAL SHEET SIZE A1

CLIENT STRATEGIC PROPERTY GROUP
WAPC NO. 200869
PROJECT NO 116 BARFIELD ROAD HAMMOND PARK
LOCATION BARFIELD ROAD, HAMMOND PARK
SHEET TITLE LIMESTONE RETAINING WALL SHEET 6 OF 6

JOB CODE P003127
SHEET NUMBER C955
REV C

Appendix H

DRAINAGE CALCULATIONS

COMPENSATION BASIN CALCULATOR

Project: No 116 Barfield Road, Hammond Park **Job No.** P003127

Client: Strategic Property Group **Date:** 11/08/2025

COMPENSATING BASIN DISCHARGE - Section 7.5.7 AR&R 1987

LOCATION	COCKBURN
EQUIV AREA (ha)	1.119
ARI	100
DURATION (hrs)	2
RAINFALL (mm/hr)	28.29
INFLOW VOL (cum)	633
HYET PERIOD (hrs)	0.08
CALC PERIOD (hrs)	0.04

------- PEAK -------			
INFLOW	OUTFLOW	VOLUME	LEVEL
279	41	411	22.908

DURATN	INFLOW	OUTFLOW	VOLUME	LEVEL	RAINFALL	WORST CASE
1	372	41	404	22.904	46.0	
2	279	41	411	22.908	28.3	<=
3	192	40	389	22.892	21.3	
6	125	39	368	22.878	13.3	
12	136	36	316	22.841	8.5	
24	88	37	325	22.847	5.6	
48	63	36	341	22.859	3.7	
72	43	32	256	22.799	2.8	

PERIOD	HRS	HYETO GRAPH (%)	INFLOW (l/s)	OUTFLOW (l/s)	VOLUME (cum)	LEVEL (m)
			0	0	0	22.600
0	0.00	0.00	44	1	7	22.605
1	0.04	1.05	44	2	13	22.610
2	0.08	1.05	279	7	54	22.643
3	0.13	6.60	279	16	93	22.675
4	0.17	6.60	209	23	121	22.697
5	0.21	4.95	209	27	148	22.718
6	0.25	4.95	150	28	166	22.732
7	0.29	3.55	150	29	184	22.745
8	0.33	3.55	116	30	197	22.755
9	0.38	2.75	116	31	210	22.765
10	0.42	2.75	129	31	225	22.776
11	0.46	3.05	129	32	239	22.786
12	0.50	3.05	173	33	260	22.802
13	0.54	4.10	173	34	281	22.817
14	0.58	4.10	103	35	291	22.824
15	0.63	2.45	103	35	302	22.831
16	0.67	2.45	63	36	306	22.834
17	0.71	1.50	63	36	310	22.837
18	0.75	1.50	55	36	313	22.839
19	0.79	1.30	55	36	315	22.841
20	0.83	1.30	76	37	321	22.845
21	0.88	1.80	76	37	327	22.849
22	0.92	1.80	74	37	333	22.853
23	0.96	1.75	74	37	338	22.857
24	1.00	1.75	55	38	341	22.859
25	1.04	1.30	55	38	343	22.861
26	1.08	1.30	44	38	344	22.861
27	1.13	1.05	44	38	345	22.862
28	1.17	1.05	65	38	349	22.865
29	1.21	1.55	65	38	353	22.868
30	1.25	1.55	72	38	358	22.871
31	1.29	1.70	72	39	363	22.875
32	1.33	1.70	89	39	371	22.880
33	1.38	2.10	89	39	378	22.885
34	1.42	2.10	84	40	385	22.890
35	1.46	2.00	84	40	392	22.894
36	1.50	2.00	95	41	400	22.900
37	1.54	2.25	95	41	408	22.906
38	1.58	2.25	51	41	409	22.907
39	1.63	1.20	51	41	411	22.908
40	1.67	1.20	34	41	409	22.907
41	1.71	0.80	34	41	408	22.906
42	1.75	0.80	25	41	406	22.905
43	1.79	0.60	25	41	404	22.903
44	1.83	0.60	17	41	400	22.900
45	1.88	0.40	17	41	396	22.898
46	1.92	0.40	8	40	392	22.895
47	1.96	0.20	8	40	387	22.891
48	2.00	0.20	0	40	381	22.887
49	2.04	0.00	0	40	375	22.883
50	2.08	0.00	0	39	369	22.879
TOTAL Q		100	4221	1760		
TOTAL V			633	264	633	

