Civil Engineering & Servicing Report for Reconfiguring a Lot (RAL)

Southern Thornlands PDA Precinct One

Stage 1 and 2

Job No: B00702

Submission to: Urbex Pty Ltd.

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EMPOWER

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1. Introduction

Empower Engineers & Project Managers have been engaged by Urbex to prepare an Engineering Infrastructure Report as supporting information to the Reconfiguring a Lot (RAL) development application for Precinct 1, Stage 1 & 2, of the Southern Thornlands Priority Development Area (PDA). The infrastructure nominated within this report has been prepared to be consistent with the approved MCU application for this site.

This report has been compiled based on the approved MCU plans (Precinct 1 Land Use & Context Plans), which can be found in Appendix A.

This report should be read in conjunction with the other documents issued by the consultant team.

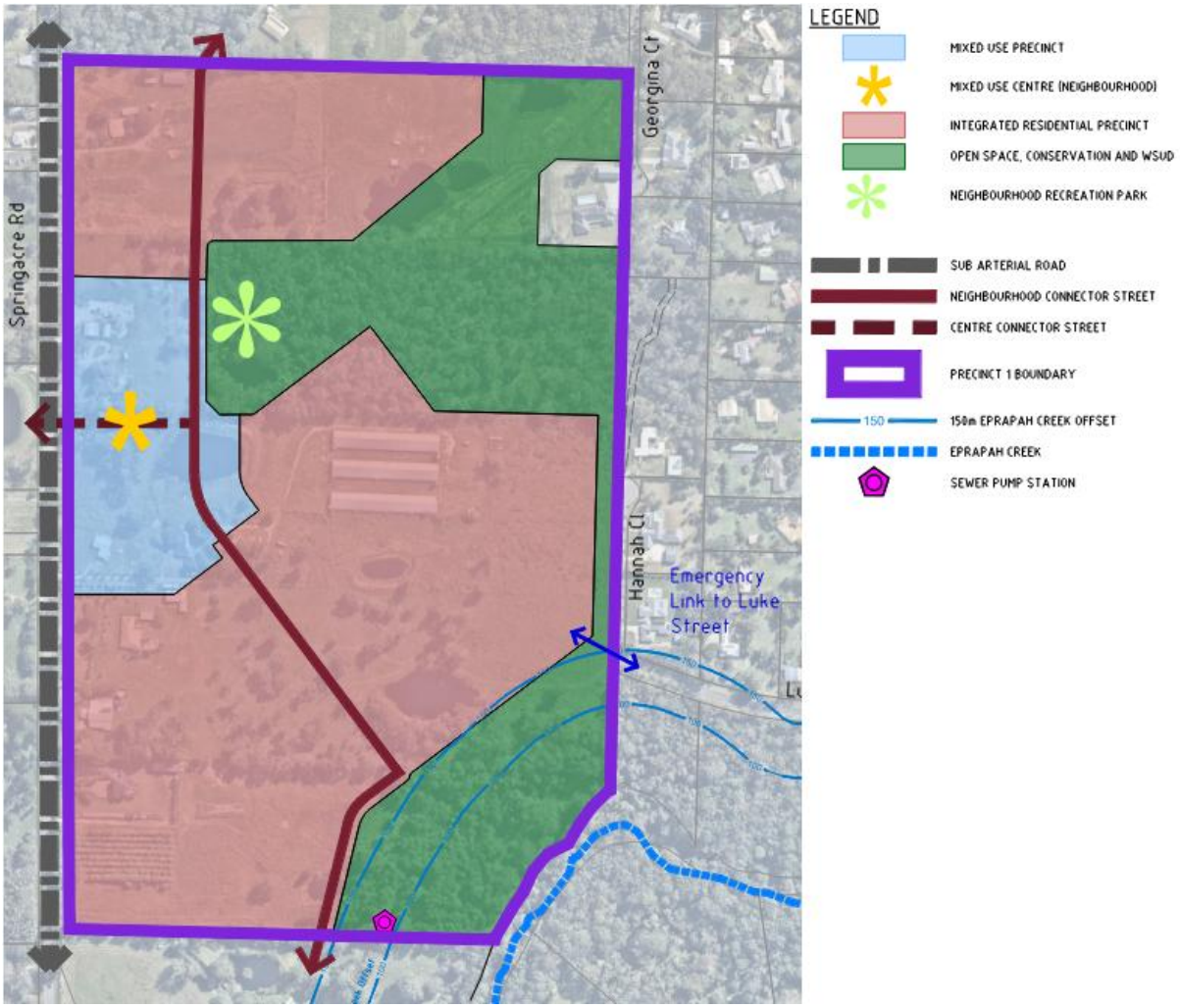


Figure 1-1 | Precinct 1 Land Use Plan

2. Site Characteristics

2.1 Location

The proposed development site is located to the east of Springacre Road, Thornlands. The site is comprised of six allotments, with street address and SP descriptions listed in Table 2-1 below.

This site is bounded externally by a public road to the west (Springacre Road), by Eprapah Creek to south-east, and existing rural-res to the east. Other parts of the Priority Development Area (PDA) bound the site to the north and south, these representing future urban residential opportunity.

The existing properties and allotments on the western side of Springacre Road are not part of this Precinct 1 development application.

Table 2-1 | Property Data

Item	Street Address	RP Description
1	62-74 Springacre Road, Thornlands	Lot 12 on RP 53653
2	76-94 Springacre Road, Thornlands	Lot 13 on RP 53653
3	96-108 Springacre Road, Thornlands	Lot 14 on RP 53653
4	110-118 Springacre Road, Thornlands	Lot 2 on RP 128089
5	120-122 Springacre Road, Thornlands	Lot 1 on RP 128089
6	124-138 Springacre Road, Thornlands	Lot 16 on RP 53653



Figure 2-1 | Aerial Photo of the Proposed Development Site and Surrounds – NearMap ©

2.2 Land Use

2.2.1 Existing

The existing sites have a combined area of approximately 40.41 ha and are currently occupied by a combination of pasture and cultivated fields, native and exotic vegetation, small and large farming sheds, farm dams and single dwelling houses. The sites also have several unsealed internal access tracks.

There are several dams onsite, however and as expected, based on the provided survey information, none of the dams have low flows pipes or formed overflow weirs. As such the onsite dams are not considered to attenuate flows in the predevelopment scenario. As per typical rural farm dams, they are intended to capture and hold water and not release it.

Figure 2-2 below details the existing structures and vegetation of the proposed development sites.



Figure 2-2 | Proposed Development Sites Existing Condition

2.2.2 Proposed Development

The proposed development is to consist of an internal road network, residential lots of mixed sizes and an open space conservation zone which will also be included as part of the stormwater system. The proposed development layout can be seen in Appendix C. All engineering services are to be provided to each allotment as part of the proposed development. This includes the following:

- Road Access via Springacre Road
- Stormwater Drainage
- Sewer Connection
- Reticulated Potable Water Connection, and
- Electrical and Communication Services

Figure 2-3 below (and Appendix B) shows the proposed RAL for Stages 1 and 2

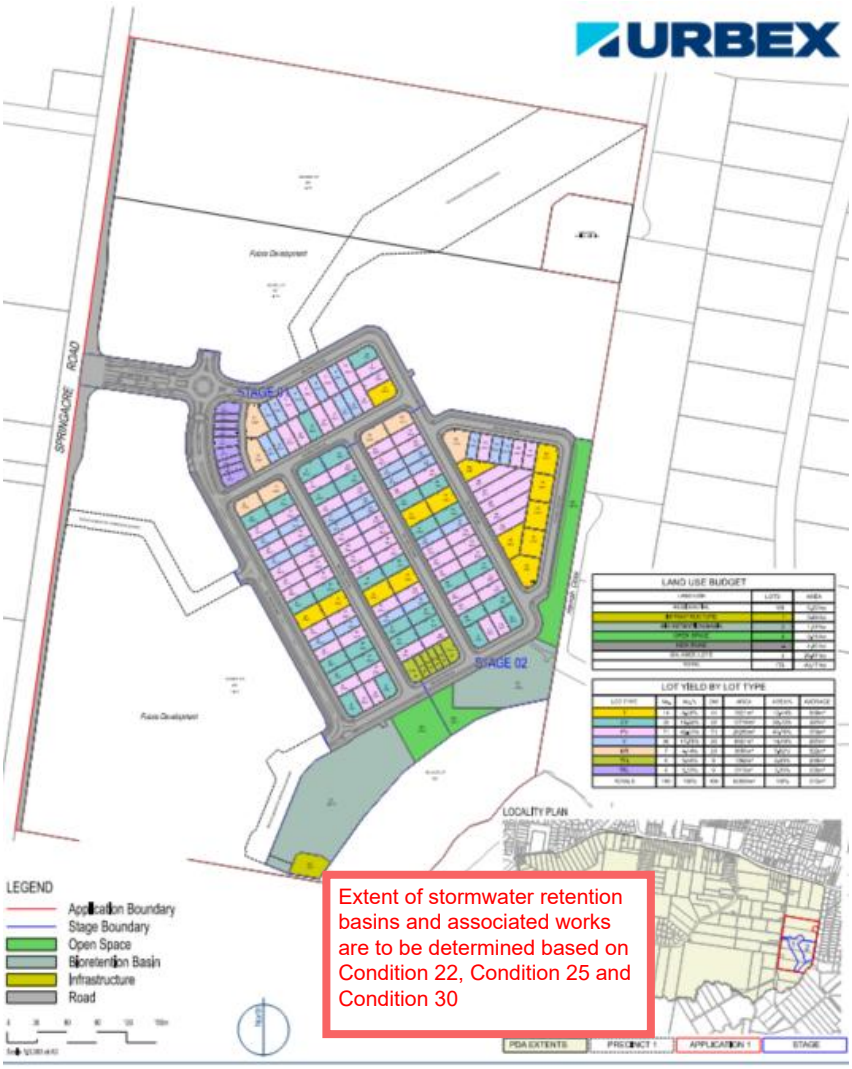


Figure 2-3 | Proposed RAL Plan Stage 1 and 2

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Date: 19 April 2026

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2.2.3 Development Staging

The initial engineering assessment for the proposed development has been based on the staging details as per Table 2-2 below.

Table 2-2 | Assumed Development Staging Table

	Stage	Lots
Current	1	88 (+5 MD)
	2	77 (+6 MD)
	Subtotal	**165 (+11 MD)**
Future Stages	*3*	*77 (+6 MD)*
	4	*73 (+7 MD)*
	5	*56 (+5 MD)*
	6	*47 (+10 MD)*
	Grand Total	***418 (+39 MD)***

2.3 Topography and Site Drainage

The site is divided by a central ridge running east-to-west, splitting the site into two distinct catchments, north and south.

The levels across the northern half of the site vary from RL 44.0 at the western boundary to RL 39.5 at the site's centre and RL 25.0 at the north-eastern boundary. The levels across the southern half of the site vary from RL 39.5 at the site's centre to RL 15.0 at the south-eastern boundary.

The site falls with an approximate grade of 6.0% on average with surface water currently flowing to four discharge locations across the site:

1. The north-eastern boundary of the development discharging to an existing private property (40-60 Springacre Road) and channel near Georgina Court
2. The eastern boundary of the development discharging to the existing drainage infrastructure adjacent to Hannah Close and ultimately Eprapah Creek.
3. The southern boundary of the development drains towards Eprapah Creek.
4. The north-western boundary of the development discharging to an existing property (40-60 Springacre Road) and road reserve adjacent to Springacre Road.

It is noted that there is an external catchment (to the west of the site) which flows naturally to the proposed development via cross drainage under Springacre Road and overland flow. There is also a catchment to the north of the Precinct One Sites which flows naturally into the Precinct One Area.

For the purposes of stormwater modelling, it shall be assumed that external flows entering the site are doing so at undeveloped flow rates in the pre-development scenario. However, because the upstream catchment is flagged for development as part of a greater PDA, the post development flow from this catchment shall be assumed to be developed in a similar nature to the internal catchments. This will allow for conveyance through the site and stormwater detention of the regional flows. This information is summarised in Figure 2-4 below.

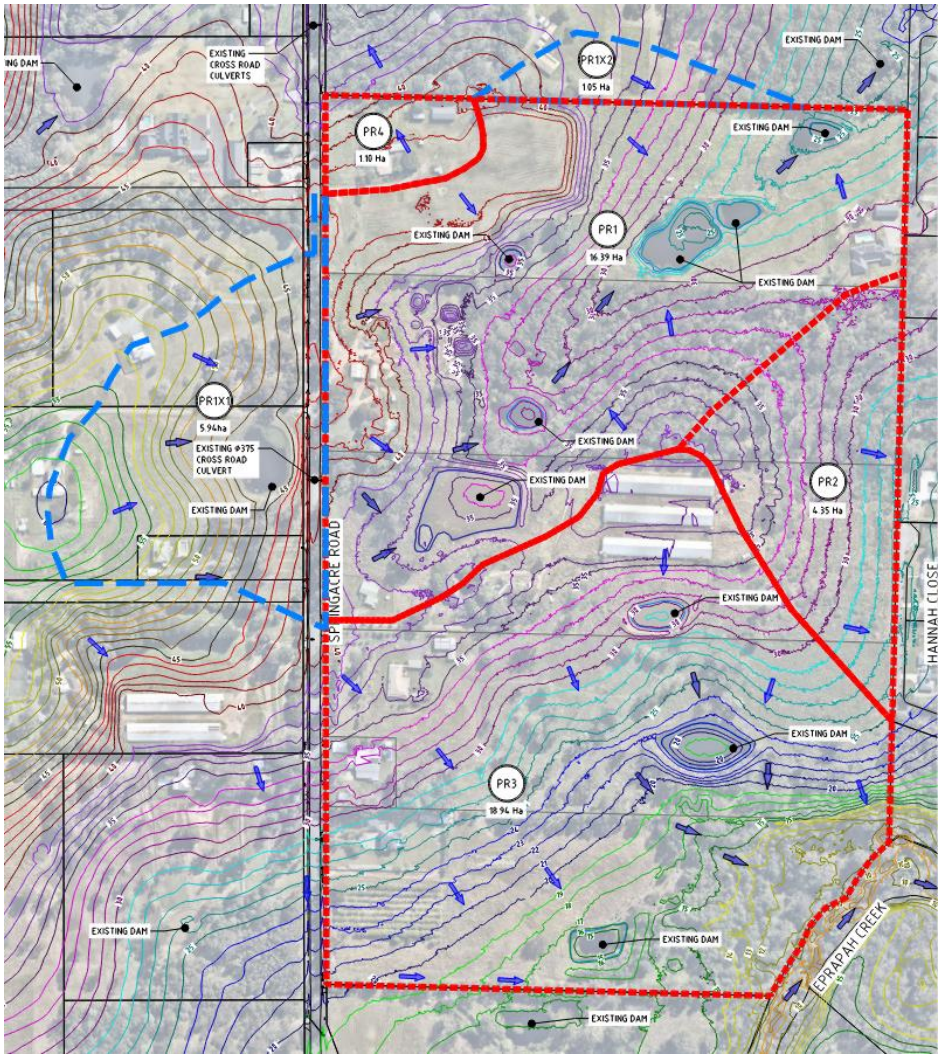


Figure 2-4 | Existing Catchment Diagram

3. Existing and Proposed Civil Engineering Infrastructure

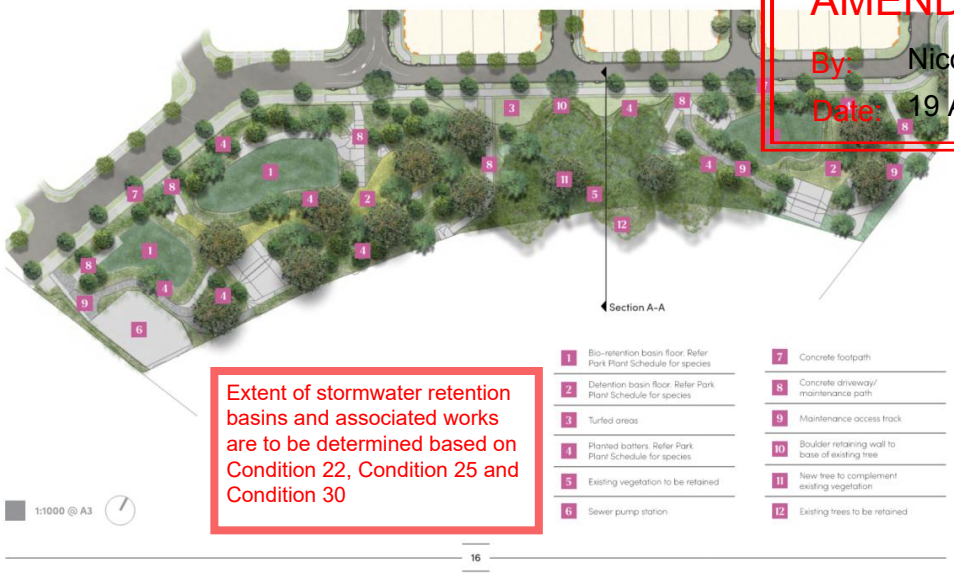
The engineering plans included in Appendix C show the proposed infrastructure intended to service the reconfiguration of the lot for stages 1 and 2 of Precinct 1. The final infrastructure servicing strategy for the rest of Precinct 1 and the wider PDA is subject to further planning with Economic Development Queensland (EDQ) which will consider the wider Southern Thornlands PDA requirements.

3.1 Stormwater

The proposed stormwater strategy to manage stormwater quality, quantity and overland flow has been developed in accordance with the RCC City Plan - Planning Policy 2. A Conceptual Stormwater Management Plan has been prepared by Engeny Australia and is included in Appendix D. This report details the stormwater strategy for the proposed development and details the requirements for Stages 1 and 2.

Significant coordination between Engeny, AS Design and Empower has been undertaken in relation the Eprapah Creek Conservation/drainage reserve area. As detailed on the Civil and Landscape plans significant investment into civil and landscape elements ensure a seamless integration with the ecological elements of the corridor.

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Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

Figure 3-1 | Extract of Landscape plan for Eprapah Corridor

3.1.1 Existing Infrastructure

The existing site consists of primarily agricultural land, farming sheds and single dwellings. There are several farmers dams on-site, however in the absence of any identifiable low flow pipes or formed overflow weirs, they aren't considered attenuating in the pre-development scenario.

3.1.2 Proposed Infrastructure

The stormwater management plan in Appendix D further details the strategy for the management of stormwater quality and quantity. The information contained below is intended to provide a high-level overview of the stormwater management strategy and as such should be read in conjunction with the above mentioned Engeny Report.

3.1.2.1 Stormwater Quality Approach

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) has been used to predict the likely pollutants generated in the post development scenario. A series of bioretention basins have been modelled and appropriately sized within the MUSIC model so as to ensure that pollutants are reduced in accordance with the requirements outlined in the state planning policy. The overall reduction in pollutants discharged from the site and the requirements for pollutant reduction can be seen in Table 3-1 below.

Table 3-1 | Overall Treatment Train Effectiveness

Pollutants	Sources	Residual	Required Reduction	Development Reduction
Total Suspended Solids (kg/yr.)	48200	9650	80%	80%
Total Phosphorus (kg/yr.)	94.4	24.8	60%	73.7%
Total Nitrogen (kg/yr.)	453	224	45%	50.5%
Gross Pollutants (kg/yr.)	5920	249	90%	95.8%

Further detail on the composition and performance of the bioretention basins can be found in Appendix D, while their locations and footprints are included in the engineering plans Appendix C.

3.1.2.2 Stormwater Quantity Approach

The software package XP-Rafts has been used to confirm that the pre-development peak discharge is not exceeded by the post development peak discharge for a range of storm events over a range of recurrence intervals. To ensure non-worsening of pre-development peak flows, a series of detention basins have been proposed at strategic locations within the site. The installation of these detention basins combined with the proposed bulk earthworks has ensured that the pre-development peak discharge across all storm events is not exceeded in the post development scenario at all of the discharge points. This has been shown diagrammatically in Figure 3-2.

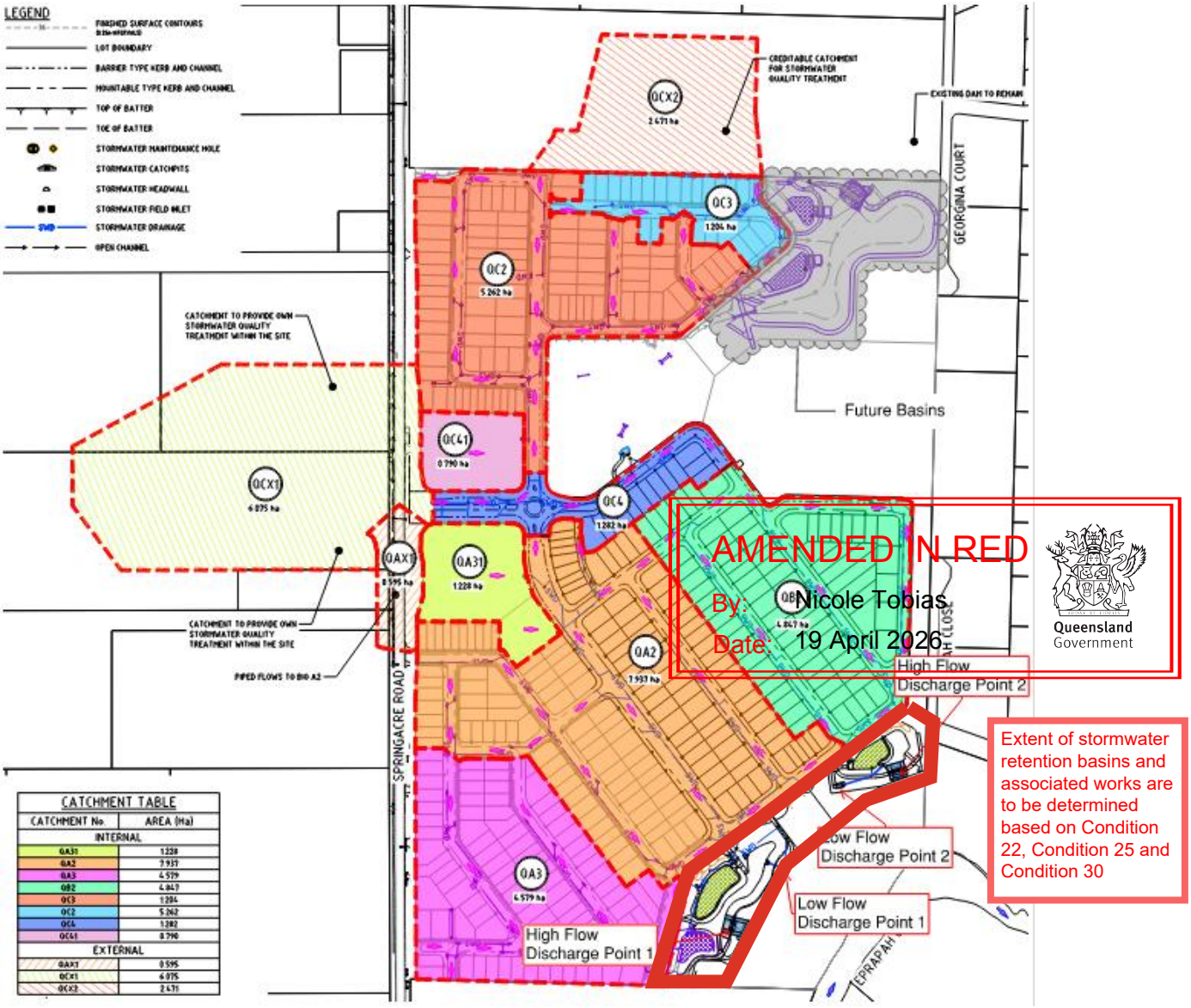


Figure 3-2 | Summary of Post Development Catchments and Discharge Points for Precinct 1 Stages 1 & 2

3.1.2.3 Stormwater Staging

The basins to the north are not required for stages 1 and 2 and as such will be developed further in future stages. During development, dedicated temporary sediment basins will also be installed on the bottom of each catchment and will have sufficient capacity to contain the treatment within the sites. These temporary sediment basins, for construction phase erosion and sediment control, will be designed in accordance with Appendix B of Best Practise Erosion and Sediment Control (IECA Australasia, Nov 2008). Where practical, it is planned that the sediment basins will be decommissioned and replaced with bio-retention/detention basins when construction of a majority (>80%) of residential dwellings and commercial buildings has been completed.

3.1.2.4 External Catchments

Catchment QCX1 to the west of Springacre Road is expected to be developed in a similar manner to the proposed development site. In it's current condition, the undeveloped external catchment discharges to the proposed development site which is assumed to continue once the site is developed. No allowance has been made for treatment of external catchments for stormwater quality with the expectance that this site is to provide it's own quality treatment.

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3.2 Sewerage Reticulation

Extent of sewer network outcomes are to be determined based on Condition 22 and Condition 25

3.2.1 Existing Infrastructure

No existing sewer infrastructure is directly adjacent to the proposed site. Connection to existing external sewer infrastructure is intending to be carried out as detailed in Appendix E - Sewer Network Capacity Assessment, prepared by H2One.

3.2.2 Proposed Infrastructure

To service Precinct 1 for sewer, a new sewage pump station is proposed to be established within the site. This pump station with an associated proposed rising main shall conveying flows to the existing RCC sewer network. The rising main is then proposed to connect into an existing DN300 gravity main in the vicinity of Ondine Court, Victoria Point. For further information refer the H2One report in Appendix E.

Opportunities exist for the sewage pump station to service other developed areas within the PDA. This approach provides a practical and scalable solution that is consistent with the broader infrastructure vision for the Southern Thornlands PDA. As part of this application an appropriately sized land parcel is proposed to be dedicated for a future pump station.

Empower understands that EDQ is actively engaging with Redland City Council to facilitate an integrated sewer solution as part of their formulation of the PDA-wide Development Scheme and Development Charges and Offset Plan (DCOP). These ongoing discussions will inform the alignment, capacity and delivery responsibilities for sewer infrastructure across the PDA.

The proposed strategy ensures that sewer servicing for Precinct 1 is both feasible, scalable and adaptable and does not prejudice the delivery or staging of EDQ's ultimate infrastructure plans for the PDA.