STORAGE & DISCHARGE RELATIONSHIPS

DEPTH (m)	Vs (cu m)	Qo (l/s)	WATER LEVEL (m)	LAKE VOLUME (cu m)	TWL AREA (sq m)	CULVERT FLOW (l/s)	ORIFICE FLOW (l/s)	INFILT'N Qo (l/s)	CLOGGED Qo (l/s)
0.000	0	0	22.60	0	1200	0	0	69.4	20.8
0.100	124	27	22.70	124	1285	0	0	74.4	26.8
0.200	257	33	22.80	257	1374	0	0	79.5	33.4
0.308	411	41	22.91	411	1472	0	0	85.2	41.3
0.408	563	49	23.01	563	1567	0	0	90.7	49.4
0.608	896	68	23.21	896	1764	0	0	102.1	67.9
0.808	1269	90	23.41	1269	1973	0	0	114.2	89.6
0.908	1472	102	23.51	1472	2081	0	0	120.5	101.8
1.108	1911	129	23.71	1911	2308	0	0	133.5	128.8

BASIN GEOMETRY

V = A*h + B*h^2 + C*h^3

Length (m)	40	1200	**Coefficient A**	1200
Width (m)	30	760	**Coefficient B**	420
Side Slope (1 in)	6		**Coefficient C**	48

OUTLET CULVERT PARAMETERS

Diameter (m)	0.300
Culvert Fall (m)	0.080
Culvert Length (m)	4.0
Tailwater Depth (m)	0.300
No of Culverts	1
Entrance Type (1-3)	1
Inlet Loss Coeff	4.00
Manning's n	0.011

SOIL PERMEABILITY PARAMETERS

Permeability Kt (m/d)	5	13
Clogged Kc (m/d)	1.5	
Clogged Layer Thickness t (m)	0.5	

ORIFICE PLATE PARAMETERS

Orifice Dia (m)	0.010
Orifice Coeff	1.00
Orifice CL depth (m)	0.150

PRITCHARD FRANCIS PTY LTD
ACN 008 891 094 ABN: 82 139 830 466

COMPENSATION BASIN CALCULATOR

Project: No 116 Barfield Road, Hammond Park **Job No.** P003127

Client: Strategic Property Group **Date:** 11/08/2025

COMPENSATING BASIN DISCHARGE - Section 7.5.7 AR&R 1987

LOCATION	COCKBURN				
EQUIV AREA (ha)	0.327				
ARI	5				
DURATION (hrs)	6				
RAINFALL (mm/hr)	7.81	----------	------- PEAK	----------	----------
INFLOW VOL (cum)	153	INFLOW	OUTFLOW	VOLUME	LEVEL
HYET PERIOD (hrs)	0.50	26	8	69	22.913
CALC PERIOD (hrs)	0.25	----------	----------	----------	----------

DURATN	INFLOW	OUTFLOW	VOLUME	LEVEL	RAINFALL	WORST CASE
1	64	8	63	22.891	25.3	
2	59	8	64	22.895	16.1	
3	39	8	66	22.901	12.3	
6	26	8	69	22.913	7.8	<=
12	29	8	66	22.903	5.0	
24	19	8	68	22.908	3.2	
48	13	8	67	22.905	2.0	
72	8	6	48	22.835	1.5	

PERIOD	HRS	HYETO GRAPH (%)	INFLOW (l/s)	OUTFLOW (l/s)	VOLUME (cum)	LEVEL (m)
			0	0	0	22.600
0	0.00	0.00	8	1	6	22.637
1	0.25	4.55	8	2	11	22.667
2	0.50	4.55	16	4	22	22.722
3	0.75	9.15	16	5	32	22.767
4	1.00	9.15	4	5	30	22.760
5	1.25	2.10	4	5	29	22.754
6	1.50	2.10	26	6	47	22.831
7	1.75	15.30	26	7	64	22.894
8	2.00	15.30	11	8	67	22.904
9	2.25	6.45	11	8	69	22.913
10	2.50	6.45	5	8	67	22.904
11	2.75	3.20	5	8	64	22.895
12	3.00	3.20	4	8	61	22.881
13	3.25	2.15	4	7	57	22.869
14	3.50	2.15	5	7	55	22.859
15	3.75	2.65	5	7	52	22.851
16	4.00	2.65	3	7	49	22.837
17	4.25	1.65	3	7	45	22.825
18	4.50	1.65	2	6	42	22.811
19	4.75	1.15	2	6	38	22.797
20	5.00	1.15	2	6	34	22.780
21	5.25	0.95	2	5	31	22.764
22	5.50	0.95	1	5	28	22.748
23	5.75	0.70	1	5	24	22.734
24	6.00	0.70	0	4	20	22.715
25	6.25	0.00	0	4	17	22.697
26	6.50	0.00	0	4	13	22.679
27	6.75	0.00	0	3	11	22.664
28	7.00	0.00	0	2	9	22.651
29	7.25	0.00	0	2	7	22.642
30	7.50	0.00	0	2	6	22.634
31	7.75	0.00	0	1	5	22.627
32	8.00	0.00	0	1	4	22.622
33	8.25	0.00	0	1	3	22.618
34	8.50	0.00	0	1	2	22.614
35	8.75	0.00	0	1	2	22.612
36	9.00	0.00	0	0	2	22.609
37	9.25	0.00	0	0	1	22.608
38	9.50	0.00	0	0	1	22.606
39	9.75	0.00	0	0	1	22.605
40	10.00	0.00	0	0	1	22.604
41	10.25	0.00	0	0	1	22.603
42	10.50	0.00	0	0	0	22.603
43	10.75	0.00	0	0	0	22.602
44	11.00	0.00	0	0	0	22.602
45	11.25	0.00	0	0	0	22.601
46	11.50	0.00	0	0	0	22.601
47	11.75	0.00	0	0	0	22.601
48	12.00	0.00	0	0	0	22.601
49	12.25	0.00	0	0	0	22.601
50	12.50	0.00	0	0	0	22.600
TOTAL Q		100	170	170		
TOTAL V			153	153	153	

STORAGE & DISCHARGE RELATIONSHIPS

DEPTH (m)	Vs (cu m)	Qo (l/s)	WATER LEVEL (m)	LAKE VOLUME (cu m)	TWL AREA (sq m)	CULVERT FLOW (l/s)	ORIFICE FLOW (l/s)	INFILT'N Qo (l/s)	CLOGGED Qo (l/s)
0.000	0	0	22.60	0	150	0	0	8.7	2.6
0.100	17	4	22.70	17	193	0	0	11.2	4.0
0.200	39	6	22.80	39	240	0	0	13.9	5.8
0.313	69	8	22.91	69	296	0	0	17.1	8.3
0.413	101	11	23.01	101	348	0	0	20.1	11.0
0.613	182	18	23.21	182	462	0	0	26.7	17.8
0.813	287	27	23.41	287	587	0	0	33.9	26.7
0.913	349	32	23.51	349	653	0	0	37.8	32.1
1.113	493	45	23.71	493	796	0	0	46.1	44.6