Additionally, subject to confirmation by EDQ on preferred service strategies, interim solutions such as tankering would be suggested during development for Precinct 1 stages 1 & 2. This would then service this development until the sewer strategy is finalised and implemented.

3.2.3 Design Loading

3.2.3.1 Design Loading Assumptions

The sewer design loading has been based on the proposed lot layout for the development and design parameters in the SEQ WS&S D&C Code. The total number of equivalent persons (EP's) the sewerage network must service as part of the proposed development has been based on an EP/ET ratio of 2.7; as per Appendix A of the SEQ WS&S D&C Code. Similarly, Average Dry Weather Flows (ADWF), Peak Dry Weather Flows (PDWF) and Peak Wet Weather Flows (PWWF) have been calculated based on the information provided within Table 10 of the SEQ WS&S D&C Code. The table below outlines the design calculations used to determine flows within the sewerage network.

Table 3-2 | Sewer Loading Calculations

Parameter	**Calculation/Assumption**
ADWF	Assumed to be 210 L/EP/Day for existing sewerage infrastructure Assumed to be 200 L/EP/Day for proposed sewerage infrastructure
PDWF	$PDWF = C2 \times ADWF$
C2	$C2 = 4.7 \times (EP)^{-0.105}$
PWWF	$PWWF = 5 \times ADWF$

Table 3-3 | Estimated Sewage Generation for Precinct 1 (Ultimate)

Site Land-Use and Density	Demand Rate	EP	ADWF (L/s)	PWWF (L/s)
418 x res. freehold lots	2.7	1128.6	2.6	13.1
47 x duplex units	2.51 EP/Apt.	197.7	0.5	2.3
140 x 1 bedroom apt.	1.31 EP/Apt.	183.4	0.4	2.1
40 x 2-bedroom apt.	1.76 EP/Apt.	70.4	0.2	0.8
70 x 3-bedroom apt.	2.51 EP/Apt.	175.7	0.4	2
3,400 m^2 GFA com.	1.68 EP/100 m^2 GFA	57.1	0.1	0.7
	TOTAL	1812.9	4.2	21

3.2.3.2 Sewer Design Flows

The design flows adopted for the ultimate catchment are as follows in Table 3-4 and further detailed in Appendix E.

Table 3-4 | Sewer Design Flows

Catchment	Site Total
ET	671.4
EP/ET	2.7
EP	1812.9
Flow per EP (L/EP/Day)	200
ADWF (L/Day)	99.78
ADWF (L/S)	4.2
C1	3.5
PDWF (L/s)	349.22
PWWF (L/s)	21.0

3.3 Potable Water Reticulation

3.3.1 Existing Infrastructure

Existing potable water infrastructure is present along the frontage of the site to Springacre Road; in the form of a DN 150 AC main. Figure 3-3 shows existing potable water infrastructure adjacent to and nearby the site.



Figure 3-3 | Existing Potable Water Network as per Red-E-Map

3.3.2 Proposed Infrastructure

An interim potable water servicing solution for the initial two stages of the development is available via connection to the existing DN 150 watermain located adjacent to the site in Springacre Road. This option may be appropriate for early stages of development, subject to further capacity analysis.

Future stages of the development will require additional network connections to offer enhanced capacity and longer-term network resilience, including;

- Northern Connection: a trunk main exists in Springacre Rd near Boundary Road,
- Southern Connection: a trunk watermain solution is available to the south via Bunker Road. This aligns with the likely ultimate trunk infrastructure strategy currently under consideration by EDQ and RCC for the PDA.
    - Alternatively, other connections through to Woodlands Drive are available should the southern connection be delayed.

The proposed solution shall be designed to ensure flexibility in servicing and shall not prejudice the delivery of EDQ's ultimate water infrastructure plans for the PDA.



Figure 3-4 | Dual Connections for Stage 1 & 2 - Existing Springacre Watermains

3.4 Development Access

3.4.1 External Roads & Intersection

The rural zoned site in its existing condition is currently serviced by Springacre Road. The existing Springacre Road is a sub-arterial road within the Redland City Council Network. The existing road has a rural profile with a spray sealed wearing course and roadside swale drains.

It is proposed that a new intersection on Springacre Road will provide access to all proposed lots.

A traffic study has been prepared by SLR Consulting to support the development; this providing additional technical guidance related to the suitability of the Springacre Road formation.

In accordance with advice from EDQ the proposed ultimate cross section of Springacre is shown below in Figure 3-5.

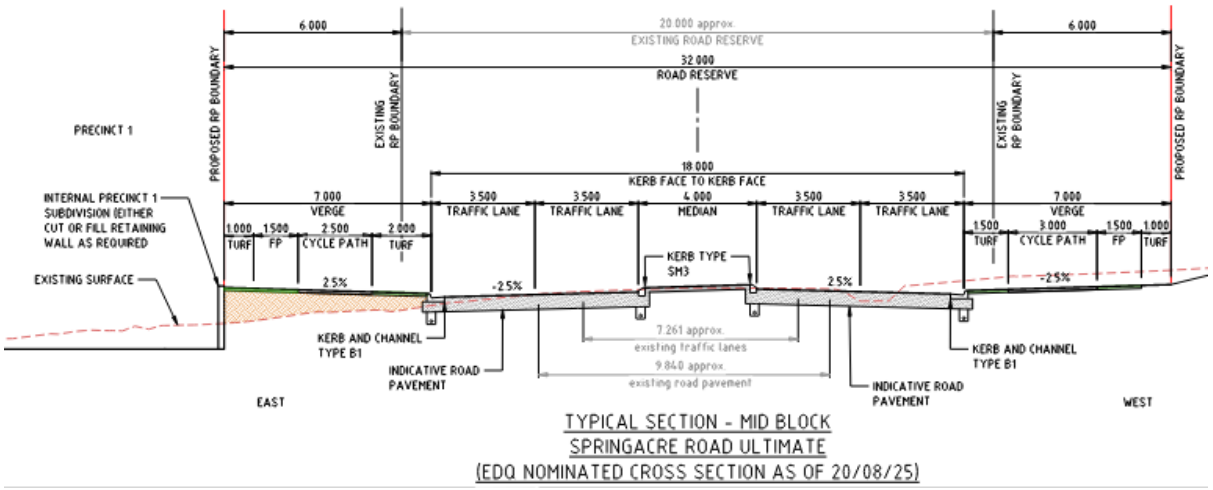


Figure 3-5 | EDQ Nominated Cross Section for Ultimate Springacre Road

It is also a requirement for the Springacre Road Speed Limit to be reduced to posted 60km/hr. There are many reasons and justification for the proposed change which is detailed in SLR's Speed Review

Preliminary design of the proposed intersection on Springacre Road has been undertaken to confirm that a future road connection to Woodlands Drive as part of the overall PDA is possible. This design and associated conformance checks (SISD, hydroplane etc.) can be found in Appendix G.

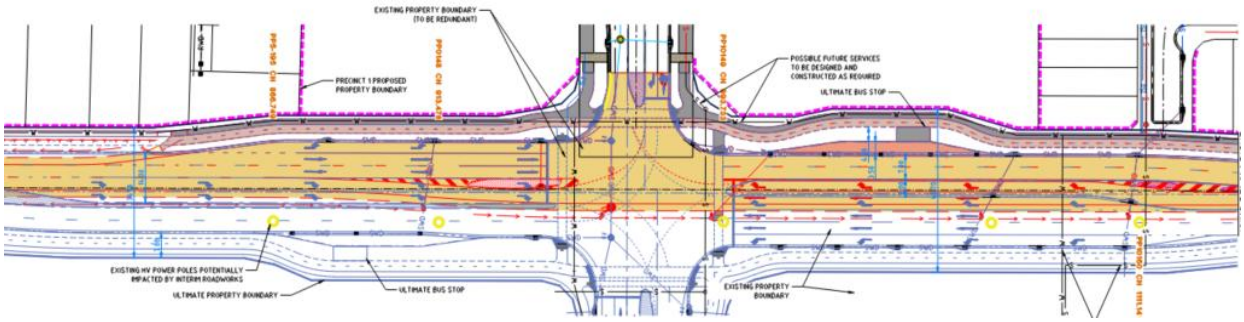


Figure 3-6 | Extract showing interim design coordinated with ultimate design

The detailed design of the interim and ultimate intersections shall be in accordance with Austroads Guide to Road Design and the SLR Traffic Report. The design of interim and ultimate intersections throughout the project shall consider input from all key stakeholders including EDQ, Council, Traffic Consultants and other relevant parties.

3.4.2 Internal Roads

In co-operation with SLR consulting, the internal road network has been designed to account for a dynamic range of road users. A holistic design approach has been undertaken, considering a multitude of parameters including spatial constraints, estimate road user volumes and transport mode preferences, drainage requirements, road safety, vertical and horizontal geometry.

3.4.2.1 Road Hierarchy

The road hierarchy as shown in Figure 3-7 has been determined to best convey users through the development under this design philosophy.

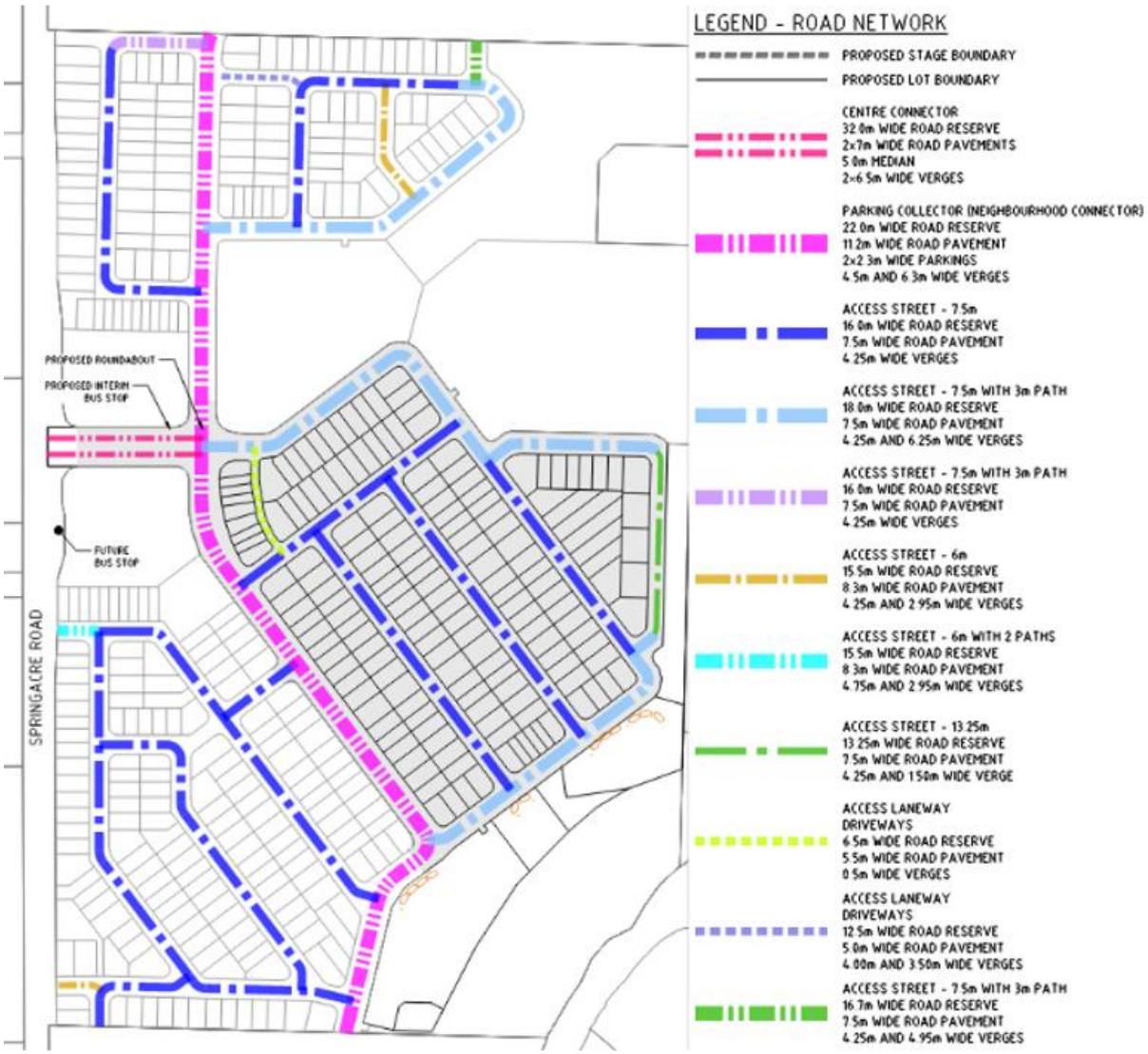


Figure 3-7 | Road Network Hierarchy

3.4.2.1.1 Centre Connector

Access to Precinct 1 Stages 1 & 2 will be through the centre connector off of Springacre Road. During the development of Precinct 1, an interim T-intersection as seen in Figure 3-8 will service the site.

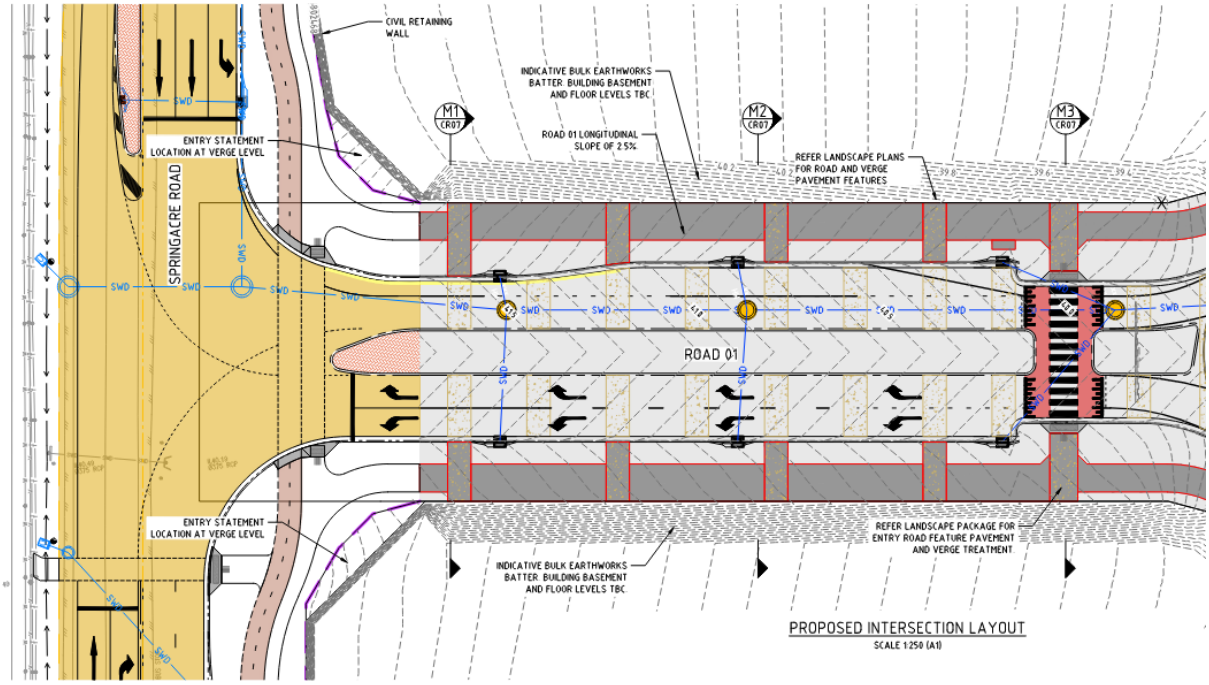


Figure 3-8 | Entry Road and Intersection Interim Layout

As demand increases with the construction of further stages and the planned development to the west of Springacre Road commences, this interim layout will be replaced by the ultimate intersection layout as shown in Figure 3-9.

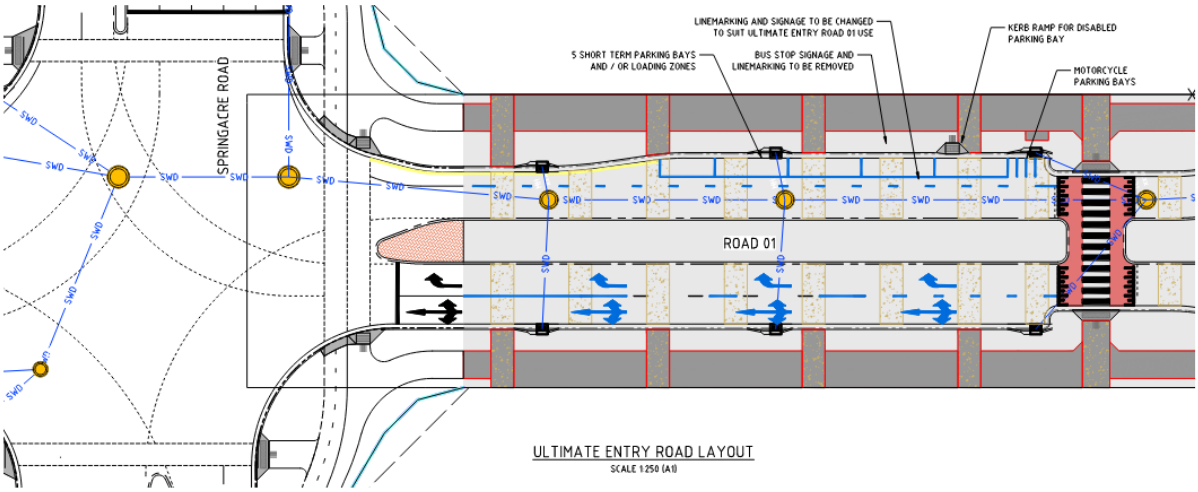


Figure 3-9 | Entry Road and Intersection Ultimate Layout

The proposed cross-section of this centre corridor is as shown in Figure 3-10. This and all cross-sections (as can be seen in Appendix C) have been designed in accordance with EDQ's PDA Guideline no. 06. The centre connector profile was selected for this road due to the requirement to service a combination of high-density residential and commercial lots while satisfying volume requirements.

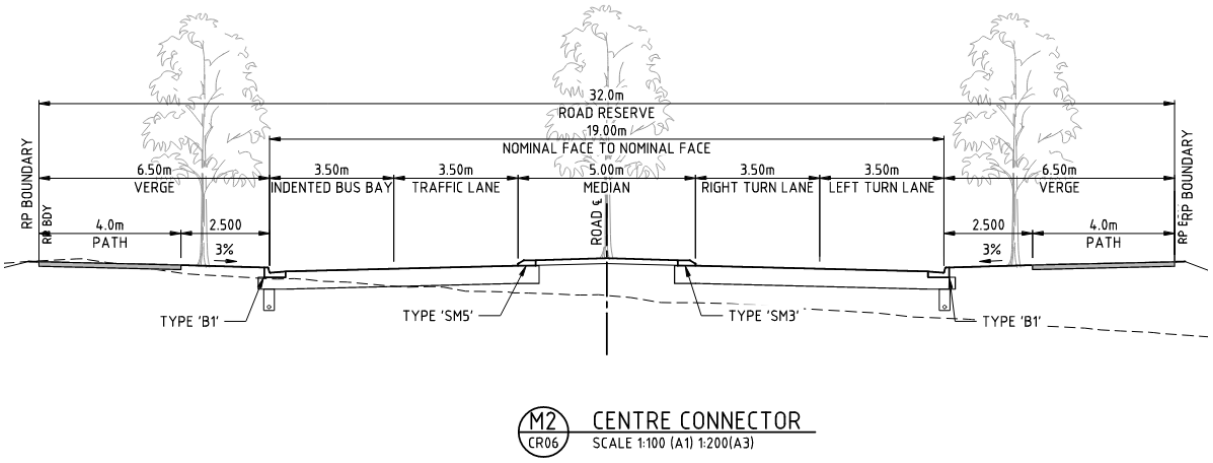


Figure 3-10 | Centre Connector Profile

3.4.2.2 Active Transport

Special consideration has been given to 'Active Transport' to ensure that there are safe, accessible and efficient routes for multimodal travel as an alternative to private transport. Raised "Wombat Crossings" have been emplaced in areas expecting a high volume of pedestrian movement. Where footpath grades must be steeper than 5.0% due to the topography of the site, steps have been taken to ensure an alternative route is available at shallower grades. These examples can be seen in Figure 3-11.



Figure 3-11 | Pedestrian Considerations

3.4.2.3 Design Vehicles

Design vehicles were adopted as shown at critical locations in Appendix C and in Table 3-5.

Table 3-5 | Design Vehicles

Road/Intersection	Design Vehicle	Design Vehicle Turn Radii	Check Vehicle	Check Vehicle Turn Radii
Roundabout: Roads 01, 02, 03, 04	14.5m Long Rigid Bus	15.00m	19.0m Semi-Truck	15.0m
Road 04	14.5m Long Rigid Bus	15.00m	19.0m Semi-Truck	15.0m
Lane 01	10.3m Service Vehicle	9.757m		
Road 06	10.3m Service Vehicle	9.757m		
Road 04 to Commercial Driveway	10.3m Service Vehicle	9.757m		
Road 03	5.2m Passenger Vehicle	6.30m		

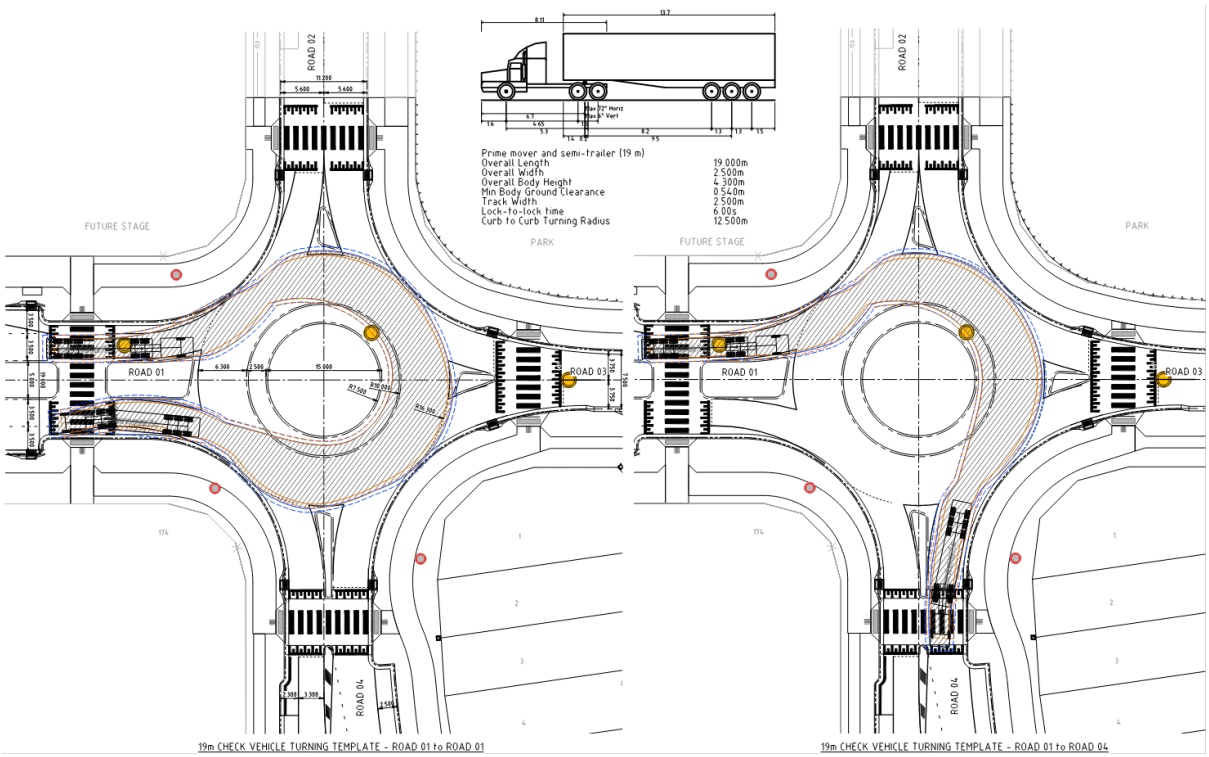


Figure 3-12 | Example Turning Path Check with 19.0m Semi-Truck

3.5 Earthworks

As can be seen in Figure 3-13 and attached in Appendix C, the earthworks design, where possible, minimises steep grades on lots and reduces the requirements for retaining walls. The natural slope of the development area will be incorporated into the earthworks design, and it is intended that the earthworks cut to fill is to be balanced. The preliminary design of earthworks will be undertaken with the intention that where possible all lots will fall to the street. This will reduce the need for rear of lot services for stormwater and sewer. Steep grades on lots will also be avoided.