BASIN GEOMETRY

V = A*h + B*h^2 + C*h^3

Length (m)	5	150	**Coefficient A**	150
Width (m)	30	760	**Coefficient B**	210
Side Slope (1 in)	6		**Coefficient C**	48

OUTLET CULVERT PARAMETERS

Diameter (m)	0.300
Culvert Fall (m)	0.080
Culvert Length (m)	4.0
Tailwater Depth (m)	0.300
No of Culverts	1
Entrance Type (1-3)	1
Inlet Loss Coeff	4.00
Manning's n	0.011

SOIL PERMEABILITY PARAMETERS

Permeability Kt (m/d)	5	13
Clogged Kc (m/d)	1.5	
Clogged Layer Thickness t (m)	0.5	

ORIFICE PLATE PARAMETERS

Orifice Dia (m)	0.010
Orifice Coeff	1.00
Orifice CL depth (m)	0.150

COMPENSATION BASIN CALCULATOR

Project: No 116 Barfield Road, Hammond Park **Job No.** P003127

Client: Strategic Property Group **Date:** 11/08/2025

COMPENSATING BASIN DISCHARGE - Section 7.5.7 AR&R 1987

LOCATION	COCKBURN				
EQUIV AREA (ha)	0.327				
ARI	1				
DURATION (hrs)	6				
RAINFALL (mm/hr)	5.11	----------	------- PEAK	----------	----------
INFLOW VOL (cum)	100	INFLOW	OUTFLOW	VOLUME	LEVEL
HYET PERIOD (hrs)	0.50	17	6	41	22.808
CALC PERIOD (hrs)	0.25	----------	----------	----------	----------

DURATN	INFLOW	OUTFLOW	VOLUME	LEVEL	RAINFALL	WORST CASE
1	40	6	38	22.795	15.9	
2	38	6	37	22.791	10.2	
3	25	6	39	22.798	7.9	
6	17	6	41	22.808	5.1	<=
12	19	6	41	22.808	3.3	
24	12	6	41	22.807	2.1	
48	8	5	36	22.787	1.3	
72	5	4	24	22.732	0.9	

PERIOD	HRS	HYETO GRAPH (%)	INFLOW (l/s)	OUTFLOW (l/s)	VOLUME (cum)	LEVEL (m)
			0	0	0	22.600
0	0.00	0.00	5	0	4	22.624
1	0.25	4.55	5	1	7	22.643
2	0.50	4.55	10	3	14	22.683
3	0.75	9.15	10	4	20	22.712
4	1.00	9.15	2	4	18	22.705
5	1.25	2.10	2	4	17	22.697
6	1.50	2.10	17	4	28	22.750
7	1.75	15.30	17	5	38	22.798
8	2.00	15.30	7	6	40	22.803
9	2.25	6.45	7	6	41	22.808
10	2.50	6.45	4	6	39	22.799
11	2.75	3.20	4	6	37	22.790
12	3.00	3.20	2	6	34	22.777
13	3.25	2.15	2	5	31	22.765
14	3.50	2.15	3	5	29	22.756
15	3.75	2.65	3	5	27	22.747
16	4.00	2.65	2	5	25	22.735
17	4.25	1.65	2	5	22	22.724
18	4.50	1.65	1	4	20	22.711
19	4.75	1.15	1	4	17	22.699
20	5.00	1.15	1	4	15	22.685
21	5.25	0.95	1	3	13	22.674
22	5.50	0.95	1	3	11	22.664
23	5.75	0.70	1	2	9	22.655
24	6.00	0.70	0	2	8	22.645
25	6.25	0.00	0	2	6	22.636
26	6.50	0.00	0	1	5	22.629
27	6.75	0.00	0	1	4	22.624
28	7.00	0.00	0	1	3	22.619
29	7.25	0.00	0	1	3	22.615
30	7.50	0.00	0	1	2	22.612
31	7.75	0.00	0	0	2	22.610
32	8.00	0.00	0	0	1	22.608
33	8.25	0.00	0	0	1	22.607
34	8.50	0.00	0	0	1	22.605
35	8.75	0.00	0	0	1	22.604
36	9.00	0.00	0	0	1	22.603
37	9.25	0.00	0	0	0	22.603
38	9.50	0.00	0	0	0	22.602
39	9.75	0.00	0	0	0	22.602
40	10.00	0.00	0	0	0	22.601
41	10.25	0.00	0	0	0	22.601
42	10.50	0.00	0	0	0	22.601
43	10.75	0.00	0	0	0	22.601
44	11.00	0.00	0	0	0	22.601
45	11.25	0.00	0	0	0	22.601
46	11.50	0.00	0	0	0	22.600
47	11.75	0.00	0	0	0	22.600
48	12.00	0.00	0	0	0	22.600
49	12.25	0.00	0	0	0	22.600
50	12.50	0.00	0	0	0	22.600
TOTAL Q		100	111	111		
TOTAL V			100	100	100	