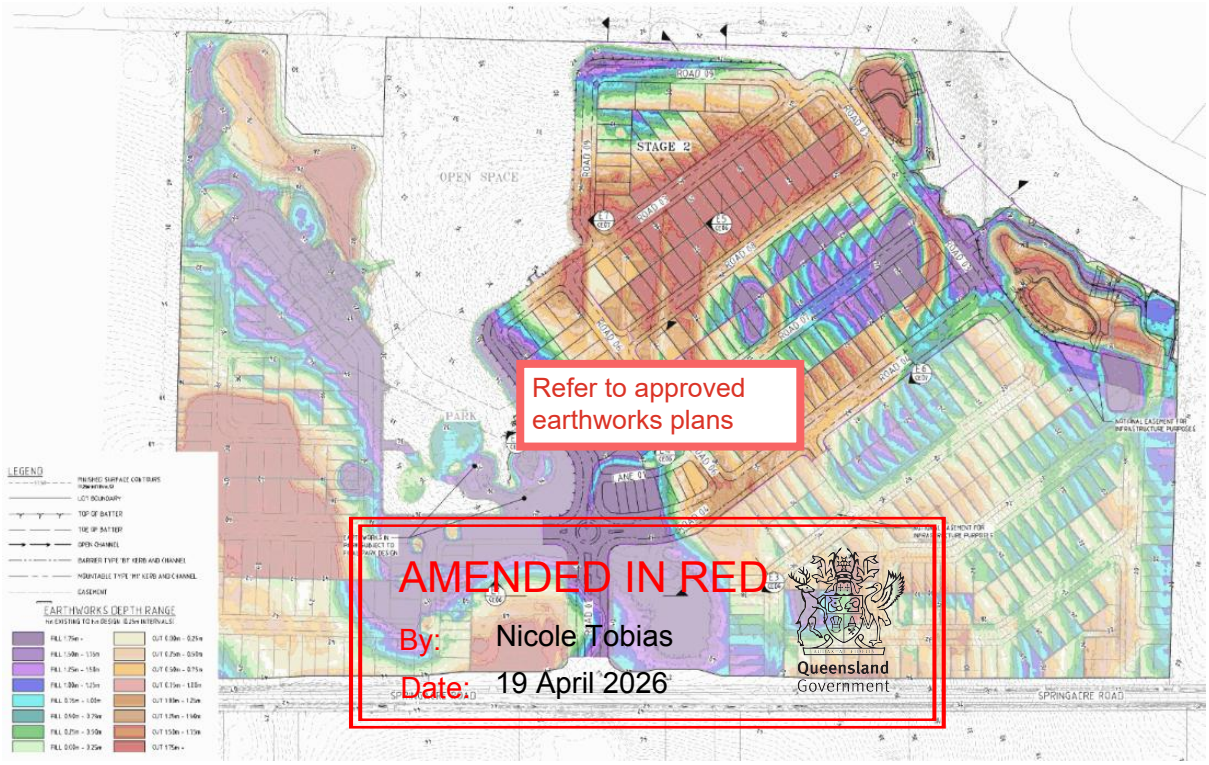


Figure 3-13 | Earthworks Plan

Where retaining walls are required within allotments, they are to have a desirable maximum height of 2.5 m. Noting the steep grade within the existing site, this may not be possible in all areas and the design shall seek to adopt an absolute maximum retaining wall height of 3.0 m. If walls are to be greater than 2.5m the walls will be terraced and landscape in accordance with RCC requirements. The 3m max walls will only be used at the rear of lot. It is proposed that all retaining structures are to be installed in accordance with AS 4678-2002. It is noted that structural design of retaining walls is to be undertaken by others.

Earthworks for the proposed development sites are to be constructed in accordance with AS3798-2007 – Guidelines on Earthworks for Commercial, and Residential Developments and Redland City Council requirements. Testing of fill will also be undertaken as part of the construction stage of the development. All fill shall be placed, compacted, and tested to a Level 1 standard as specified within the Australian standards.

3.6 Electrical, Streetlighting & Communications

An 11 kV High Voltage feeder lines exists along the Springacre Road frontage to the subject site, with several distribution transformers and Customer Energy Resources (CER). These can be seen in Figure 3-14.

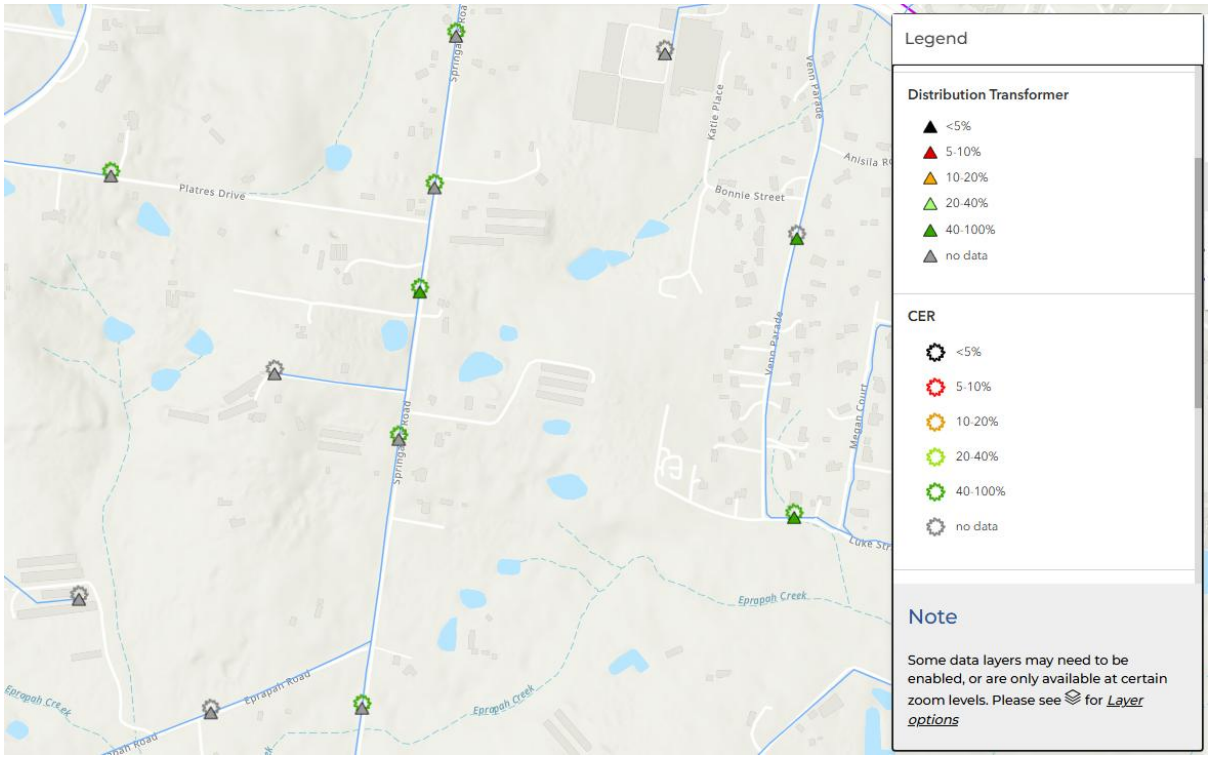


Figure 3-14 | Existing External HV Infrastructure

It is proposed that each allotment within the development shall be provided with an LV Service.

Internal streetlighting design shall be provided to all internal roads in accordance with Australian Standards and the requirements of the Redland City Council Planning Scheme.

Communications infrastructure shall also be provided to each allotment as part of the detailed design. This shall be subject to the approval of the relevant communications providers.

As part of the proposed development, once the site layout has been finalised, it is proposed to undertake a HV and LV assessment of the site to determine the minimum upgrade requirements externally.

- The internal HV Electrical Design shall nominate the location and staging requirements for all HV Infrastructure.
- The internal subdivision detailed LV and HV Design shall be prepared in accordance with Energex standards and guidelines.
- This information shall be documented and submitted to Energex for approval as part of the separate approval.

3.7 Erosion and Sediment Control

A comprehensive erosion and sediment control plan is to be prepared and submitted as part of the operational works application for this development. The erosion and sediment control plan is to be prepared in accordance with standards outlined by Redland City Council and the standards specified within the International Erosion Control of Australasia (IECA) Best Practices Erosion and Sediment Control (BPESC), November 2008. The erosion and sediment control plan will aim to mitigate potential erosion in the first instance and utilise end of line sedimentation devices. Recommendations for the ongoing monitoring and maintenance of sedimentation devices will also be included as part of the erosion and sediment control plan.

3.8 Asset Handover

It is the intention of the applicant that all engineering infrastructure which forms part of these developments is to be handed over to Redland City Council upon the completion of construction and acceptance “on maintenance”. This includes infrastructure such as:

- Stormwater
- Reticulated Water
- Sewerage
- Roads and Drainage
- Parks
- Conservation areas
- Bioretention/detention Basins
- Streetlights.

Electrical and communications assets shall be owned, operated and maintained by their respective approval authorities.

4. Conclusion

This engineering infrastructure report and associated documents appended demonstrate that the proposed development can be adequately serviced. The servicing strategy for all engineering features assessed within this report shall be further refined as part of future submissions.

The engineering infrastructure nominated within this report is consistent with the Southern Thornlands Interim Land Use Plan and does not inhibit the future development of the PDA.

The proposed development will require access to the following existing services and infrastructure from their associated providers:

- Sewerage Reticulation (Redland Water)
- Water Reticulation (Redland Water)
- Stormwater Quality and Quantity Treatment (Redland City Council)
- Internal and External Road Networks (Redland City Council)

The design methodology implemented as part of the detailed design phase shall be consistent with the EDQ Requirements, as well as other best practices engineering standards and guidelines.

It is proposed that the ownership of all infrastructure will be transferred to the appropriate service providers, as detailed above, upon completion of construction works.

Appendix A. MCU Approved Plans

EMPOWER

www.bmdgroup.global

Plot Date: 20/06/2025 1:18:10 PM
File Name: S:\12ds\data\MAN12DSYN01\B00702_2451\4 CIVIL-DRGS\4.2 CURRENT\MCU\B00702-MC-LUP

Springacre Rd
Georgina Ct
Hannah Cl
Emergency Link to Luke Street
Luke St
150m Eprapah Creek Offset
100m Eprapah Creek Offset
Eprapah Creek

LEGEND

- MIXED USE PRECINCT
- MIXED USE CENTRE (NEIGHBOURHOOD)
- INTEGRATED RESIDENTIAL PRECINCT
- OPEN SPACE, CONSERVATION AND WSUD
- NEIGHBOURHOOD RECREATION PARK
- SUB ARTERIAL ROAD
- NEIGHBOURHOOD CONNECTOR STREET
- CENTRE CONNECTOR STREET
- PRECINCT 1 BOUNDARY
- 150m EPRAPAH CREEK OFFSET
- EPRAPAH CREEK
- SEWER PUMP STATION

KEY PLAN
1:25,000 @ A1

PRECINCT 2
PDA EXTENTS (GREY HATCH)
PRECINCT 1

Aerial images shown on this drawing sourced from Nearmaps

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URBEX
PlacePlan
EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1
Title: LAND USE PLAN

Drawn	Design	Design Chk	Appd	Date	Project No.	Drawing No.	Rev
PDW	PDW	PI	PI	20/06/25	B00702	MC-LU01	A

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DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

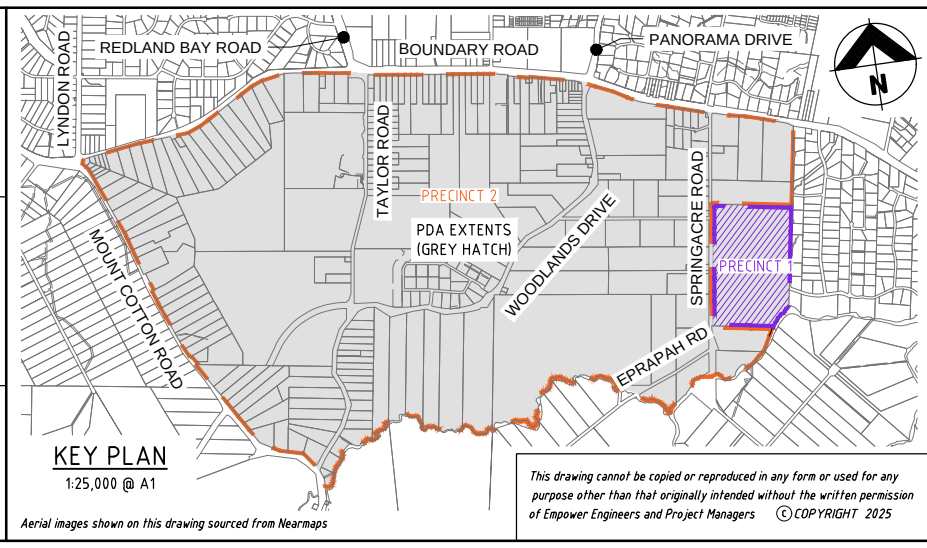
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Boundary Rd
Korsman Dr
Trundle Rd
Woodlands Dr
Jessie Cl
Springacre Rd
Katie Pl
Bonnie St
Georgina Ct
Venn Pde
Hannah Ct
Luke St
Platres Dr
Eprapah Rd
Eprapah Creek
Kingfisher Rd
150m Eprapah Creek Offset
100m Eprapah Creek Offset

Nazarene Theological College
Rural Residential & Low Density Residential
Redlands Retirement Village
Rural Living, Nursery & Flower Farm
Rural Living & Home Enterprise
Advance Nursery
Conservation

LEGEND

- PDA BOUNDARY (REFER KEY PLAN FOR EXTENTS)
- PRECINCT 1 BOUNDARY
- PRECINCT 2 AREA (REFER KEY PLAN FOR EXTENTS)
- ARTERIAL ROADS (STATE CONTROLLED)
- ARTERIAL ROADS
- SUB ARTERIAL ROADS
- FUTURE POTENTIAL CONNECTOR ROADS (INDICATIVE ONLY)
- PRECINCT 1 CONNECTOR ROADS
- 150 — 150m EPRAPAH CREEK OFFSET
- EPRAPAH CREEK



KEY PLAN
1:25,000 @ A1

Aerial images shown on this drawing sourced from Nearmaps

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URBEX
PlacePlan
EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1
Title: CONTEXT PLAN

Drawn	Design	Design Chk	Appd	Date	Project No.	Drawing No.	Rev
PDW	PDW	PI	PI	20/06/25	B00702	MC-CP01	A

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80 40 60 20
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DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

Appendix B. POD and RAL Drawings

Refer to Approved Plans

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

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AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

SPRINGACRE ROAD

STAGE 01

STAGE 02

Future Development

Approved Lot awaiting registration

Hannah Close

Notional easement for infrastructure purposes

BALANCE LOT 907 7.31ha

BALANCE LOT 909 11.54ha

BALANCE LOT 909

New Road 32.0m wide

New Road 18.0m wide

New Road 16.0m wide

New Road 13.0m wide

New Road 22.0m wide

New Road 19.0m wide

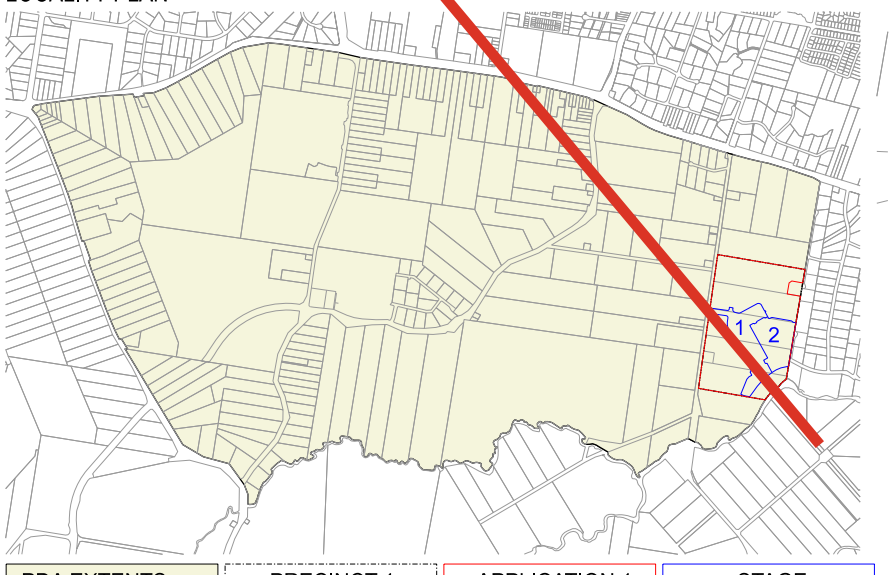
LAND USE BUDGET

LAND USE	LOTS	AREA
RESIDENTIAL	169	6.29 ha
INFRASTRUCTURE	1	0.08 ha
BIO RETENTION BASIN	2	1.54 ha
OPEN SPACE	3	0.74 ha
NEW ROAD	-	4.95 ha
BALANCE LOTS	3	26.57 ha
TOTAL	178	40.17 ha

LOT YIELD BY LOT TYPE

LOT TYPE	No.	No.%	DW	AREA	AREA%	AVERAGE
T	14	8.28%	14	7821m²	12.44%	559m²
CY	32	18.93%	32	12714m²	20.23%	397m²
PV	71	42.01%	71	26250m²	41.76%	370m²
V	30	17.75%	30	8921m²	14.19%	297m²
[illegible]	7	4.14%	23	3656m²	5.82%	522m²
TFL	6	3.55%	6	1382m²	2.20%	230m²
TRL	9	5.33%	9	2113m²	3.36%	235m²
TOTALS	169	100%	185	62858m²	100%	372m²

LOCALITY PLAN



LEGEND

- Application Boundary
- Stage Boundary
- Open Space
- Bioretention Basin
- Infrastructure
- Road

0 30 60 90 120 150m

Scale 1:3,000 at A3

North

Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO STP01-RaL1 (Sht 1 of 3)

DATE 10.12.2025

FILE REF STP01

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AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

LEGEND
- Application Boundary
- Stage Boundary
- Open Space
- Bioretention Basin
- Infrastructure
- Road

URBEX

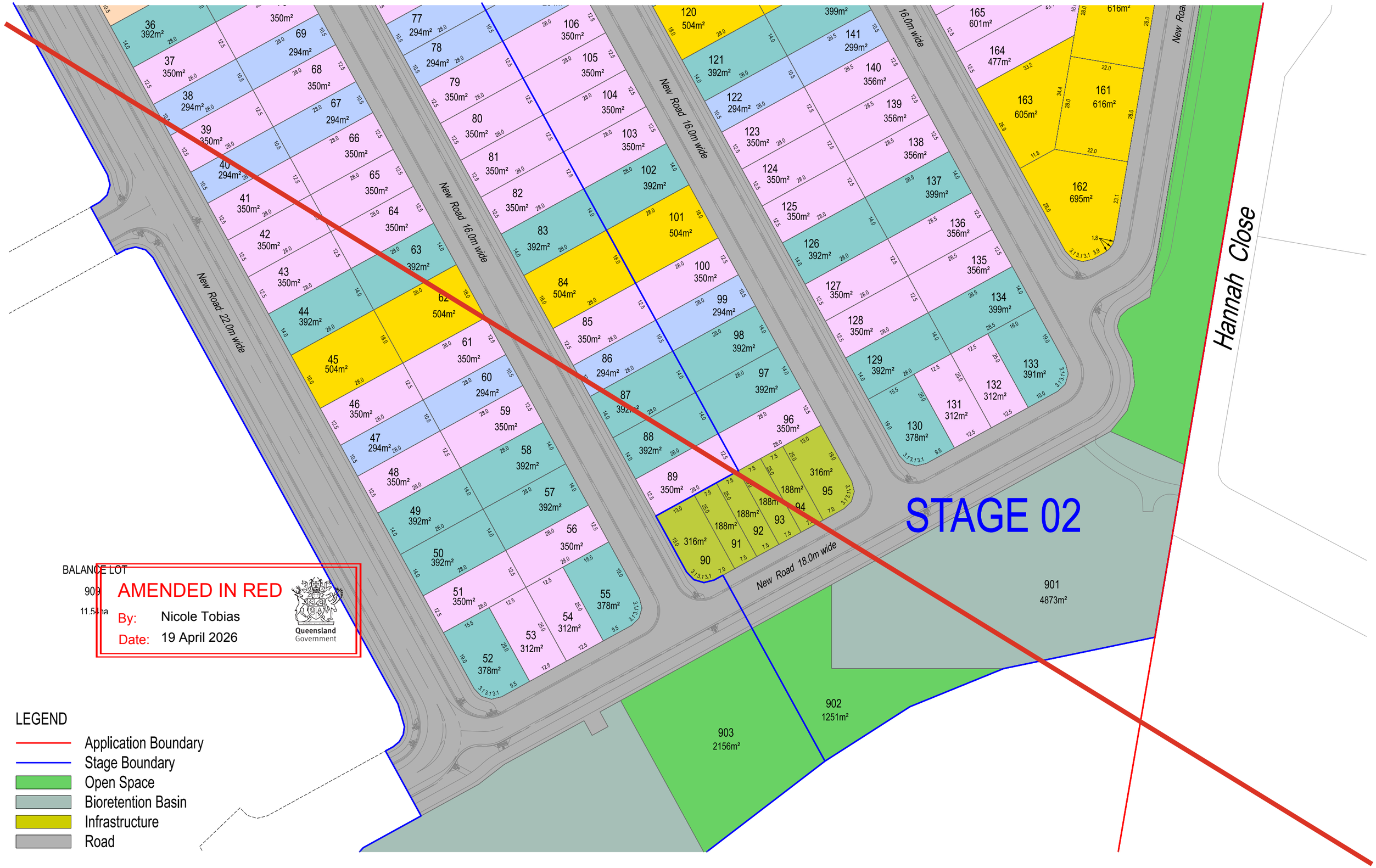
Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO	STP01-RaL1 (Sht 2 of 3)
DATE	10.12.2025
FILE REF	STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North



BALANCE LOT
909
11.54ha

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

LEGEND
- Application Boundary
- Stage Boundary
- Open Space
- Bioretention Basin
- Infrastructure
- Road

URBEX

Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO	STP01-RaL1 (Sht 3 of 3)
DATE	07.12.2025
FILE REF	STP01

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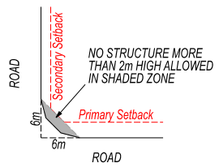
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North

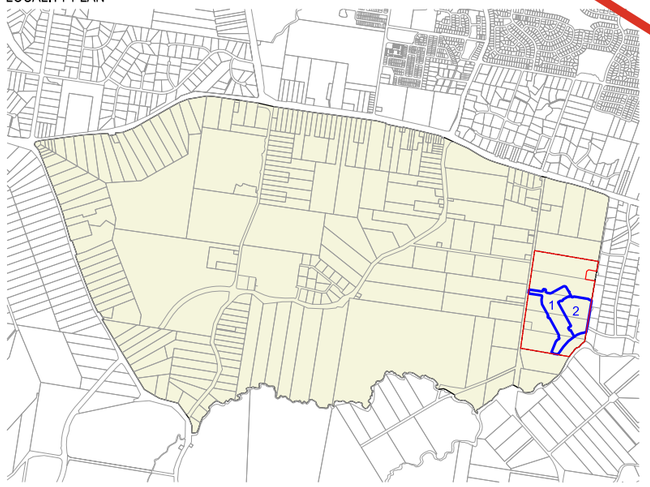
LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
- Mandatory Build to Boundary
- Indicative Driveway Location
- (3) Indicates maximum number of dwellings on multi-residential lots
- (S) Single Storey Dwellings only permitted
- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

CORNER ALLOTMENTS

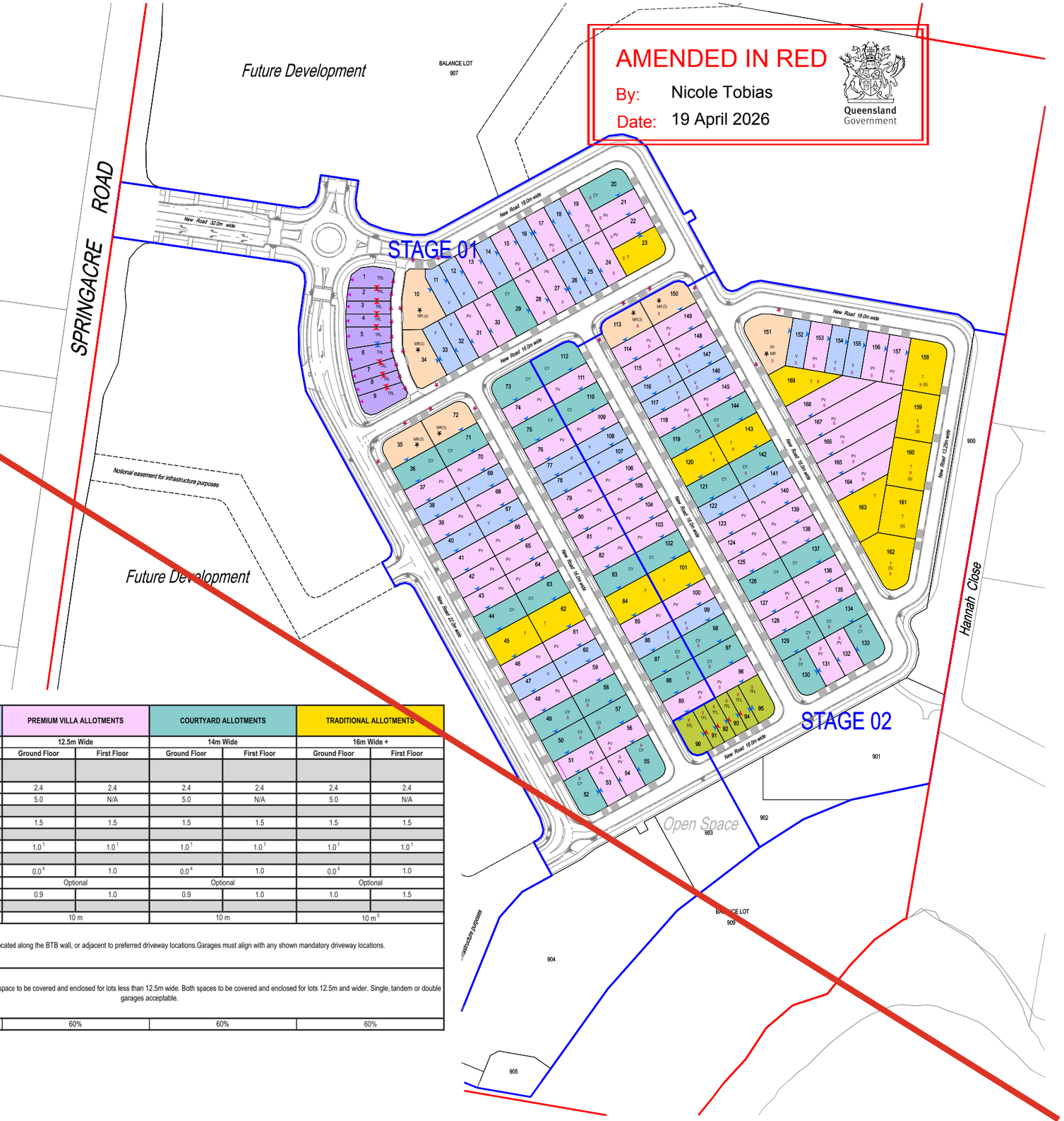


LOCALITY PLAN



PDA EXTENTS | PRECINCT 1 | APPLICATION 1 | STAGES

NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5



Plan of Development Table	FRONT-LOADED TERRACE ALLOTMENTS		REAR LOADED TERRACE ALLOTMENTS		MULTIPLE RESIDENTIAL		VILLA ALLOTMENTS		PREMIUM VILLA ALLOTMENTS		COURTYARD ALLOTMENTS		TRADITIONAL ALLOTMENTS	
	7.5m - 9m		7.5m - 9m Wide		VARIES		10.5m Wide		12.5m Wide		14m Wide		16m Wide +	
	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor
Primary Frontage Setback (metres)														
Front Wall	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Garage	5.0	N/A	N/A	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A
Corner Allotments (metres)														
Secondary Frontage (Road)	1.2	1.2	1.2	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Rear Setback (metres)														
Rear Setback	1.0[3]	1.0[3]	0.0	0.0	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]
Side - General Lots (metres)														
Build to Boundary	0.0	0.0	0.0	0.0	0.0[4]	1.0	0.0[4]	0.9	0.0[4]	1.0	0.0[4]	1.0	0.0[4]	1.0
	Mandatory[2]		Mandatory[2]		Optional		Optional		Optional		Optional		Optional	
Non Build to Boundary	0.9	0.9	0.9	0.9	1.5	1.5	0.9	1.0	0.9	1.0	0.9	1.0	1.0	1.5
Other Requirements														
Build to Boundary Length	80% of lot length		80% of lot length		10 m		10 m		10 m		10 m		10 m[5]	
Garage Location	Garages are to be located along one of the BTB walls, preferably on the low side.				Garages are to be located along the B~B wall where it is available. Additional garaging should align to preferred driveway locations.		Garages are preferred to be located along the BTB wall, or adjacent to preferred driveway locations.Garages must align with any shown mandatory driveway locations.							
On Site Parking Requirements (minimum)	1 space to be covered and enclosed. Single or tandem garages acceptable. Double garages are permitted on two storey dwellings only.		2 spaces, 1 space to be covered and enclosed. Garage to be located to laneway frontage unless noted on plan.		1 covered space per dwelling plus 0.5 addional spaces per dwelling		Minimum of two (2) car parking spaces on-site. 1 space to be covered and enclosed for lots less than 12.5m wide. Both spaces to be covered and enclosed for lots 12.5m and wider. Single, tandem or double garages acceptable.							
Site Cover (maximum)	75%		75%		75%		60%		60%		60%		60%	

1. Where adjoining a retaining wall >1.5m, the setback is 1.2m.
2. Except for ends of Terrace pack.
3. Where the rear of the lot adjoins a road or a park, the rear setback will be 1.5m.
4. Build to boundary length limited to 10m. Build to boundary length can be increased to 50% of the depth of the lot if such lengthening does not cause adverse impacts for winter solar access for adjacent lots.
5. Traditional lots with a primary frontage over 18m cannot Build to the Boundary.

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO STP01-POD1 (Sht 1 of 5)
DATE 10.12.2025
FILE REF STP01

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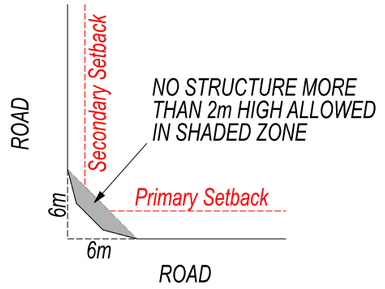
0 25 50 75 100 125 m
Scale 1:2,500 at A3

North

NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5

STAGE 01

CORNER ALLOTMENTS



LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
- Mandatory Build to Boundary
- Indicative Driveway Location
- (3) Indicates maximum number of dwellings on multi-residential lots
- (S) Single Storey Dwellings only permitted
- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

PRODUCT TYPE
16m Wide + (T)
14m Wide (CY)
12.5m Wide (PV)
10.5m Wide (V)
Multiple Residential (MR)
Front-loaded Terrace (TFL)
Rear-loaded Terrace (TRL)

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO	STP01-POD1 (Sht 2 of 5)
DATE	10.12.2025
FILE REF	STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

PRODUCT TYPE
16m Wide + (T)
14m Wide (CY)
12.5m Wide (PV)
10.5m Wide (V)
Multiple Residential (MR)
Front-loaded Terrace (TFL)
Rear-loaded Terrace (TRL)

LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
- Mandatory Build to Boundary
- Indicative Driveway Location
- (3) Indicates maximum number of dwellings on multi-residential lots
- (S) Single Storey Dwellings only permitted
- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

Hannah Close

STAGE 02

901

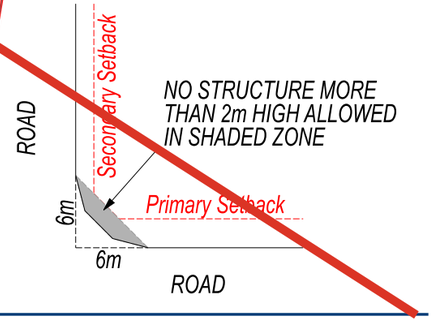
902

903

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

CORNER ALLOTMENTS



NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO	STP01-POD1 (Sht 3 of 5)
DATE	10.12.2025
FILE REF	STP01

Prepared by Place Plan for Urbex Pty Ltd
DISCLAIMER: This design and drawing is subject to Copyright and intellectual property laws and may not be reproduced for any purpose without the consent of Urbex Pty Ltd. This plan is indicative only, and specific uses, road alignment, boundaries, setbacks shown may vary due to detailed design consideration and relevant Authority approvals. c 2025

0 10 20 30 40 50m

Scale 1:1,000 at A3

North

1. General

1.1 All development is to be undertaken in accordance with the Development Approval, and Queensland Development Code (QDC), except as varied below.

1.2 The maximum height of buildings shall not exceed three (3) storeys or 10.5m above Natural Ground Level, except where noted on the POD. Lots marked with an (S) have a maximum building height of 1 storey or 6.0 m above natural grond level.

1.3 Maximum building location envelopes are subject to future proposed easements and/or other underground services.

1.4 Buildings shall be constructed in accordance with Bushfire AS3959. Refer to the BAL Rating advice relevant to the lot.

1.5 Secondary dwellings are not permitted on lots less than 400m².

1.6 Approved uses are Dwelling House, dual occupancy, display home, multiple dwelling, home-based business.

1.7 Advertising Devices, where associated with a display home/village and temporary in nature, are Exempt Development.

1.8 Where Mandatory Primary Frontage is required the dwelling must address the nominated frontage by incorporating an entry, portico / verandah, front door, windows, letter box, appropriate fencing and pedestrian entry facing this frontage.

2. Setbacks

2.1 Setbacks are as per the Plan of Development Table unless otherwise dimensioned. If a lot is not developed for a Multiple Residential (MR) site, then the equivalent size detached lot setbacks will apply.

2.2 The location of the built to boundary walls are indicated on the Plan of Development. Where built to boundary walls are not adopted, side setbacks shall be in accordance with the Plan of Development Table.

2.3.1 Boundary setbacks are measured to the Outermost Projection (OMP) of the structure.

2.3.2 Front verandah and covered areas to the front door are permitted to extend into the front setback on the condition that the roofed area is not enclosed. For front setbacks, this roofed area can extend to 1.0m from the front property line.

2.3.3 Eaves and window shades are permitted to extend into side and rear setbacks provided they do not encroach closer than 450mm to the lot boundary (other than where buildings are built to boundary).

2.4 Excluding Terrace product, the maximum length of a wall built on the BTB line shall not exceed 10 metres, unless it can be shown that a greater length will not adversely impact overshadowing of adjoining lots. Excluding Terraces, the maximum height of a wall built on the BTB line shall not exceed 4.0 m.

2.5 Where a retaining wall on the rear boundary is either terraced or a single face wall over 2.0m high, a 2.5m rear setback is required.

2.6 A corner lot, for the purposes of determining setbacks, is a lot that adjoins the intersection of two streets. For lots that abut a shared access driveway, laneway or a pedestrian link / landscape buffer, a secondary frontage setback does not apply. Buildings on corner lots are to be sited in accordance with the 'Special Siting Requirements for Corner Allotments'.

2.7 Setbacks on corner lots are determined by the frontage that the primary facade addresses. The primary facade is the frontage where the front door and letterbox are located, and requires Primary Frontage setbacks. Secondary frontage setbacks are required on the alternative frontage.

3. Private Open Space

3.1 Private open space must measure a minimum of 12m² with a minimum dimension in any direction of 2.4 metres. Private Open Space cannot include driveways and must have a minimum grade of less than 5%.

3.2 Private open space must be directly accessible from a living space.

4. On-site car parking and driveways

4.1 On-site car parking is to be provided in accordance the requirements setout in the Plan of Development table.

4.2 Driveways are to accord with Redland City Council's (RCC) standards. Prior to construction, approval from RCC for Vehicular Access to Residential Premises is required. Driveways within the verge must be built at the grade of the verge.

4.3 The maximum width of a driveway within the verge shall be 4.8 metres for a lot with a double car width garage and 3.0 metres for a lot with a single car width garage.

4.4 Double garages are permitted on terraces where they are accessed from the laneway.

4.5 Garages and carports accessed from a Laneway must be built setback 0.9 metres from the boundary unless otherwise dimensioned on the Plan of Development. Ingress/egress must be achieved for a B99 Vehicle.

4.6 Maximum of one driveway per dwelling.

4.7 Minimum distance of a driveway from an intersection of one street with another street is 6.0 metres. The Driveway must be laid at the grade of the adjacent verge area. No grade changes to the verge for the driveway will be allowed.

4.8 Where there is a footpath within the verge, the driveway prevails and the footpath should be cut at the nearest joint and the footpath reinstated to either side of the driveway without compromising the structural integrity of the footpath.

4.9 Driveways must be completed prior to occupation of the dwelling.

4.10 Driveways must be atleast 300mm from side property boundaries.

5. Onsite Parking lots 10 to 12.49m wide

5.1 Garages for any single storey dwelling on a Lot between 10.0m and 12.49m in width must adhere to the following design criteria:
a. The front facing building wall, which includes the garage door, must not exceed an external width of 5.7m
b. The garage door must have a sectional tilt or roller door and:
i. must not exceed 4.8m wide,
ii. must have a minimum 450mm eave above it, and
iii. must be setback a minimum of 240mm behind the pillar of the garage door
c. The front façade of the dwelling must be forward of the alignment of the garage wall, and must include a front entry door with glass inserts, sidelights, other street facing windows or a habitable room with a window. Additionally a front veranda, portico or porch must be located over the front entry and extend 1.6m forward of the front wall/door and include front piers with distinct materials and/or colours.
d. Driveways cannot exceed 3.0m across the verge on Lots between 10.0m and 12.49m wide.

5.2 Double car garages are permitted on any double storey dwelling built on a Lot between 10.0m and 12.49m.

6. Fencing

6.1 Fencing erected by developer must not be altered, modified or removed without their prior written approval.

6.2 Fencing on all park or street frontages has a maximum height of 1.2 metres where solid or have a maximum height of 1.8 metres where containing openings that make the fence more than 50% transparent.

6.3 Fencing on lanes can be screen fencing at 1.8m high where along private open space, carparking and service areas.

6.4 Fencing on corner lots is to be designed as front fences addressing both streets (rather than a front and a side fence).

6.5 Where fencing is not proposed in front of the house, all side fencing must return to the house a minimum of 1.0 metre behind the front facade, unless a side fence is required for safety above a retaining wall.

6.6 If elevated construction is to be used, under floor services must be located or screened from adjoining properties and public spaces.

7. Retaining Walls

7.1 For retaining walls **not** constructed by the developer:
a. Retaining walls must not exceed more than 1.0m where fronted to a public street or park. Retaining walls to side and rear boundaries (which are not visible from a public street or park) can be up to 2.0m. Retaining in excess of 2.5m in height must be terraced.
b. Where retaining walls are terraced, the lower face is to be a maximum of 1.0m from the property boundary.

7.2 No timber retaining walls over 1.0m high or where visible from any public street or park.

7.3 Retaining walls 1.0m or higher require RPEQ certification.

8. Building Articulation

8.1 All buildings with a width of more than 10 metres that are visible from a street or park are to include articulation to reduce the mass of the building by one or more of the following:
- Balconies, porches or verandahs;
- Articulation of roof lines and walls

8.2 Where adjoining an area of open space, housing design must facilitate passive surveillance of the open space, through the incorporation of at least one (1) habitable room orientated towards the open space.

8.3 Carports and garages are to be compatible with the main building design in terms of height, roof form, detailing, materials and colours.

8.4 Air-conditioners, gas bottles, hot water systems, clothes lines, sheds, satellite dishes, water tanks and other household services must be screened and/or located to minimise visual impact to public streets or parks (solar panels and hot water system panels (not tanks) can be sited to optimise orientation).

8.5 Homes must include a clearly identifiable and addressed front door and undercover point of entry.

8.6 Screened drying areas and rubbish bins area must be behind the main face of the dwelling.

9. Slope and Building Footings

9.1 Buildings on sloping sites built to the boundary on the low side of the lot must project the footing deep enough to be below the adjoining property building pad level. If the pad level is not nominated the pad level is assumed to be the average of the four corners of the adjoining property using as constructed levels.

9.2 Building footings are to be designed in accordance with the appropriate Australian Standard. Building footings are to be designed to ensure that there are no adverse impacts (functional, financial or construction limitations) on adjoining allotments, particularly in relation to retaining walls.

10. Electric Vehicle Readiness

10.1 All dwellings are to have a dedicated electrical circuit from the circuit board to the garage for at least one basic (slow) EVSE charger per home, in accordance with the Australian Wiring Rules AS/NZS 3000: 2018.
The circuit is to be fitted with a minimum 20 Amp GPO outlet which can be replaced by a dedicated 7kW EVSE of the occupant's choice. Where not used for Electric Vehicle Supply Equipment, the circuit is to be terminated at an isolator.

11. Additional Criteria for Multiple Residential Allotments

11.1 Buildings must address all street frontages with driveways, pedestrian entries or both.

11.2 All dwellings must have a clearly identifiable front door, which is undercover.

11.3 Drying and rubbish bin areas must be located behind the main face of the dwelling or suitably screened from public streets and park frontages.

11.4 Maximum number of dwellings on each multiple residential lot is annotated on the Plan of Development.

12. Additional Criteria for Secondary Dwellings

12.1 Floor area must be between a minimum of 40m² and 75m².

12.2 Materials, detailing, colours and roof form are consistent with those of the primary house.

12.3 Outdoor living space must measure a minimum of 9m² with a minimum dimension in any direction of 3 metres.

12.4 Outdoor living space must be directly accessible from the main living space and can be combined with the primary dwelling outdoor space.

12.5 Outdoor living space on a corner allotment must be suitably screened if located within the secondary street boundary setback.

12.6 A minimum of one (5m x 3m) car parking space must be provided for the secondary dwelling, in addition to parking for the primary dwelling.

12.7 The driveway must be shared with the primary house, however on corner allotments a separate driveway may be provided with a minimum width of 3 metres and a maximum width of 4.8 metres.

12.8 Corner allotments must provide dedicated pedestrian entry and a visible door from and addressing the secondary street to the secondary dwelling.

12.9 Corner allotments must provide a minimum of one habitable room, with large windows or balconies, fronting the secondary street.

13. Definitions

13.1 Laneway Allotment - Allotments serviced by a laneway, typically rear loaded Terrace Allotments.

13.2 Site Cover - Site cover, of development, means the portion of the site, expressed as a percentage, that will be covered by a building or structure, measured to its outermost projection, after the development is carried out, other than a building or structure, or part of a building or structure, that is -
a. in a landscaped or open space area, including, for example, a gazebo or shade structure; or
b. a basement completely below ground level and used for car parking; or
c. the eaves of a building; or a sun shade.

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026
Queensland Government

URBEX

Southern Thornlands Precinct 1
Development Controls - Application 1

DRAWING NO STP01-POD1 (Sht 4 of 5)
DATE 10.12.2025
FILE REF STP01

Prepared by Place Plan for Urbex Pty Ltd
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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

Plan of Development Table	FRONT-LOADED TERRACE ALLOTMENTS		REAR LOADED TERRACE ALLOTMENTS		MULTIPLE RESIDENTIAL		VILLA ALLOTMENTS		PREMIUM VILLA ALLOTMENTS		COURTYARD ALLOTMENTS		TRADITIONAL ALLOTMENTS	
	7.5m - 9m		7.5m - 9m Wide		VARIES		10.5m Wide		12.5m Wide		14m Wide		16m Wide +	
	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor
Primary Frontage Setback (metres)														
Front Wall	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Garage	5.0	N/A	N/A	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A
Corner Allotments (metres)														
Secondary Frontage (Road)	1.2	1.2	1.2	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Rear Setback (metres)														
Rear Setback	1.0[3]	1.0[3]	0.0	0.0	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]
Side - General Lots (metres)														
Build to Boundary	0.0	0.0	0.0	0.0	0.0[4]	1.0	0.0[4]	0.9	0.0[4]	1.0	0.0[4]	1.0	0.0[4]	1.0
	Mandatory[2]		Mandatory[2]		Optional		Optional		Optional		Optional		Optional	
Non Build to Boundary	0.9	0.9	0.9	0.9	1.5	1.5	0.9	1.0	0.9	1.0	0.9	1.0	1.0	1.5
Other Requirements														
Build to Boundary Length	80% of lot length		80% of lot length		10 m		10 m		10 m		10 m		10 m[5]	
Garage Location	Garages are to be located along one of the BTB walls, preferably on the low side.				Garages are to be located along the BTB wall where it is available. Additional garaging should align to preferred driveway locations.		Garages are preferred to be located along the BTB wall, or adjacent to preferred driveway locations.Garages must align with any shown mandatory driveway locations.							
On Site Parking Requirements (minimum)	1 space to be covered and enclosed. Single or tandem garages acceptable. Double garages are permitted on two storey dwellings only.		2 spaces, 1 space to be covered and enclosed. Garage to be located to laneway frontage unless noted on plan.		1 covered space per dwelling plus 0.5 additional spaces per dwelling		Minimum of two (2) car parking spaces on-site. 1 space to be covered and enclosed for lots less than 12.5m wide. Both spaces to be covered and enclosed for lots 12.5m and wider. Single, tandem or double garages acceptable.							
Site Cover (maximum)	75%		75%		75%		60%		60%		60%		60%	

1. Where adjoining a retaining wall >1.5m, the setback is 1.2m.
2. Except for ends of Terrace pack.
3. Where the rear of the lot adjoins a road or a park, the rear setback will be 1.5m.
4. Build to boundary length limited to 10m. Build to boundary length can be increased to 50% of the depth of the lot if such lengthening does not cause adverse impacts for winter solar access for adjacent lots.
5. Traditional lots with a primary frontage over 18m cannot Build to the Boundary.

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026
Queensland Government

URBEX

Southern Thornlands Precinct 1
Development Controls - Application 1

DRAWING NO STP01-POD1 (Sht 5 of 5)
DATE 10.12.2025
FILE REF STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

Appendix C. Engineering Plans

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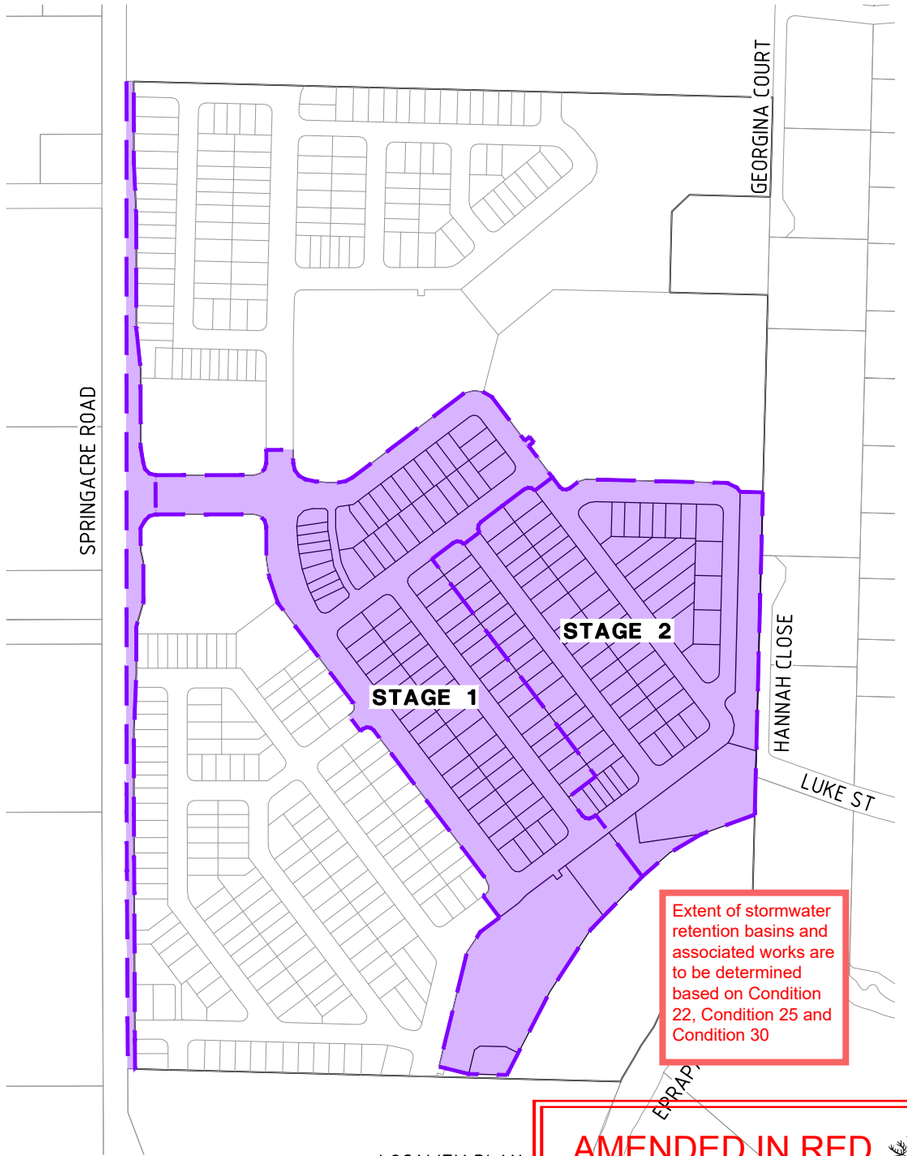
URBEX PTY LTD

SPRINGACRE RD, THORNLANDS, QLD, 4164

SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL APPLICATION



KEY PLAN
SCALE 1:25000 (A1)



LOCALITY PLAN
SCALE 1:2500 (A1)

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

DRAWING INDEX

SHEET NUMBER	REVISION	SHEET TITLE
GENERAL ARRANGEMENT		
B00702-DA-CG01	A	TITLE SHEET, LOCALITY PLAN AND DRAWING INDEX
B00702-DA-CG02	A	STAGING PLAN
B00702-DA-CG03	A	GENERAL ARRANGEMENT PLAN - SHEET 1 OF 2
B00702-DA-CG04	A	GENERAL ARRANGEMENT PLAN - SHEET 2 OF 2
B00702-DA-CG05	A	TYPICAL DETAILS
EXISTING FEATURES		
B00702-DA-EF01	A	EXISTING FEATURES LAYOUT PLAN
EARTHWORKS MANAGEMENT		
B00702-DA-CE01	A	OVERALL EARTHWORKS LAYOUT PLAN
B00702-DA-CE02	A	EARTHWORKS DETAILED LAYOUT PLAN - SHEET 1 OF 4
B00702-DA-CE03	A	EARTHWORKS DETAILED LAYOUT PLAN - SHEET 2 OF 4
B00702-DA-CE04	A	EARTHWORKS DETAILED LAYOUT PLAN - SHEET 3 OF 4
B00702-DA-CE05	A	EARTHWORKS DETAILED LAYOUT PLAN - SHEET 4 OF 4
B00702-DA-CE06	A	EARTHWORKS - CROSS SECTIONS - SHEET 1 OF 2
B00702-DA-CE07	A	EARTHWORKS - CROSS SECTIONS - SHEET 2 OF 2
B00702-DA-RW01	A	RETAINING WALL - TYPICAL DETAILS - SHEET 1 OF 2
B00702-DA-RW02	A	RETAINING WALL - TYPICAL DETAILS - SHEET 2 OF 2
ROADWORKS		
B00702-DA-CR01	A	ROAD NETWORK LAYOUT
B00702-DA-CR02	A	ROAD NETWORK SECTIONS
B00702-DA-CR03	A	ROAD AND DRAINAGE PLAN - SHEET 1 OF 2
B00702-DA-CR04	A	ROAD AND DRAINAGE PLAN - SHEET 2 OF 2
B00702-DA-CR06	A	ENTRY ROAD INTERSECTION DETAIL
B00702-DA-CR07	A	ENTRY ROAD SECTIONS
B00702-DA-CR08	A	ROAD LONGITUDINAL SECTION - SHEET 1 OF 6
B00702-DA-CR09	A	ROAD LONGITUDINAL SECTION - SHEET 2 OF 6
B00702-DA-CR10	A	ROAD LONGITUDINAL SECTION - SHEET 3 OF 6
B00702-DA-CR11	A	ROAD LONGITUDINAL SECTION - SHEET 4 OF 6
B00702-DA-CR12	A	ROAD LONGITUDINAL SECTION - SHEET 5 OF 6
B00702-DA-CR13	A	ROAD LONGITUDINAL SECTION - SHEET 6 OF 6
STORMWATER DRAINAGE		
B00702-DA-SW01	A	PRE DEVELOPMENT CATCHMENT PLAN
B00702-DA-SW02	A	POST DEVELOPMENT CATCHMENT PLAN
B00702-DA-SW03	A	STORMWATER QUALITY CATCHMENT PLAN
BIORETENTION DETAILS		
B00702-DA-CB01	A	BIORETENTION BASIN A2 AND A3 LAYOUT PLAN
B00702-DA-CB02	A	BIORETENTION BASIN A2 AND A3 CROSS SECTIONS
B00702-DA-CB03	A	BIORETENTION BASIN B2 LAYOUT PLAN
B00702-DA-CB04	A	BIORETENTION BASIN B2 CROSS SECTIONS
TURN TEMPLATE		
B00702-DA-CT01	A	TURNING TEMPLATE - DESIGN VEHICLE 14.5M BUS - SHEET 1 OF 4
B00702-DA-CT02	A	TURNING TEMPLATE - DESIGN VEHICLE 14.5M BUS - SHEET 2 OF 4
B00702-DA-CT03	A	TURNING TEMPLATE - DESIGN VEHICLE 14.5M BUS - SHEET 3 OF 4
B00702-DA-CT04	A	TURNING TEMPLATE - DESIGN VEHICLE 14.5M BUS - SHEET 4 OF 4
B00702-DA-CT05	A	TURNING TEMPLATE - CHECK VEHICLE 19M SEMI TRUCK - SHEET 1 OF 2
B00702-DA-CT06	A	TURNING TEMPLATE - CHECK VEHICLE 19M SEMI TRUCK - SHEET 2 OF 2
B00702-DA-CT07	A	TURNING TEMPLATE - SERVICE VEHICLE 10.3M TRUCK - SHEET 1 OF 4
B00702-DA-CT08	A	TURNING TEMPLATE - SERVICE VEHICLE 10.3M TRUCK - SHEET 2 OF 4
B00702-DA-CT09	A	TURNING TEMPLATE - SERVICE VEHICLE 10.3M TRUCK - SHEET 3 OF 4
B00702-DA-CT10	A	TURNING TEMPLATE - SERVICE VEHICLE 10.3M TRUCK - SHEET 4 OF 4
B00702-DA-CT11	A	TURNING TEMPLATE - DESIGN VEHICLE 5.2M CAR
SEWERAGE RETICULATION		
B00702-DA-CS01	A	CONCEPT SEWER RETICULATION PLAN - SHEET 1 OF 2
B00702-DA-CS02	A	CONCEPT SEWER RETICULATION PLAN - SHEET 2 OF 2
WATER RETICULATION		
B00702-DA-CW01	A	CONCEPT WATER RETICULATION PLAN - SHEET 1 OF 2
B00702-DA-CW02	A	CONCEPT WATER RETICULATION PLAN - SHEET 2 OF 2
COMBINED SERVICES		
B00702-DA-CM01	A	COMBINED SERVICES PLAN - SHEET 1 OF 2
B00702-DA-CM02	A	COMBINED SERVICES PLAN - SHEET 2 OF 2
B00702-DA-CM03	A	COMBINED SERVICES PLAN - TYPICAL DETAILS

NOTE:
INDICATIVE STAGING ORDER SHOWN. ORDER MAY CHANGE DEPENDING ON TIMING OF EXTERNAL INFRASTRUCTURE REQUIREMENTS.