STORAGE & DISCHARGE RELATIONSHIPS

DEPTH (m)	Vs (cu m)	Qo (l/s)	WATER LEVEL (m)	LAKE VOLUME (cu m)	TWL AREA (sq m)	CULVERT FLOW (l/s)	ORIFICE FLOW (l/s)	INFILT'N Qo (l/s)	CLOGGED Qo (l/s)
0.000	0	0	22.60	0	150	0	0	8.7	2.6
0.100	17	4	22.70	17	193	0	0	11.2	4.0
0.208	41	6	22.81	41	244	0	0	14.1	6.0
0.308	68	8	22.91	68	293	0	0	17.0	8.2
0.408	99	11	23.01	99	345	0	0	20.0	10.9
0.608	180	18	23.21	180	459	0	0	26.5	17.6
0.808	284	26	23.41	284	583	0	0	33.8	26.5
0.908	345	32	23.51	345	650	0	0	37.6	31.8
1.108	489	44	23.71	489	792	0	0	45.8	44.2

BASIN GEOMETRY

V = A*h + B*h^2 + C*h^3

Length (m)	5	150	**Coefficient A**	150
Width (m)	30	760	**Coefficient B**	210
Side Slope (1 in)	6		**Coefficient C**	48

OUTLET CULVERT PARAMETERS

Diameter (m)	0.300
Culvert Fall (m)	0.080
Culvert Length (m)	4.0
Tailwater Depth (m)	0.300
No of Culverts	1
Entrance Type (1-3)	1
Inlet Loss Coeff	4.00
Manning's n	0.011

SOIL PERMEABILITY PARAMETERS

Permeability Kt (m/d)	5	13
Clogged Kc (m/d)	1.5	
Clogged Layer Thickness t (m)	0.5	

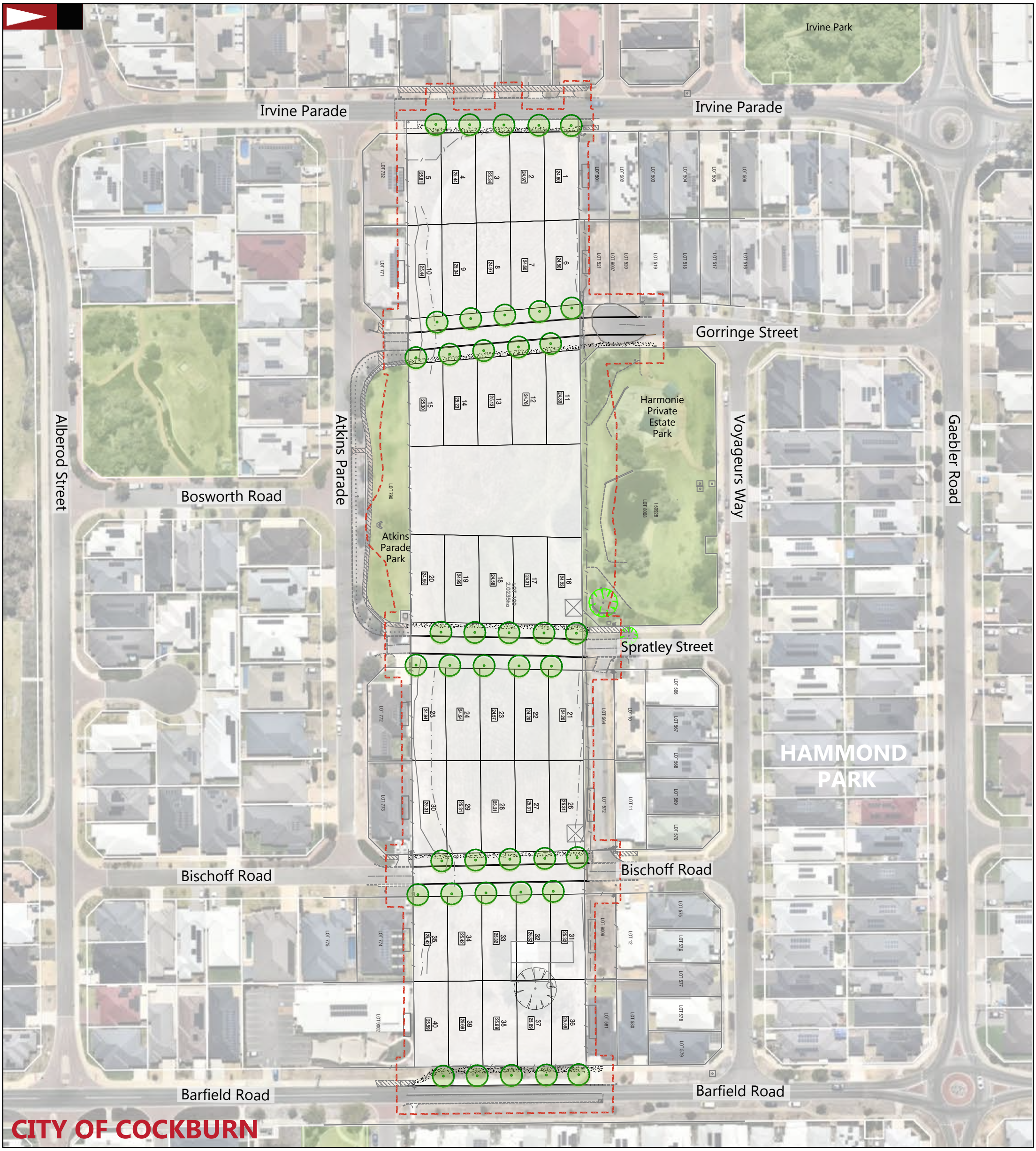
ORIFICE PLATE PARAMETERS

Orifice Dia (m)	0.010
Orifice Coeff	1.00
Orifice CL depth (m)	0.150

PRITCHARD FRANCIS PTY LTD
ACN 008 891 094 ABN: 82 139 830 466

Appendix I

STREET TREES AND LANDSCAPING PLAN



PARKS AND RECREATION

WATERWAYS

PUBLIC PURPOSE

Irvine Parade — STREET NAME

HAMOND PARK — SUBURB NAME

CITY OF COCKBURN — LOCAL GOVERNMENT NAME

STAGE BOUNDARY

CADASTRAL BOUNDARY

PROPOSED TREE

EXISTING TREE TO BE PROTECTED

EXISTING TREE TO BE REMOVED

LEGEND

REV	DATE	AMENDMENT
B	21-07-2025	ISSUED FOR REVIEW
A	05-02-2025	ISSUED FOR REVIEW

PROJECT: No 116 Barfield Road, Hammond Park

TITLE: Street Trees Plan

DRAWING NUMBER: P003127_S05

DRAWN BY: J.S.