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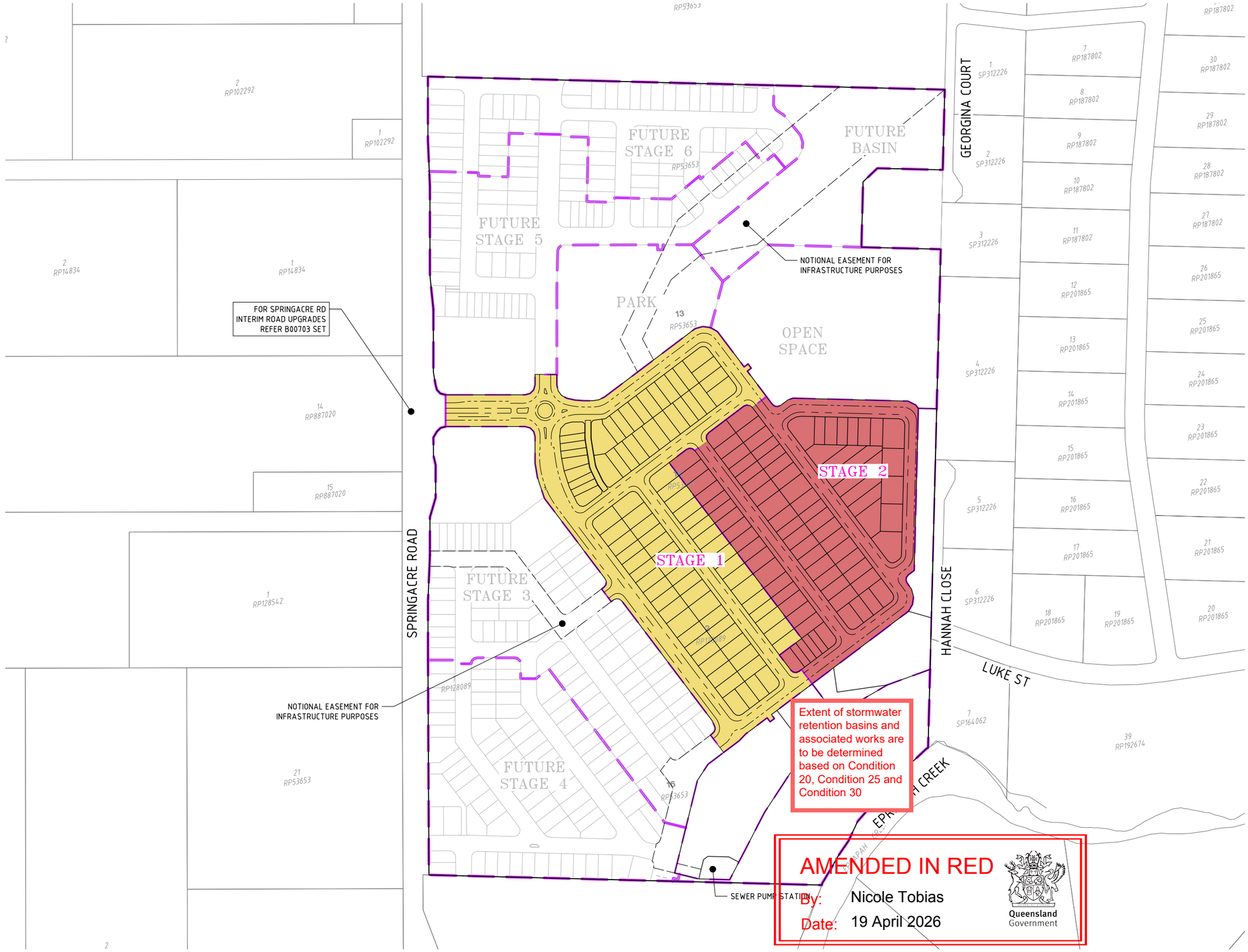
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Project No. B00702
Drawing No. DA-CG01
Rev A

REVISION: A DATE: 12/12/25

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TOTAL LOTS	
STAGE 1	90
STAGE 2	79
TOTAL	169

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX EMPOWER

Client URBEX PTY LTD
Project SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title STAGING PLAN

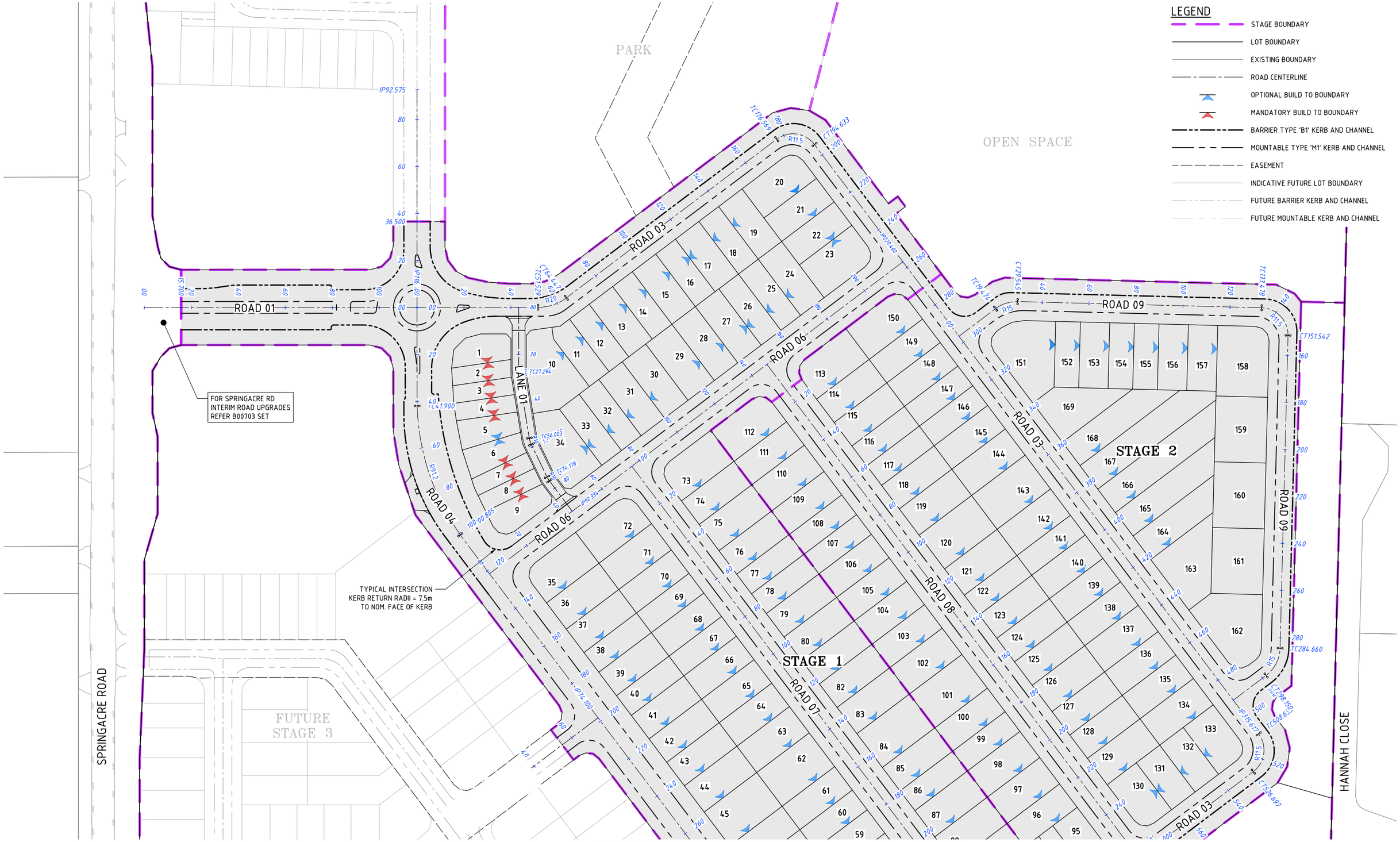
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No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Peter Ingerman
Registered Engineer
Date " "
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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: GENERAL ARRANGEMENT PLAN SHEET 1 OF 2

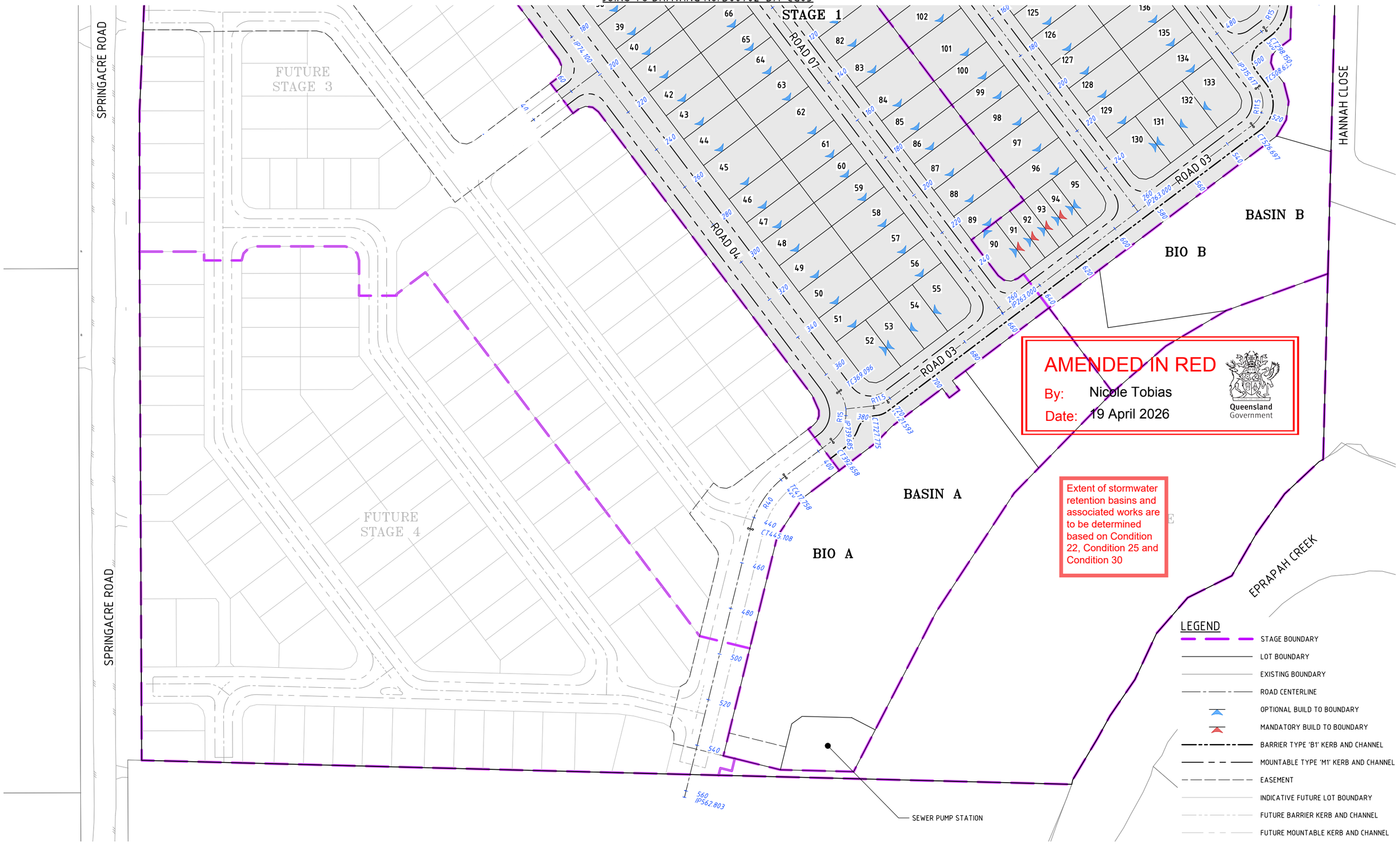
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JOINS TO DRAWING No. B00702-DA-CG03



No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: GENERAL ARRANGEMENT PLAN
SHEET 2 OF 2

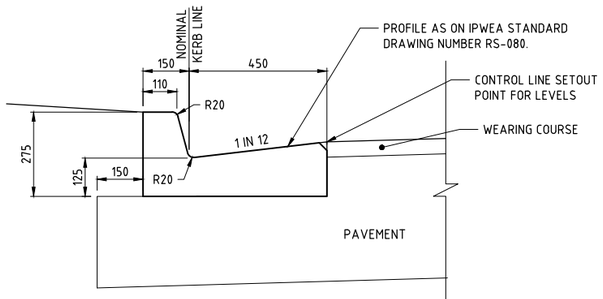
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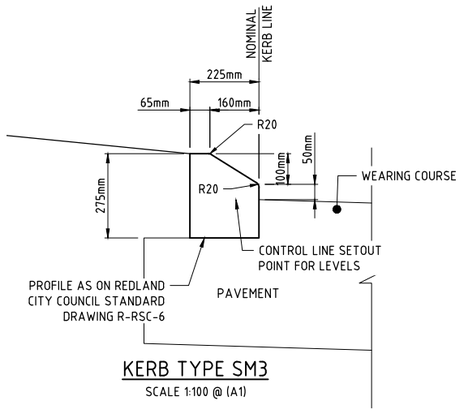
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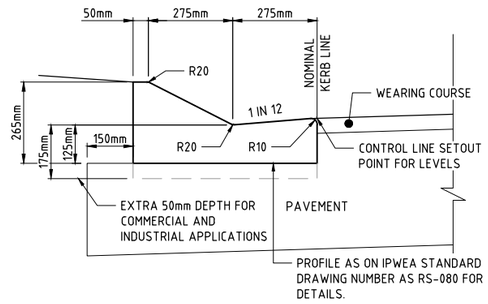
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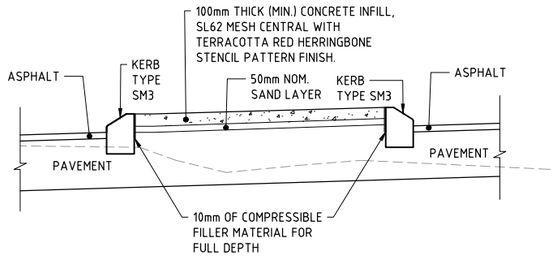
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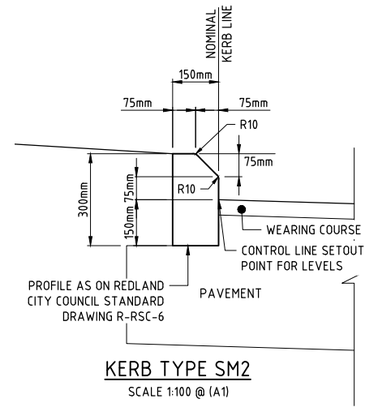
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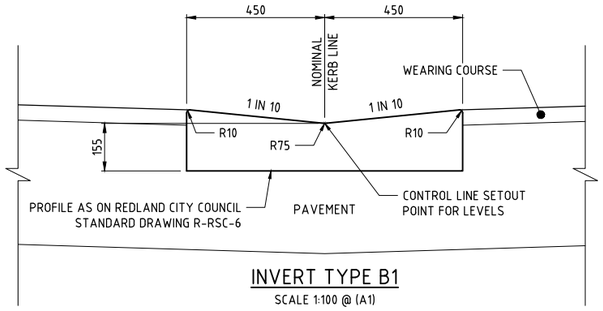
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No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Date " "
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Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: TYPICAL DETAILS

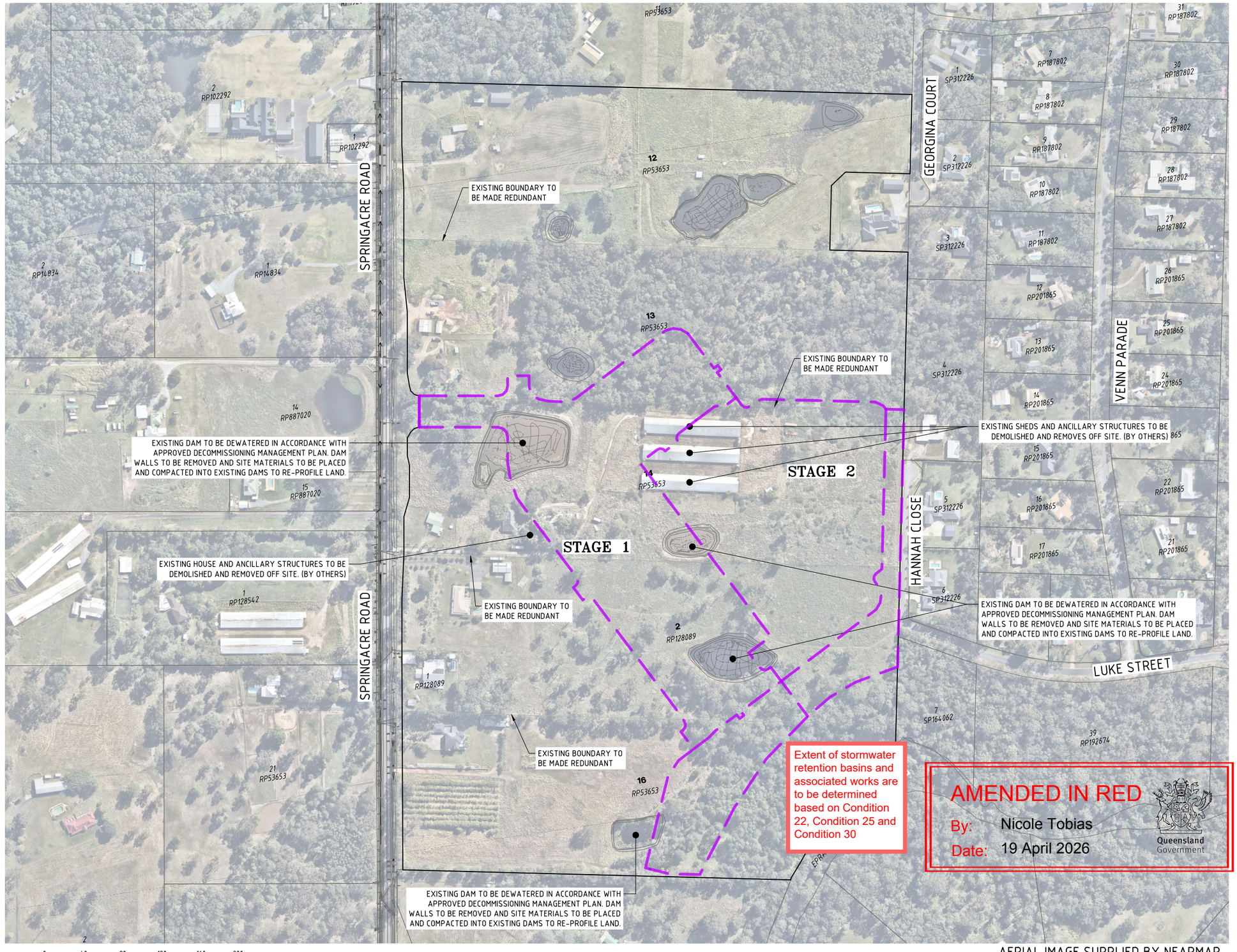
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Project No. B00702
Drawing No. DA-CG05
Rev A

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LEGEND

- STAGE BOUNDARY
- EXISTING BOUNDARY
- REDUNDANT BOUNDARY
- PRECINCT 1 BOUNDARY

AERIAL IMAGE SUPPLIED BY NEARMAP

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

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Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: EXISTING FEATURES LAYOUT PLAN

Datum: AHD PSM 79006 RL 67.474 (RCC) COORD

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Project No. B00702 | Drawing No. DA-EF01 | Rev A

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Plot Date: 12/12/2025 12:26:28 PM
File Name: S:\12Jobs\Data\MAIN2DS\TN01\B00702_2ASTLC CIVIL_ORIGS\4.2 CURRENT\DA\B00702-DA-EXF
User: WILLIAM GRIFFITH

Refer to approved bulk earthworks plan

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

ROAD 09
ROAD 02
STAGE 2
ROAD 03
ROAD 08
ROAD 07
ROAD 04
STAGE 1
ROAD 06
ROAD 05
LANE 01
ROAD 01
PARK
OPEN SPACE

E1 CE06
E2 CE06
E3 CE06
E4 CE06
E5 CE06
E6 CE07
E7 CE07

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

EARTHWORKS IN PARK SUBJECT TO FINAL PARK DESIGN

SPRINGACRE ROAD

LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS)
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- OPEN CHANNEL
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EASEMENT

EARTHWORKS DEPTH RANGE

tin EXISTING TO tin DESIGN (0.25m INTERVALS)

FILL 1.75m +	CUT 0.00m - 0.25m
FILL 1.50m - 1.75m	CUT 0.25m - 0.50m
FILL 1.25m - 1.50m	CUT 0.50m - 0.75m
FILL 1.00m - 1.25m	CUT 0.75m - 1.00m
FILL 0.75m - 1.00m	CUT 1.00m - 1.25m
FILL 0.50m - 0.75m	CUT 1.25m - 1.50m
FILL 0.25m - 0.50m	CUT 1.50m - 1.75m
FILL 0.00m - 0.25m	CUT 1.75m +

0 25 50 75 100 125m
25 18.75 12.5 6.25

SCALE 1:1250 (A1) 1:2500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PBW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: EARTHWORKS OVERALL LAYOUT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702-DA-CE01
Drawing No.
Rev A

" "

Plot Date: 09/12/2025 1:54:26 PM
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User: WILLIAM.GRIFFITH

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

No bulk earthworks outside of precinct 1 stage 1 and 2. Refer to approved bulk earthworks plan

FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

SPRINGACRE ROAD

ROAD 01

ROAD 03

ROAD 04

ROAD 06

LANE 01

LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS) — 57.50
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- RETAINING WALL
- OPEN CHANNEL
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EASEMENT
- CUT FILL LABEL — 29.945 / +0.828
- PAD RL LABEL — PAD RL 30.300
- PROPOSED AREAS OF FILL
- PROPOSED AREAS OF CUT
- RETAINING WALL 0.0m-1.5m
- RETAINING WALL 1.5m-2.0m
- RETAINING WALL 2.0m-2.5m
- SANDSTONE BOULDER RETAINING WALL

NOTE:
ALL PRECINCT 1 EARTHWORKS SHOWN. STAGE 1 AND 2 WORKS PROPOSED WITH TEMPORARY EARTHWORKS TO TIE INTO EXISTING AS DETERMINED AT THE DETAIL DESIGN PHASE OF THE PROJECT

JOINS DRAWING NUMBER B00702-DA-CE04

JOINS DRAWING NUMBER B00702-DA-CE03

0 10 20 30 40 50m
10 7.5 5 2.5

SCALE 1:500 (A1) 1:1000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: EARTHWORKS DETAILED LAYOUT PLAN SHEET 1 OF 4

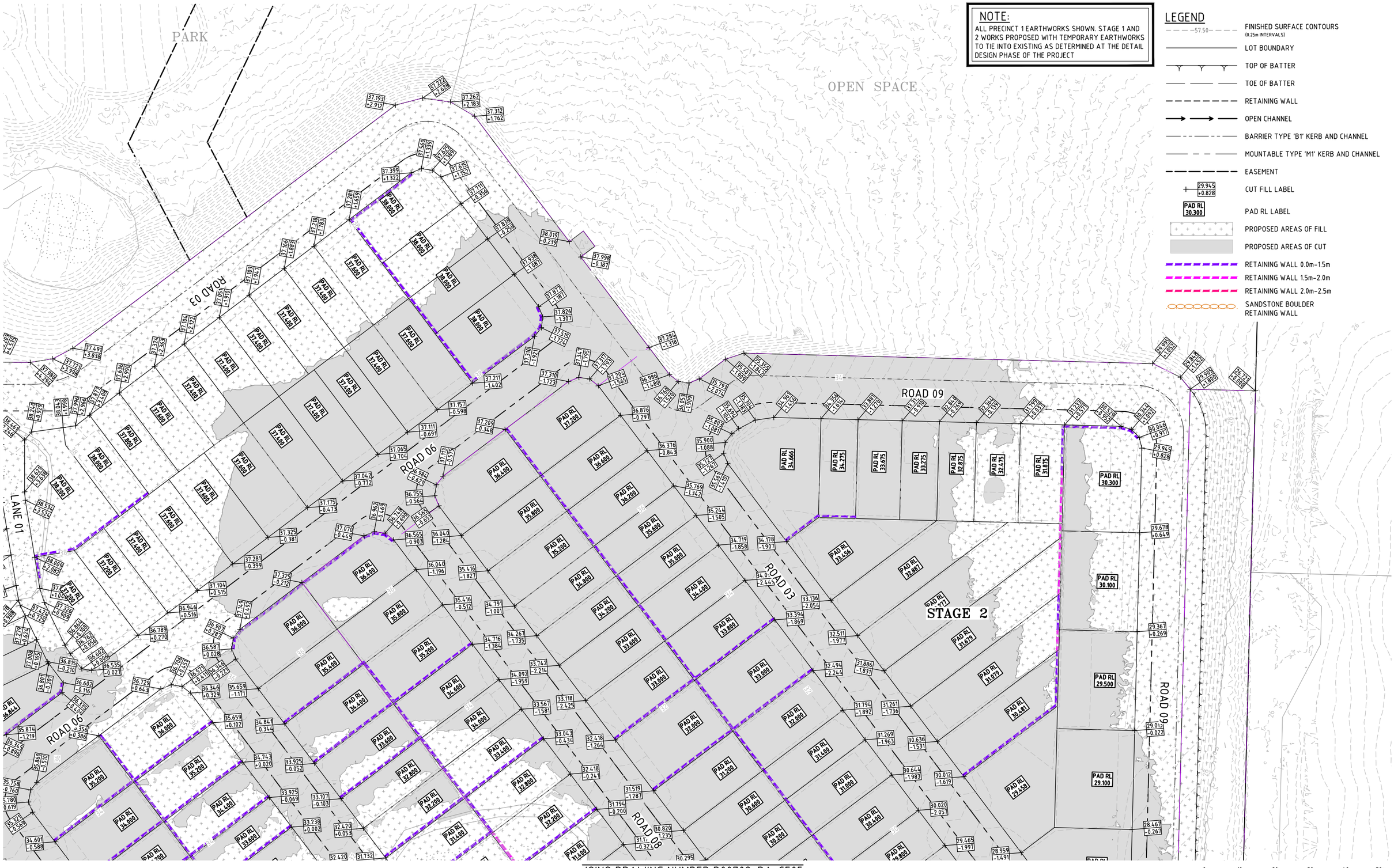
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PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-CE02 | Rev A

" "

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User: WILLIAM GRIFFITH



NOTE:
ALL PRECINCT 1 EARTHWORKS SHOWN. STAGE 1 AND 2 WORKS PROPOSED WITH TEMPORARY EARTHWORKS TO TIE INTO EXISTING AS DETERMINED AT THE DETAIL DESIGN PHASE OF THE PROJECT

LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS)
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- RETAINING WALL
- OPEN CHANNEL
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EASEMENT
- CUT FILL LABEL
- PAD RL LABEL
- PROPOSED AREAS OF FILL
- PROPOSED AREAS OF CUT
- RETAINING WALL 0.0m-1.5m
- RETAINING WALL 1.5m-2.0m
- RETAINING WALL 2.0m-2.5m
- SANDSTONE BOULDER RETAINING WALL

SCALE 1:500 (A1) 1:1000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: EARTHWORKS DETAILED LAYOUT PLAN SHEET 2 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-CE03 | Rev A

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User: WILLIAM GRIFFITH

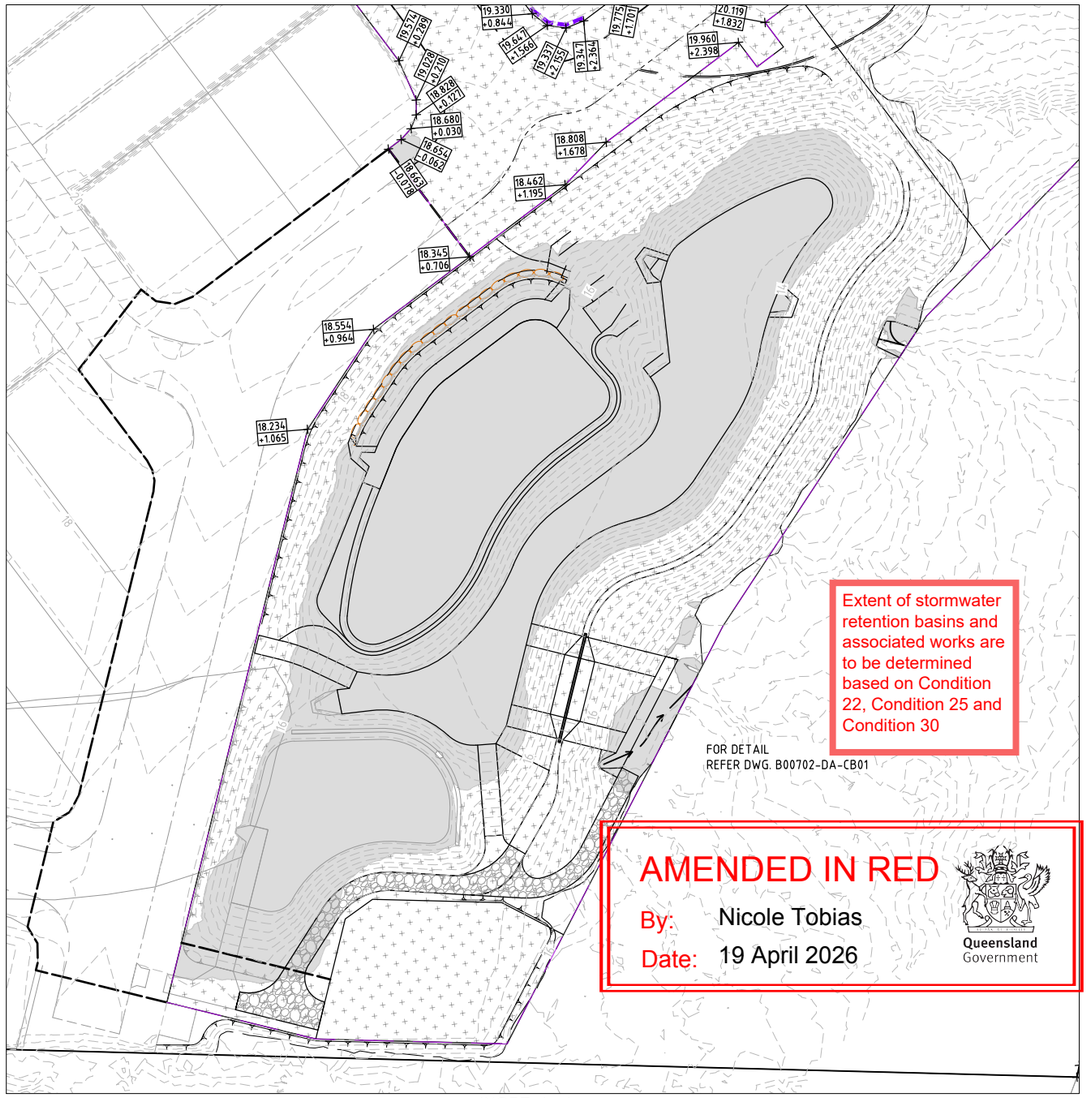
LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS) — 57.50
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- RETAINING WALL
- OPEN CHANNEL
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EASEMENT
- CUT FILL LABEL — 29.945 / +0.828
- PAD RL LABEL — PAD RL 30.300

NOTE:
ALL PRECINCT 1 EARTHWORKS SHOWN. STAGE 1 AND 2 WORKS PROPOSED WITH TEMPORARY EARTHWORKS TO TIE INTO EXISTING AS DETERMINED AT THE DETAIL DESIGN PHASE OF THE PROJECT

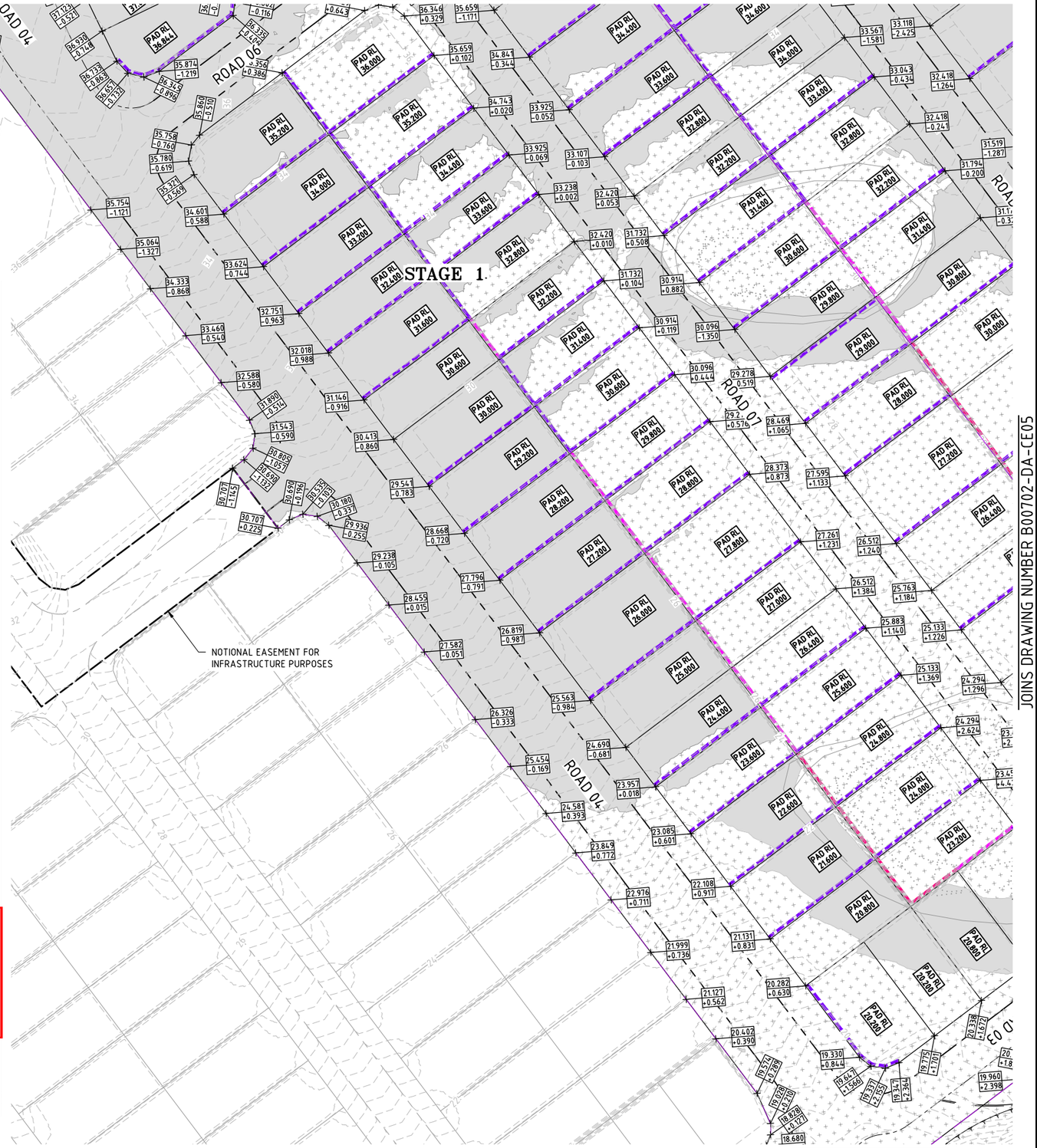
- PROPOSED AREAS OF FILL
- PROPOSED AREAS OF CUT
- RETAINING WALL 0.0m-1.5m
- RETAINING WALL 1.5m-2.0m
- RETAINING WALL 2.0m-2.5m
- SANDSTONE BOULDER RETAINING WALL

JOINS DRAWING NUMBER B00702-DA-CE02



INSET A-A

0 10 20 30 40 50m
10 7.5 5 2.5
SCALE 1:500 (A1) 1:1000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.



JOINS INSET A-A LEFT

JOINS DRAWING NUMBER B00702-DA-CE05

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: EARTHWORKS DETAILED LAYOUT PLAN SHEET 3 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. | Drawing No. | Rev
B00702-DA-CE04 | A

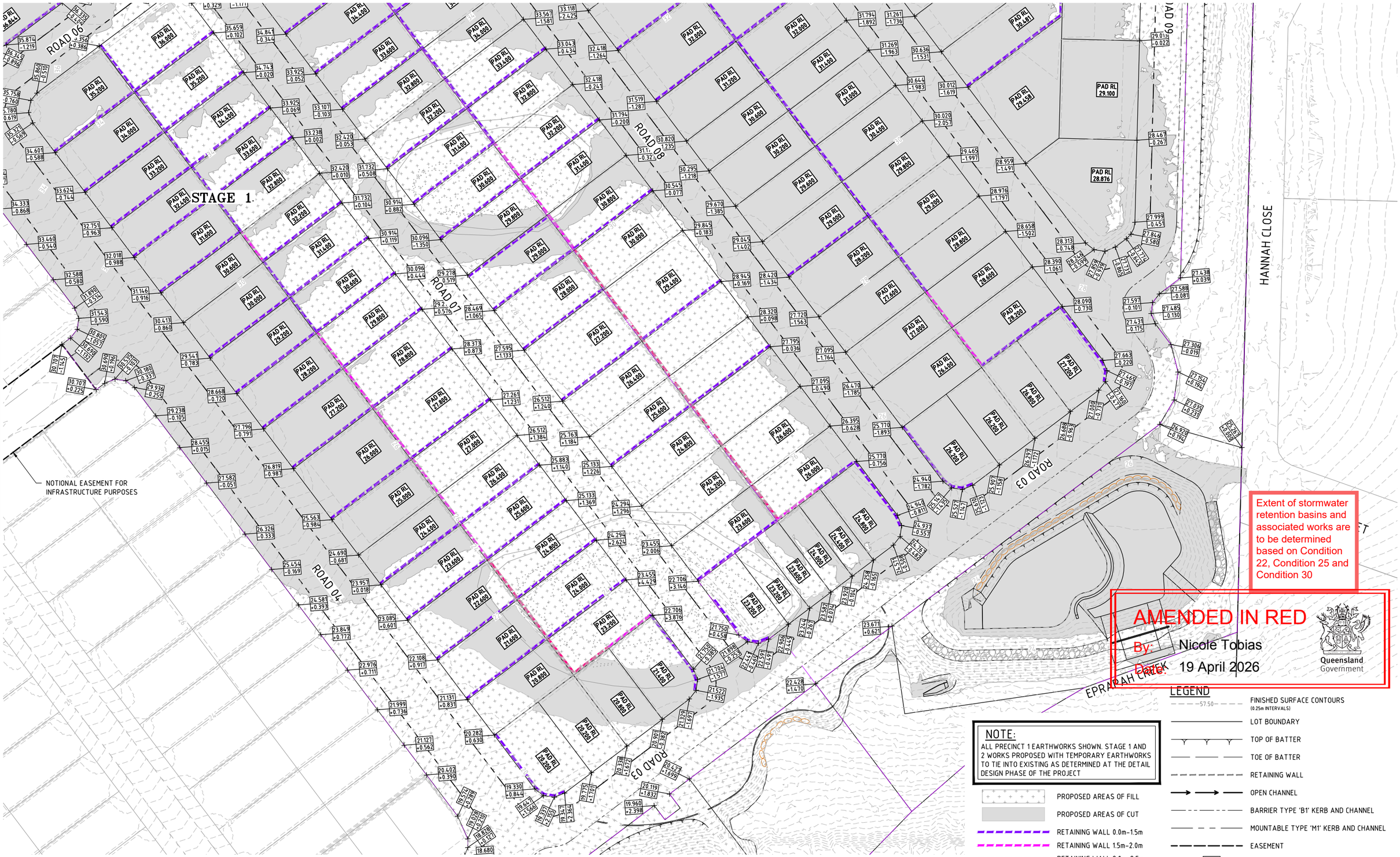
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User: WILLIAM GRIFFITH

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JOINS DRAWING NUMBER B00702-DA-CE03

JOINS DRAWING NUMBER B00702-DA-CE04



JOINS INSET A-A B00702-DA-CE04

0 10 20 30 40 50m

10 7.5 5 2.5

SCALE 1:500 (A1) 1:1000 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

NOTE:

ALL PRECINCT 1 EARTHWORKS SHOWN. STAGE 1 AND 2 WORKS PROPOSED WITH TEMPORARY EARTHWORKS TO TIE INTO EXISTING AS DETERMINED AT THE DETAIL DESIGN PHASE OF THE PROJECT

LEGEND

- PROPOSED AREAS OF FILL
- PROPOSED AREAS OF CUT
- RETAINING WALL 0.0m-1.5m
- RETAINING WALL 1.5m-2.0m
- RETAINING WALL 2.0m-2.5m
- SANDSTONE BOULDER RETAINING WALL
- 57.50 FINISHED SURFACE CONTOURS (0.25m INTERVALS)
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- RETAINING WALL
- OPEN CHANNEL
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EASEMENT
- 29.945 +0.828 CUT FILL LABEL
- PAD RL 30.300 PAD RL LABEL

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingleman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: EARTHWORKS DETAILED LAYOUT PLAN SHEET 4 OF 4

Datum: AHD PSM 79006 RL 67.474 (RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702-DA-CE05

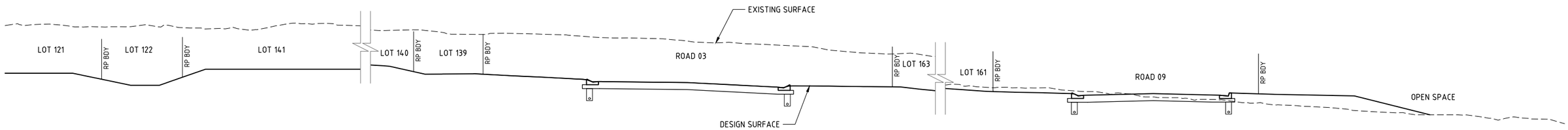
Drawing No.

Rev A

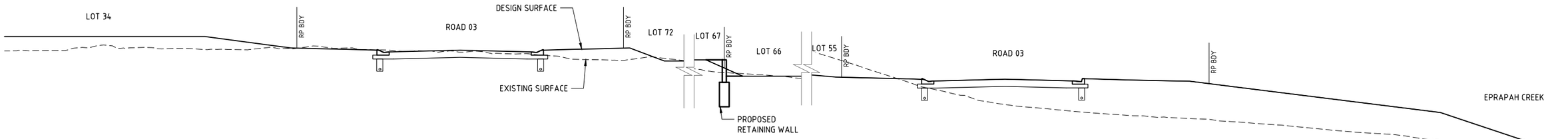
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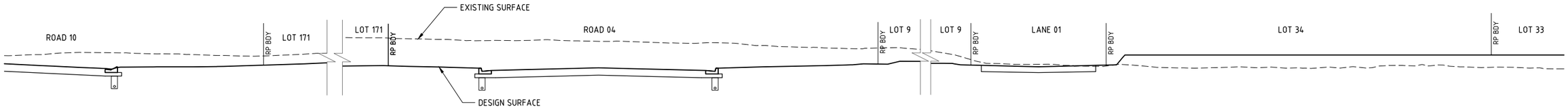
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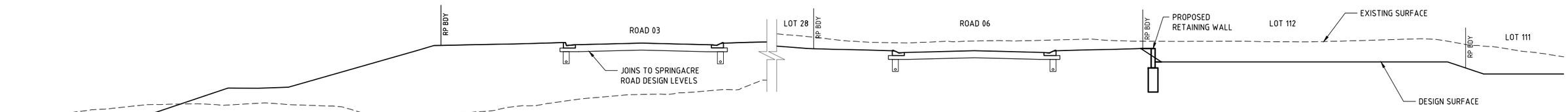
E5 CE01 SECTION
SCALE 1:100



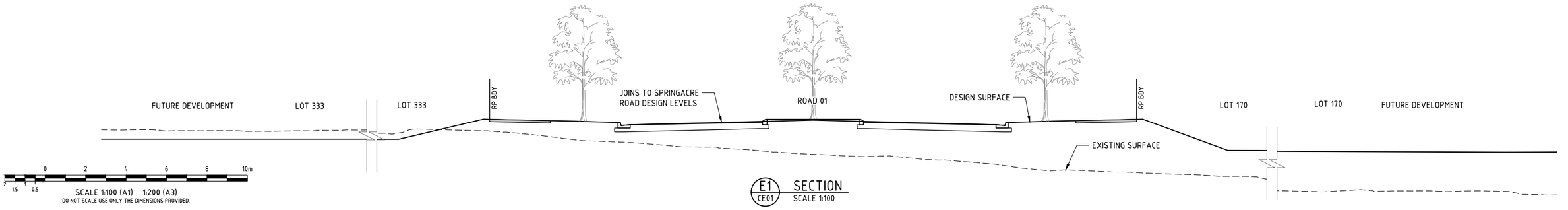
E4 CE01 SECTION
SCALE 1:100



E3 CE01 SECTION
SCALE 1:100



E2 CE01 SECTION
SCALE 1:100



E1 CE01 SECTION
SCALE 1:100

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingelman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: EARTHWORKS CROSS SECTIONS
SHEET 1 OF 2

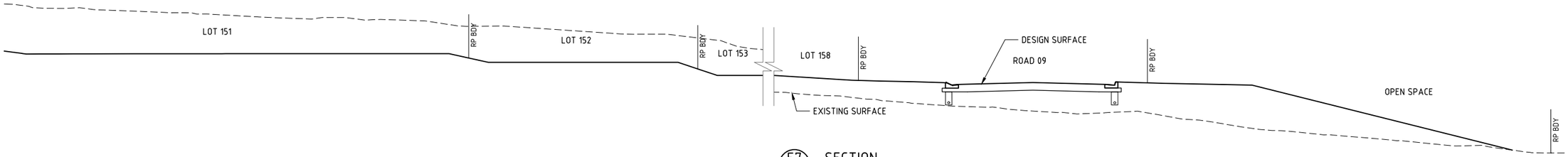
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RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

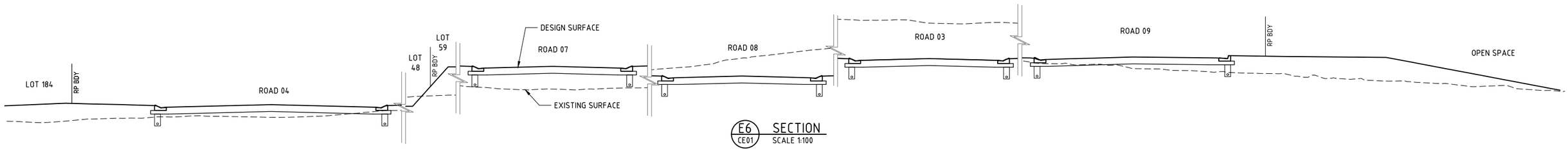
Project No. B00702 | Drawing No. DA-CE06 | Rev A

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User: WILLIAM GRIFFITH



E7 CE01 SECTION
SCALE 1:100



E6 CE01 SECTION
SCALE 1:100

0 2 4 6 8 10m
2 1.5 1 0.5
SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: EARTHWORKS CROSS SECTIONS SHEET 2 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

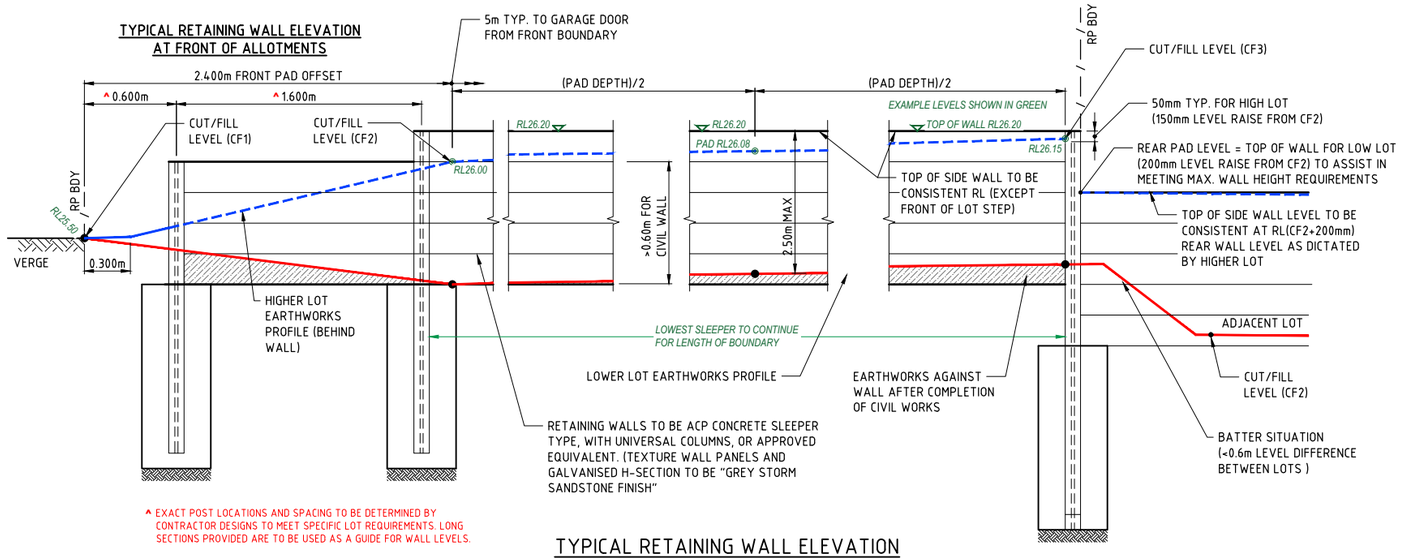
NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CE07	A

" "

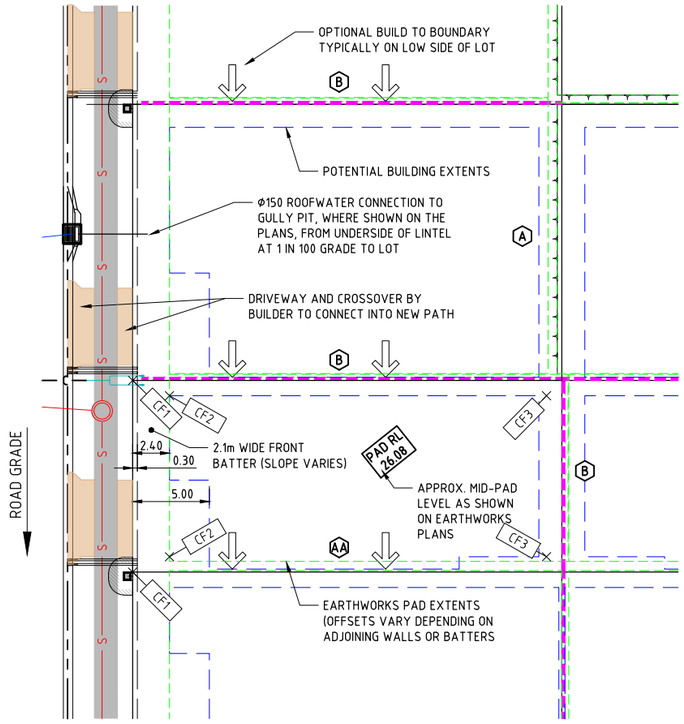
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TYPICAL RETAINING WALL ELEVATION AT FRONT OF ALLOTMENTS



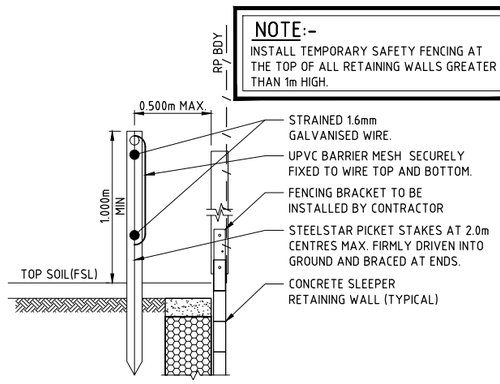
^ EXACT POST LOCATIONS AND SPACING TO BE DETERMINED BY CONTRACTOR DESIGNS TO MEET SPECIFIC LOT REQUIREMENTS. LONG SECTIONS PROVIDED ARE TO BE USED AS A GUIDE FOR WALL LEVELS.