Premise

Appendix 4: POS Landscape Concept Plan

Lot 100 Barfield Road , Hammond Park
POS Landscape Concept Plan

Path connection into existing POS.

Existing Park infrastructure including; shelter, play space, shade sail & seating

Bench seat overlooking Voyageurs Park

Passive recreation function with low height understory vegetation providing clear pedestrian sightlines

Footpath provides direct pedestrian connection to overlooking lots.

Irrigated trees, garden beds and turf to connect into the existing Voyageurs Park groundwater bore and irrigation system.

Turf embankment. 1:6 to 1:8 grade

Concrete edge / mowing kerb

New turf to tie into existing

POS lot boundary.

Small pedestrian bridge / culvert path crossing provides path connection between proposed residential lots, Atkins Parade Park to the south and Voyageurs Park to the north. Provides pedestrian linkage to greater footpath & cycle network.

Low height (irrigated) garden beds under shade trees. 1:4 to 1:6 grade.

Shade trees throughout POS & adjacent pedestrian pathways.

Vegetated stormwater detention basin / swale.

Internal path network linked to greater footpath & cycle network.

20% AEP- TWL 22.913, Depth 0.313m (1:6 side slopes)

1% AEP- TWL 22.913, Depth 0.308m (1:6 side slopes)

100% AEP- TWL 22.808, Depth 0.208m (1:3 side slopes)

Existing drainage outlet.

Footpath extension into the existing adjacent POS and greater footpath & cycle network.

EXISTING PEDESTRIAN CONNECTION

PROPOSED PEDESTRIAN CONNECTION POINTS

GARDENBED (IRRIGATED)

TURF (IRRIGATED)

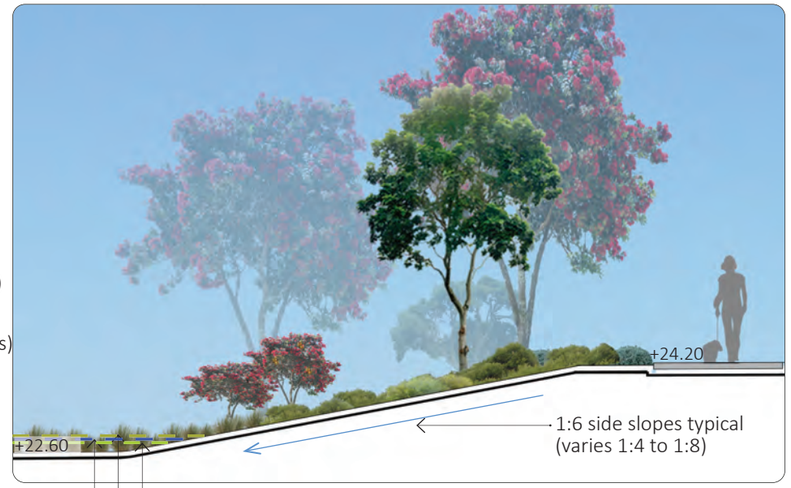
SWALE / BASIN


Bike and scooter connection.


Low understory planting.


Pedestrian connection and passive recreation.


Vegetated drainage swale.



1. basin / swale cross section
1:200 scale

N

0 2 4 6 8 10 15 20m

Drawing No	SPG001:CP01	Revision	B
Date	Oct 2025	Scale	1:500@ A3

Considered Space
Landscape Architecture
Urban Design
Play Spaces

Perth

Level 17, 1 Spring Street
Perth, WA 6000

(08) 6285 3177

Adelaide

27 Halifax Street
Enter via Symonds Pl
Adelaide, SA 5000

(08) 8333 7999

Melbourne

68 Clarke Street
Southbank, VIC 3006

(03) 8593 9650

Brisbane

GPO Box 2349
Brisbane, QLD 4000

(07) 3778 7420

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