TYPICAL RETAINING WALL ELEVATION INTER-ALLOTMENT SIDE WALLS

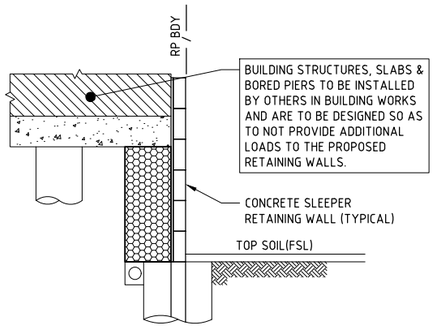


TYPICAL EARTHWORKS PAD SETOUT

NOTE:-
INSTALL TEMPORARY SAFETY FENCING AT THE TOP OF ALL RETAINING WALLS GREATER THAN 1m HIGH.

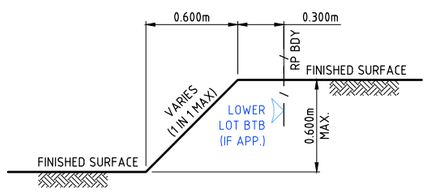


TEMPORARY SAFETY BARRIER TO RETAINING WALLS TYPICAL SECTION

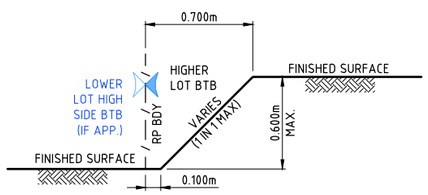


BUILD TO BOUNDARY TYPICAL SECTION

RETAINING WALL DESIGN IS INDICATIVE ONLY. DESIGN AND CONSTRUCTION OF ALL RETAINING WALLS TO BE UNDERTAKEN BY CONTRACTOR.

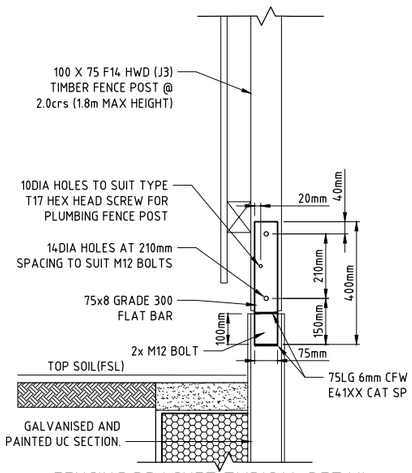


A < 0.6m BATTER TYPICAL SECTION (NON-ZERO BOUNDARY OR REAR BOUNDARY)



AA < 0.6m BATTER TYPICAL SECTION (ZERO-BOUNDARY)

NOTE:-
REFER NEXT SHEET FOR RETAINING WALL NOTES AND ADDITIONAL SECTIONS



FENCING BRACKET TYPICAL DETAIL

DESIGN AND CONSTRUCT BY OTHERS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: RETAINING WALL TYPICAL DETAILS 1 OF 2

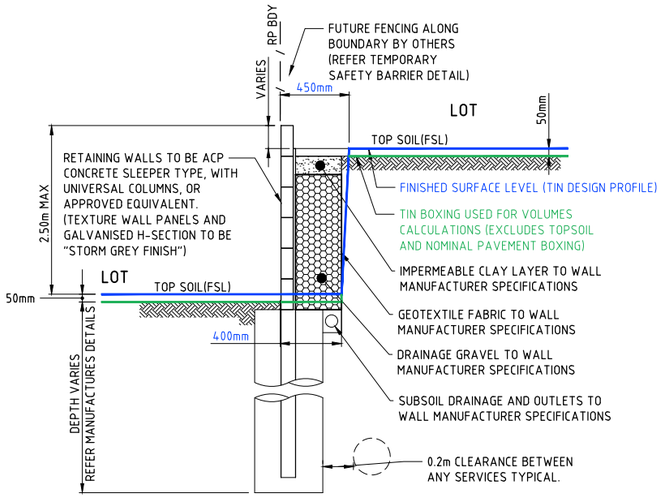
Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

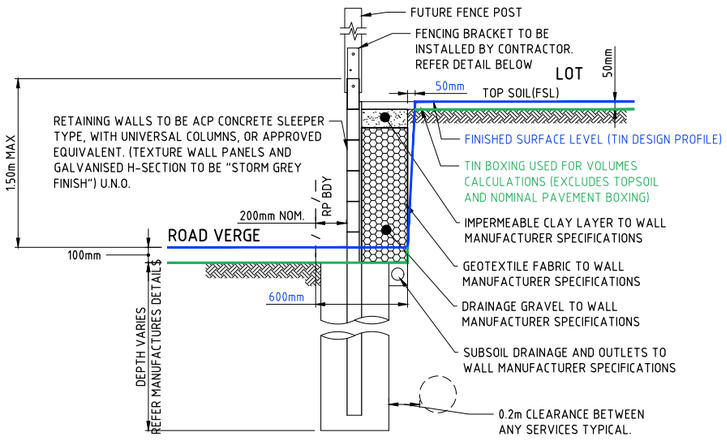
Project No. B00702 | Drawing No. DA-RW01 | Rev A

" "

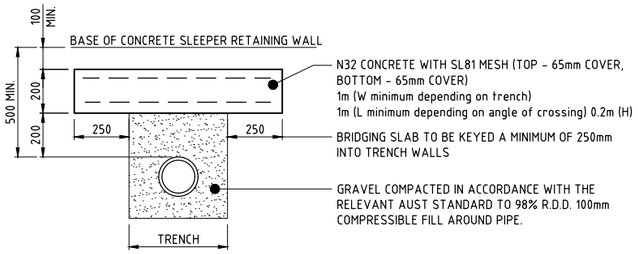
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User: WILLIAM GRIFFITH



B 2.5m MAX. HEIGHT RETAINING WALL TYPICAL SECTION



C 1.5m MAX. RETAINING WALL ADJACENT TO ROAD RESERVE TYPICAL SECTION

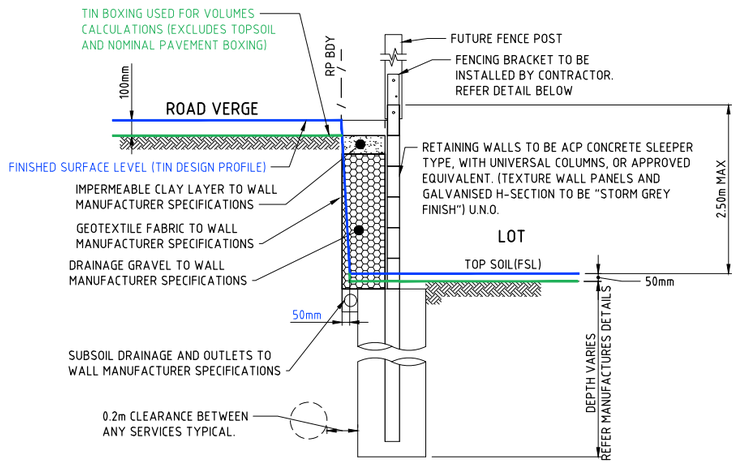


TYPE-1 BRIDGING SLAB DETAIL
NOT TO SCALE

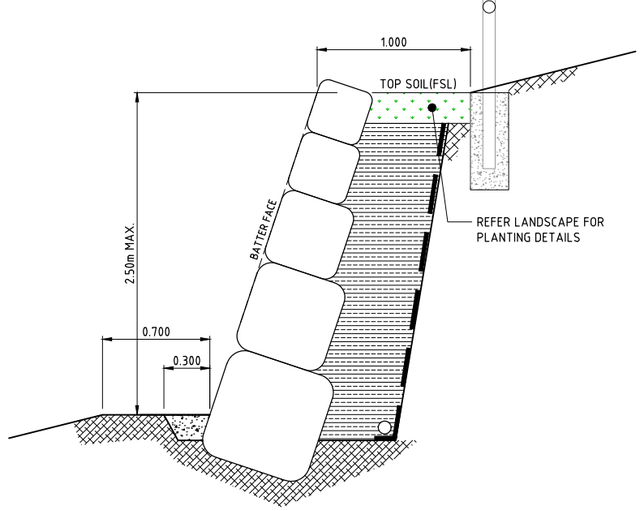
RETAINING WALL DESIGN IS INDICATIVE ONLY. DESIGN AND CONSTRUCTION OF ALL RETAINING WALLS TO BE UNDERTAKEN BY CONTRACTOR.

RETAINING WALL DESIGN PARAMETERS

1. COMPLY WITH AS4678-2002 "EARTH RETAINING STRUCTURES".
2. MINIMUM DESIGN LIFE OF 60 YEARS.
3. MINIMUM SUPERIMPOSED DESIGN LIVE LOAD OF 5kPa FOR CUT WALLS.
4. ALL WALLS RETAINING ROAD RESERVE TO HAVE MIN. 20KPa LIVE LOAD.
5. DESIGN TO CARRY WIND LOADS IMPOSED BY A 2m (MAX) HIGH FENCE.
6. COMPLY WITH REDLAND CITY COUNCIL PLANNING SCHEME AND ALL RELEVANT COUNCIL STANDARDS.
7. PROVIDE RPEQ CERTIFICATION FOR DESIGN & CONSTRUCTION AND PROVIDE APPROPRIATE CERTIFIED FORMS.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
9. FENCE BRACKETS TO BE PROVIDED AT THE INTERSECTION OF LOT BOUNDARIES, SO AS TO PROVIDE A SUITABLE POINT OF CONNECTION FOR THE FUTURE INSTALLATION OF FENCING. INTERMEDIATE SPACING OF BRACKETS ARE TO ALLOW FOR TYPICAL FENCE RAIL LENGTHS WHERE POSSIBLE.
10. RETAINING WALL DESIGNER MUST UNDERTAKE A GLOBAL STABILITY ASSESSMENT FOR ALL RETAINING WALLS COGNISANT OF ALL PRE-EXISTING AND ULTIMATE EARTHWORKS GEOMETRY, SERVICES WITHIN THE ZONE OF INFLUENCE, AND ANY RAPID DRAW-DOWN OF WATER LEVELS WHICH MAY IMPACT THE STABILITY OF THE WALL.
11. SUBSOIL DRAINS ARE TO BE CONNECTED TO KERB ADAPTORS WHERE POSSIBLE.



D 2.5m MAX. RETAINING WALL TYPICAL SECTION ADJACENT TO ROAD RESERVE



E 2.5m MAX. SANDSTONE RETAINING WALL IN DRAINAGE RESERVE - TYPICAL SECTION

0 0.02 0.04 0.06 0.08 0.1m
0.02 0.01 0.015 0.005
SCALE 1:1 (A1) 1:2 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client URBEX PTY LTD
Project SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title RETAINING WALL - TYPICAL DETAILS SHEET 2 OF 2

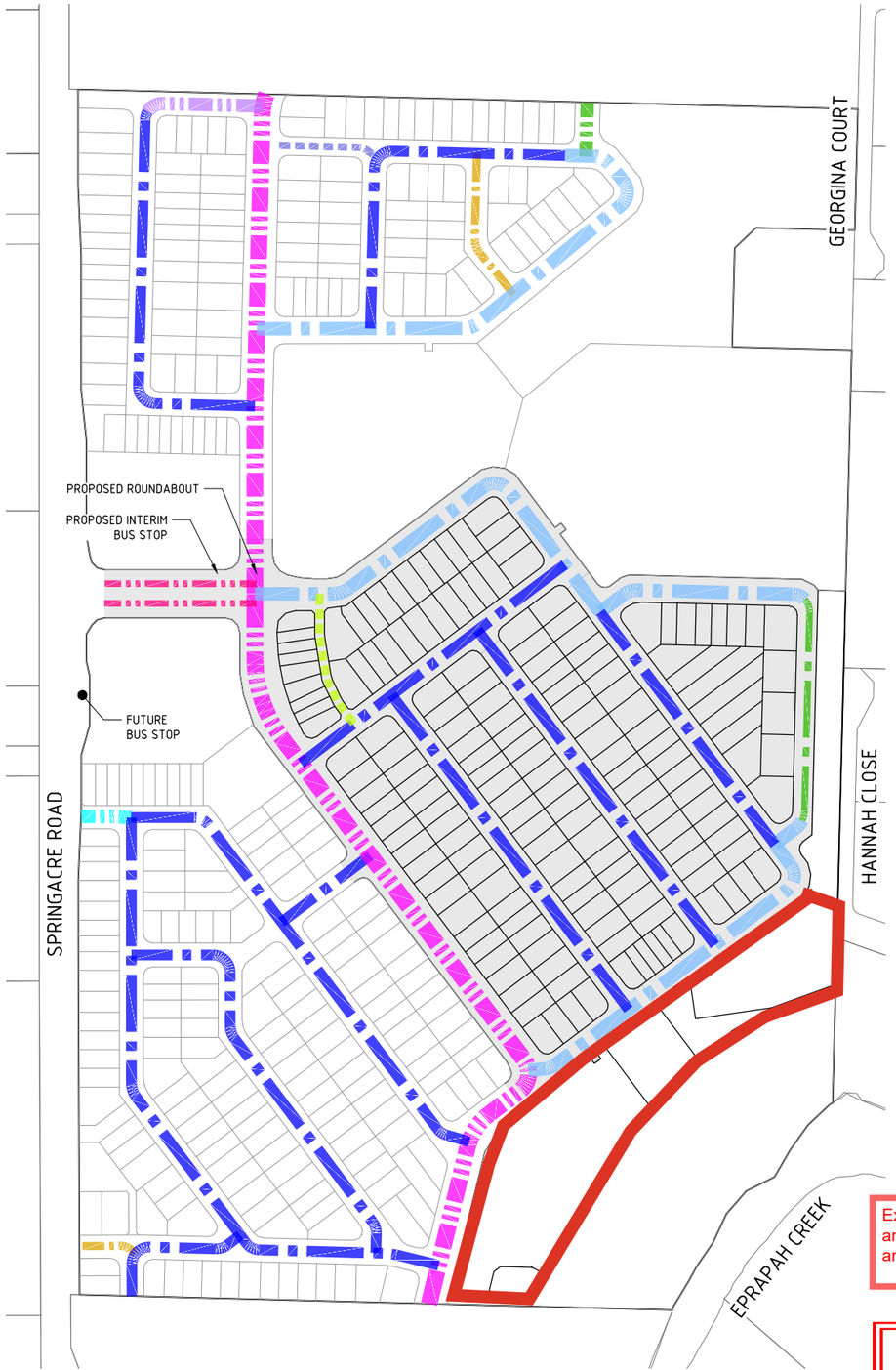
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PSM 79006
RL 67.474 (RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. DA-RW02
Rev A

" "

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File Name: S:\Jobs\data\MANJOBSYNO\1\B00702_24.51\4_CIVIL_ENGG\4.2 CURRENT\DA\B00702-DA-ENWS SECTS



ROAD NETWORK LAYOUT
SCALE 1:2000 (A1) 1:4000(A3)

0 40 80 120 160 200m
40 30 20 10
SCALE 1:2000 (A1) 1:4000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

LEGEND - ROAD NETWORK

- PROPOSED STAGE BOUNDARY
- PROPOSED LOT BOUNDARY
- CENTRE CONNECTOR
  32.0m WIDE ROAD RESERVE
  2x7m WIDE ROAD PAVEMENTS
  5.0m MEDIAN
  2x6.5m WIDE VERGES
- PARKING COLLECTOR (NEIGHBOURHOOD CONNECTOR)
  22.0m WIDE ROAD RESERVE
  11.2m WIDE ROAD PAVEMENT
  2x2.3m WIDE PARKINGS
  4.5m AND 6.3m WIDE VERGES
- ACCESS STREET - 7.5m
  16.0m WIDE ROAD RESERVE
  7.5m WIDE ROAD PAVEMENT
  4.25m WIDE VERGES
- ACCESS STREET - 7.5m WITH 3m PATH
  18.0m WIDE ROAD RESERVE
  7.5m WIDE ROAD PAVEMENT
  4.25m AND 6.25m WIDE VERGES
- ACCESS STREET - 7.5m WITH 3m PATH
  16.0m WIDE ROAD RESERVE
  7.5m WIDE ROAD PAVEMENT
  4.25m WIDE VERGES
- ACCESS STREET - 6m
  15.5m WIDE ROAD RESERVE
  8.3m WIDE ROAD PAVEMENT
  4.25m AND 2.95m WIDE VERGES
- ACCESS STREET - 6m WITH 2 PATHS
  15.5m WIDE ROAD RESERVE
  8.3m WIDE ROAD PAVEMENT
  4.75m AND 2.95m WIDE VERGES
- ACCESS STREET - 13.25m
  13.25m WIDE ROAD RESERVE
  7.5m WIDE ROAD PAVEMENT
  4.25m AND 1.50m WIDE VERGE
- ACCESS LANEWAY DRIVEWAYS
  6.5m WIDE ROAD RESERVE
  5.5m WIDE ROAD PAVEMENT
  0.5m WIDE VERGES
- ACCESS LANEWAY DRIVEWAYS
  12.5m WIDE ROAD RESERVE
  5.0m WIDE ROAD PAVEMENT
  4.00m AND 3.50m WIDE VERGES
- ACCESS STREET - 7.5m WITH 3m PATH
  16.7m WIDE ROAD RESERVE
  7.5m WIDE ROAD PAVEMENT
  4.25m AND 4.95m WIDE VERGES

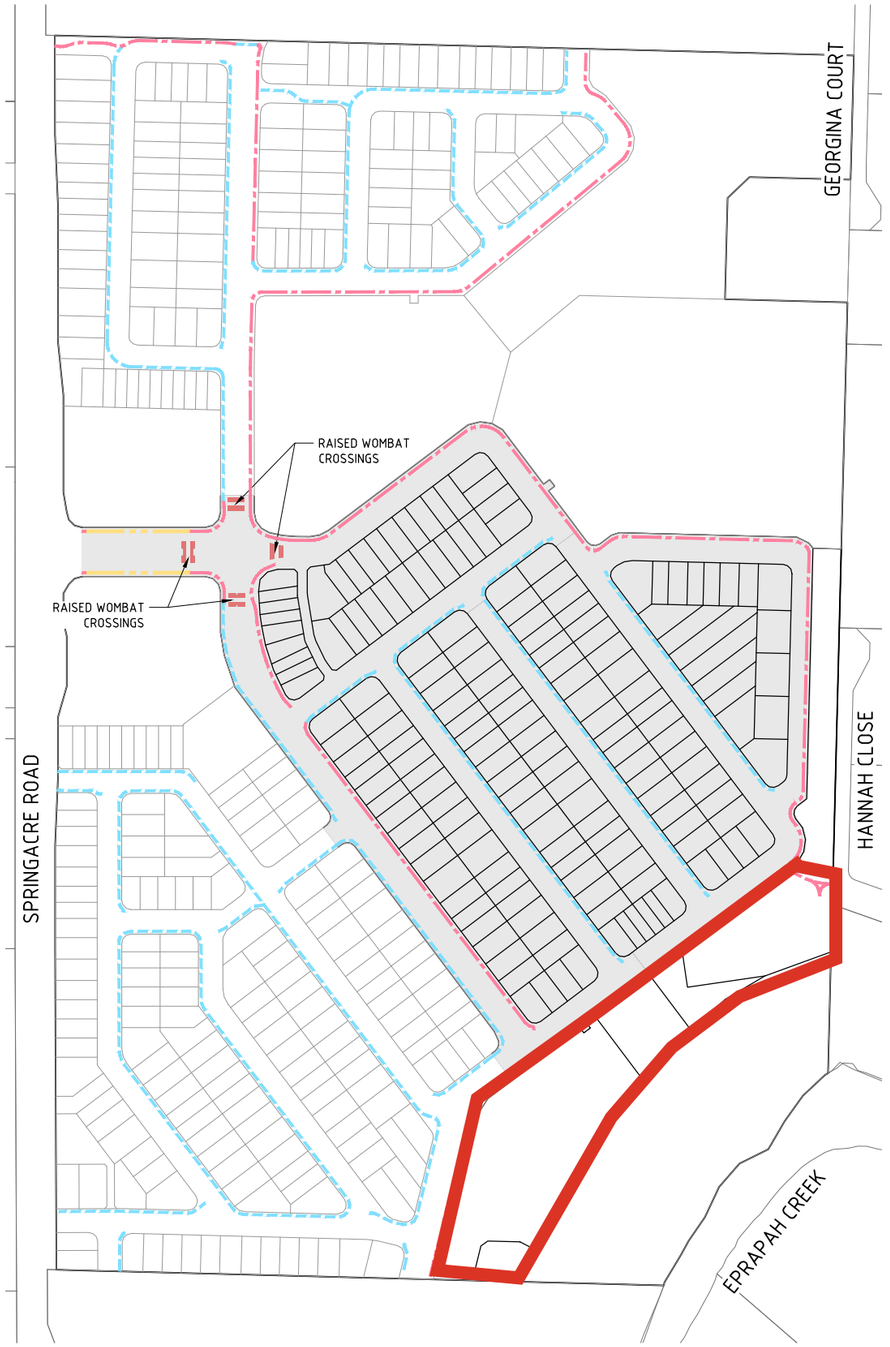
LEGEND - PATH NETWORK

- CONCRETE PATHWAY - 1.5m WIDE
- CONCRETE PATHWAY - 3m WIDE
- CONCRETE PATHWAY - 4m WIDE

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government



PATH NETWORK LAYOUT
SCALE 1:2000 (A1) 1:4000(A3)

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX | EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: ROAD NETWORK LAYOUT

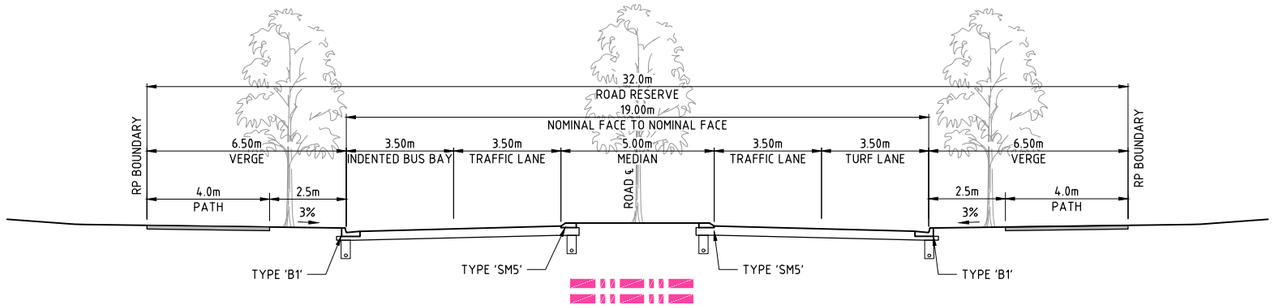
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PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

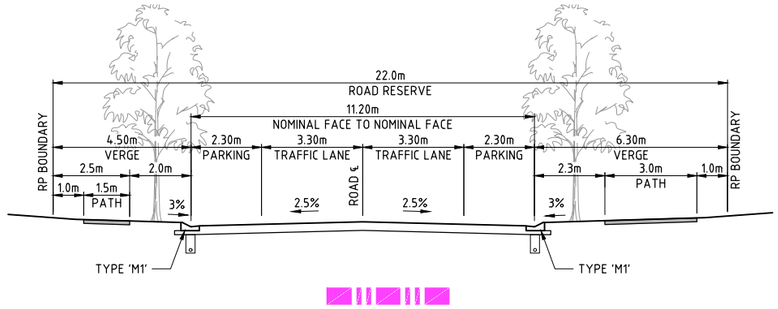
Project No. B00702 | Drawing No. -DA-CR01 | Rev A

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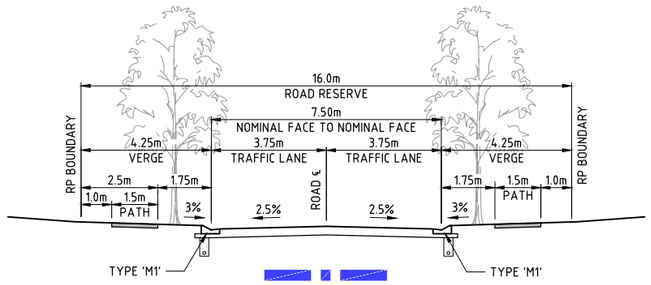
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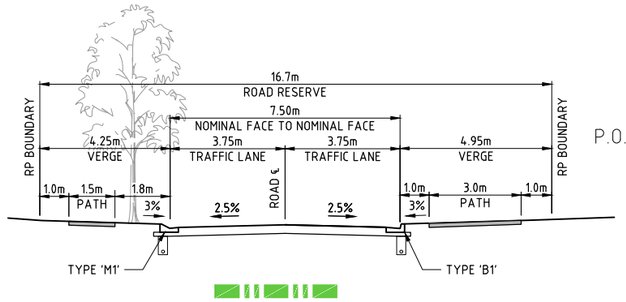
1 CR01 CENTRE CONNECTOR
SCALE 1:100 (A1) 1:200(A3)



2 CR01 PARKING COLLECTOR (NEIGHBOURHOOD CONNECTOR)
SCALE 1:100 (A1) 1:200(A3)

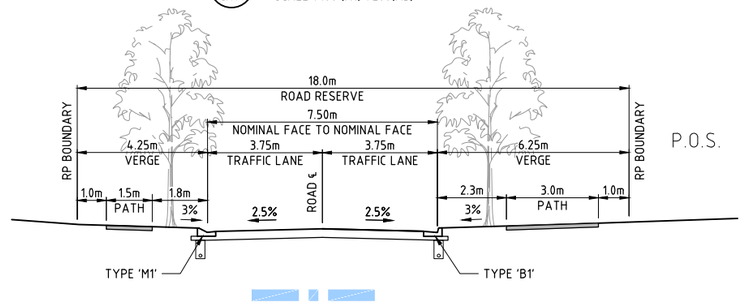


3 CR01 ACCESS STREET - 7.5m
SCALE 1:100 (A1) 1:200(A3)



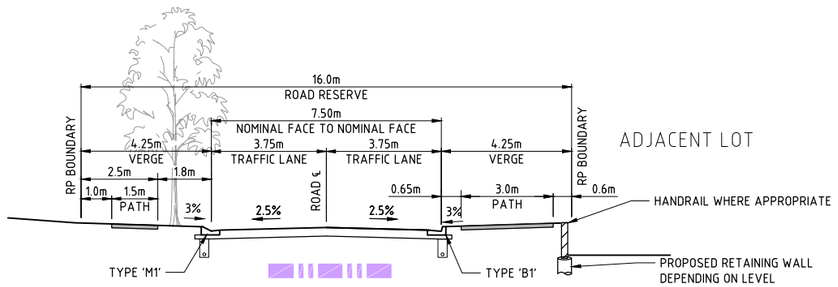
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11 CR01 ACCESS STREET - 7.5m WITH 3m PATH
SCALE 1:100 (A1) 1:200(A3)

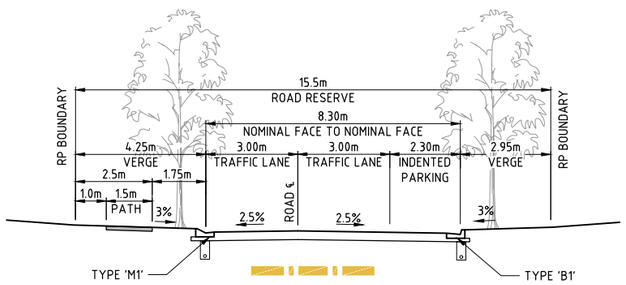


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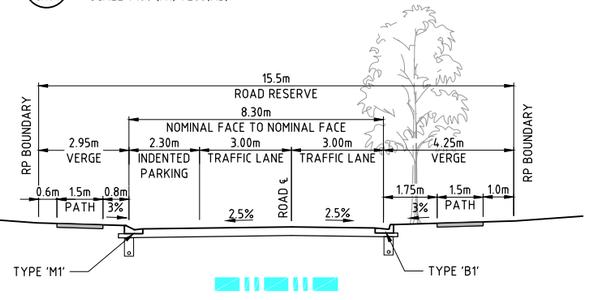
4 CR01 ACCESS STREET - 7.5m WITH 3m PATH
SCALE 1:100 (A1) 1:200(A3)



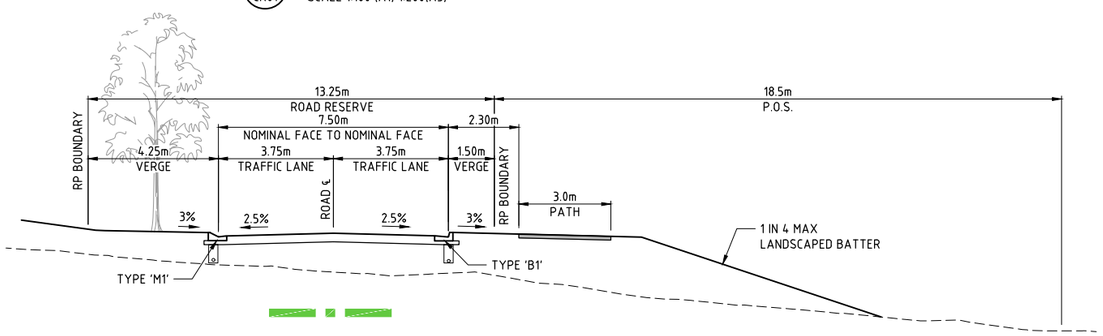
5 CR01 ACCESS STREET - 7.5m WITH 3m PATH
SCALE 1:100 (A1) 1:200(A3)



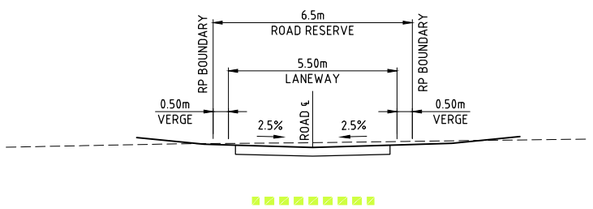
6 CR01 ACCESS STREET - 6m
SCALE 1:100 (A1) 1:200(A3)



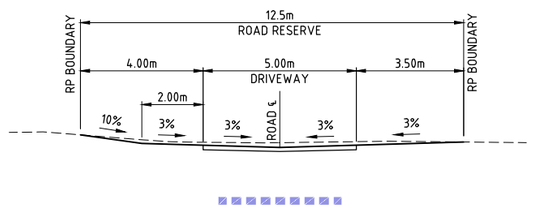
7 CR01 ACCESS STREET - 6m WITH 2 PATHS
SCALE 1:100 (A1) 1:200(A3)



8 CR01 ACCESS STREET - 13.25m
SCALE 1:100 (A1) 1:200(A3)



9 CR01 ACCESS LANEWAY
SCALE 1:100 (A1) 1:200(A3)



10 CR01 CONCRETE DRIVEWAY
SCALE 1:100 (A1) 1:200(A3)

0 2 4 6 8 10m
2 1.5 1 0.5
SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: ROAD NETWORK SECTIONS

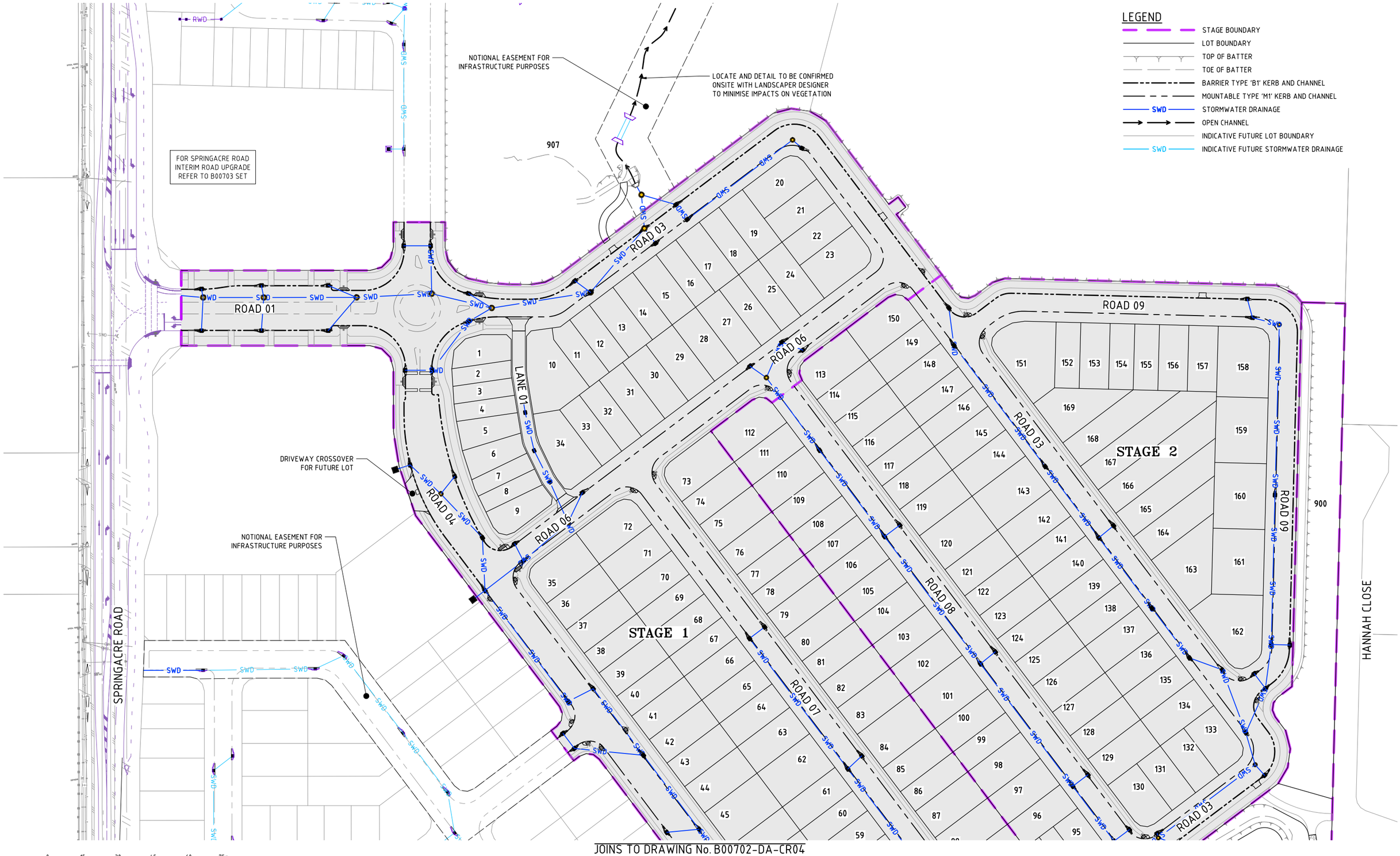
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RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. DA-CR02
Rev A

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User: WILLIAM GRIFFITH



JOINS TO DRAWING No. B00702-DA-CR04

0 15 30 45 60 75m
15 11.25 7.5 3.75
SCALE 1:750 (A1) 1:1500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: ROADWORKS AND DRAINAGE PLAN SHEET 1 OF 2

Datum: AHD PSM 79006 RL 67.474 (RCC) COORD

NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CR03	A

" "

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User: WILLIAM GRIFFITH

JOINS TO DRAWING No. B00702-DA-CR03

SPRINGACRE ROAD

ROAD 07

ROAD 04

ROAD 03

BASIN B1

BIO B2

BIO A1

BIO A2

BIO A1

901

902

903

904

905

FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

LEGEND

- STAGE BOUNDARY
- LOT BOUNDARY
- TOP OF BATTER
- TOE OF BATTER
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- SWD — STORMWATER DRAINAGE
- OPEN CHANNEL
- INDICATIVE FUTURE LOT BOUNDARY
- SWD — INDICATIVE FUTURE STORMWATER DRAINAGE

0 15 30 45 60 75m

SCALE 1:750 (A1) 1:1500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

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ENGINEERING CERTIFICATION

Peter Ingerman
Registered Engineer
Date " "

Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ROADWORKS AND DRAINAGE PLAN SHEET 2 OF 2

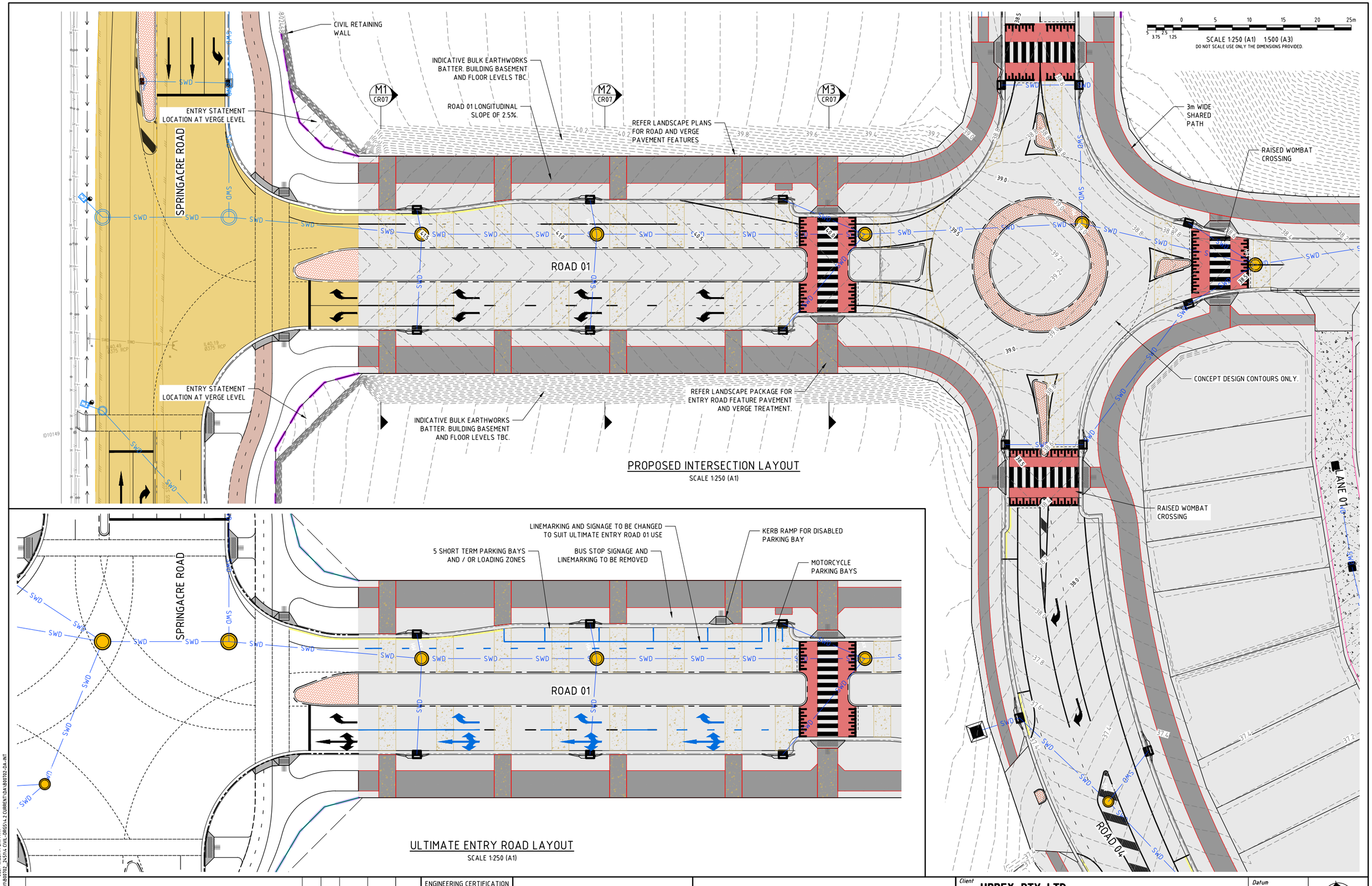
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Project No. B00702 | Drawing No. DA-CR04 | Rev A

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PROPOSED INTERSECTION LAYOUT

SCALE 1:250 (A1)

ULTIMATE ENTRY ROAD LAYOUT

SCALE 1:250 (A1)

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Angerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ENTRY ROAD INTERSECTION DETAILS

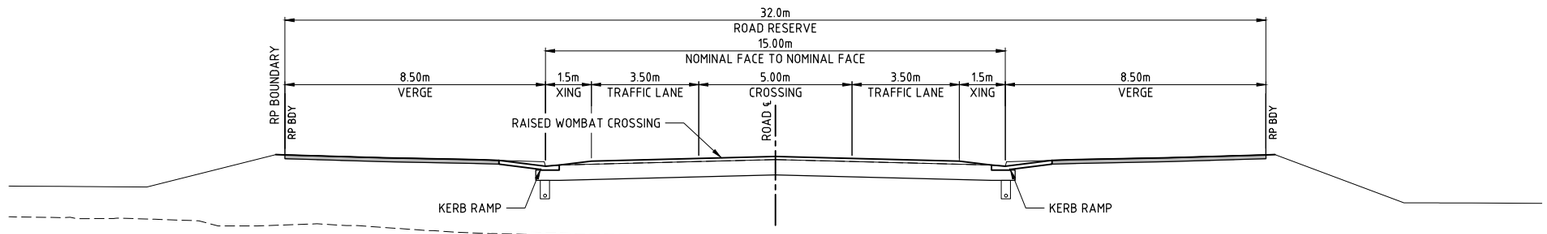
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RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

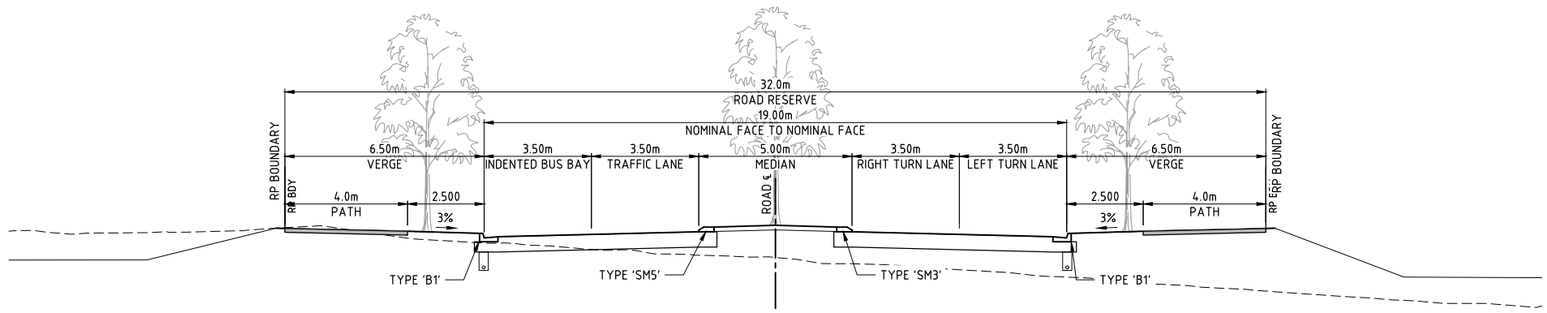
Project No. B00702 | Drawing No. DA-CR06 | Rev A

" "

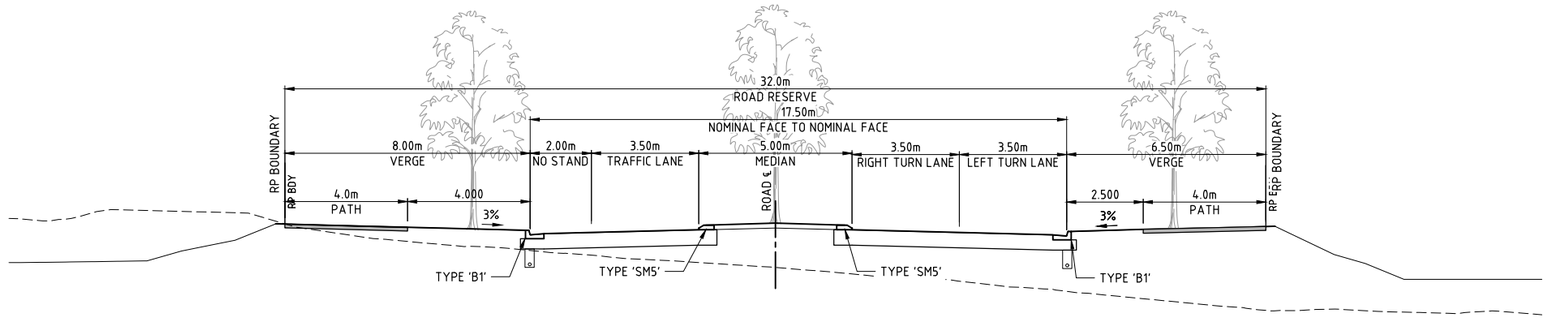
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User: WILLIAM GRIFFITH



M3 CR06 **CENTRE CONNECTOR**
SCALE 1:100 (A1) 1:200(A3)



M2 CR06 **CENTRE CONNECTOR**
SCALE 1:100 (A1) 1:200(A3)



M1 CR06 **CENTRE CONNECTOR**
SCALE 1:100 (A1) 1:200(A3)

H. SCALE 1:200 (A1) 1:400 (A3)
4 3 2 1 0 4 8 12 16 20m
2 1.5 1 0.5 0 2 4 6 8 10m
V. SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: ENTRY ROAD SECTIONS

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

N

NOT FOR CONSTRUCTION

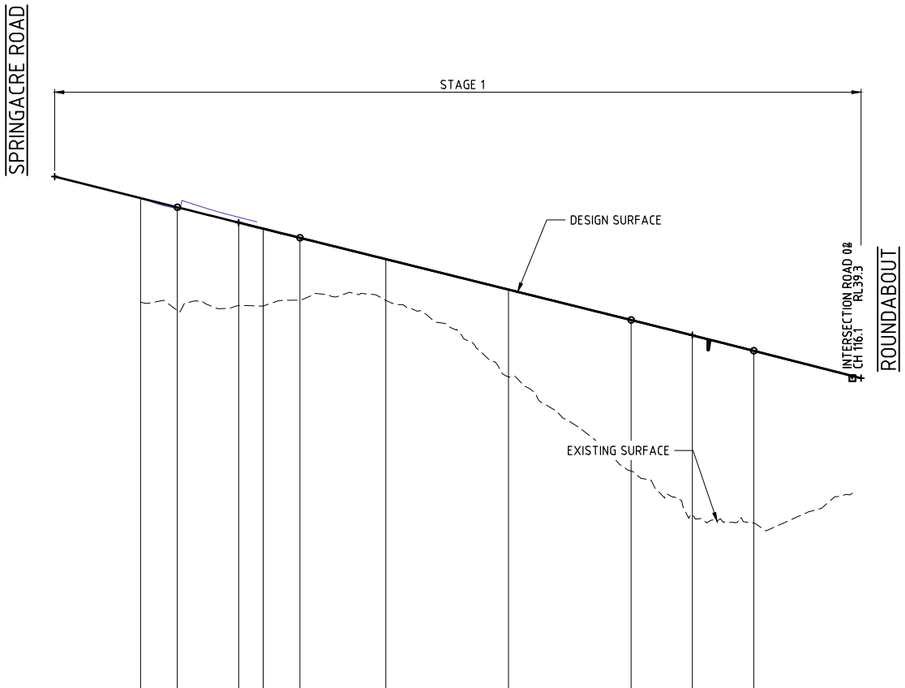
Project No. B00702-DA-CR07
Drawing No.
Rev A

" "

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User: WILLIAM GRIFFITH

FOR SPRINGACRE ROAD
INTERIM ROAD UPGRADE
REFER TO B00703 SET



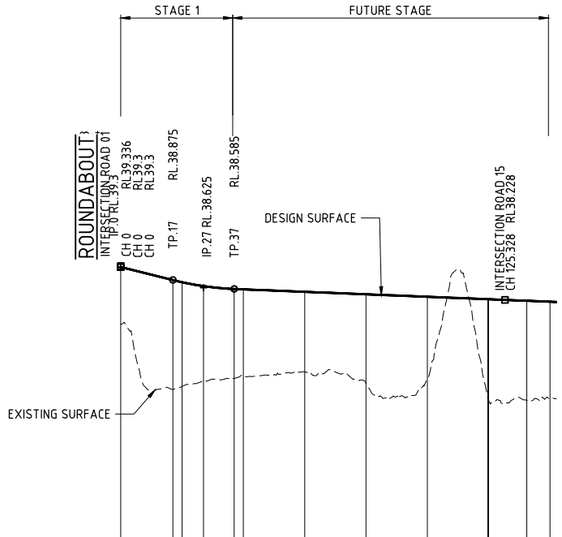
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LIP OF KERB LHS			4.1648	4.1548	4.1398			40.069	39.822	
EXISTING SURFACE	40.539	40.405	40.482	40.477	40.576	40.568	39.322	37.786	37.066	36.936
CUT/FILL DEPTH	1.697	1.681	1.354	1.26	1.011	0.672	1.422	2.462	2.933	2.809
FINISHED CENTRELINE RL	42.236	42.086	41.836	41.737	41.588	41.241	40.744	40.248	39.998	39.745
PEGGED CHAINAGE	0	6	16	20	26	40	60	80	90	100

HORIZ. CURVE RADIUS

ROAD 01 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)



DATUM R.L.26.000

LIP OF KERB RHS				38.549	38.456	38.444	38.363	38.282	38.202	38.122	38.121	38.071	38.04
LIP OF KERB LHS				38.549	38.456	38.444	38.363	38.282	38.202	38.121	38.12	38.067	38.036
EXISTING SURFACE	37.428	35.313	35.416	35.59	35.667	35.729	35.882	35.507	35.659	35.095	34.966	34.95	34.989
CUT/FILL DEPTH	1.872	3.562	3.389	3.087	2.917	2.843	2.61	2.904	2.671	3.156	3.284	3.25	3.18
FINISHED CENTRELINE RL	39.3	38.875	38.805	38.677	38.585	38.573	38.492	38.411	38.33	38.251	38.25	38.2	38.169
PEGGED CHAINAGE	0	17	20	27	37	40	60	80	100	119.693	120	132.421	140

HORIZ. CURVE RADIUS 500 R

ROAD 02 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)

SCALE 1:1000 (A1) 1:2000 (A3)

20 15 10 5 0 20 40 60 80 100m
2.0 1.5 1.0 0.5 0 2 4 6 8 10m

SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ROAD LONGITUDINAL SECTION
SHEET 1 OF 6

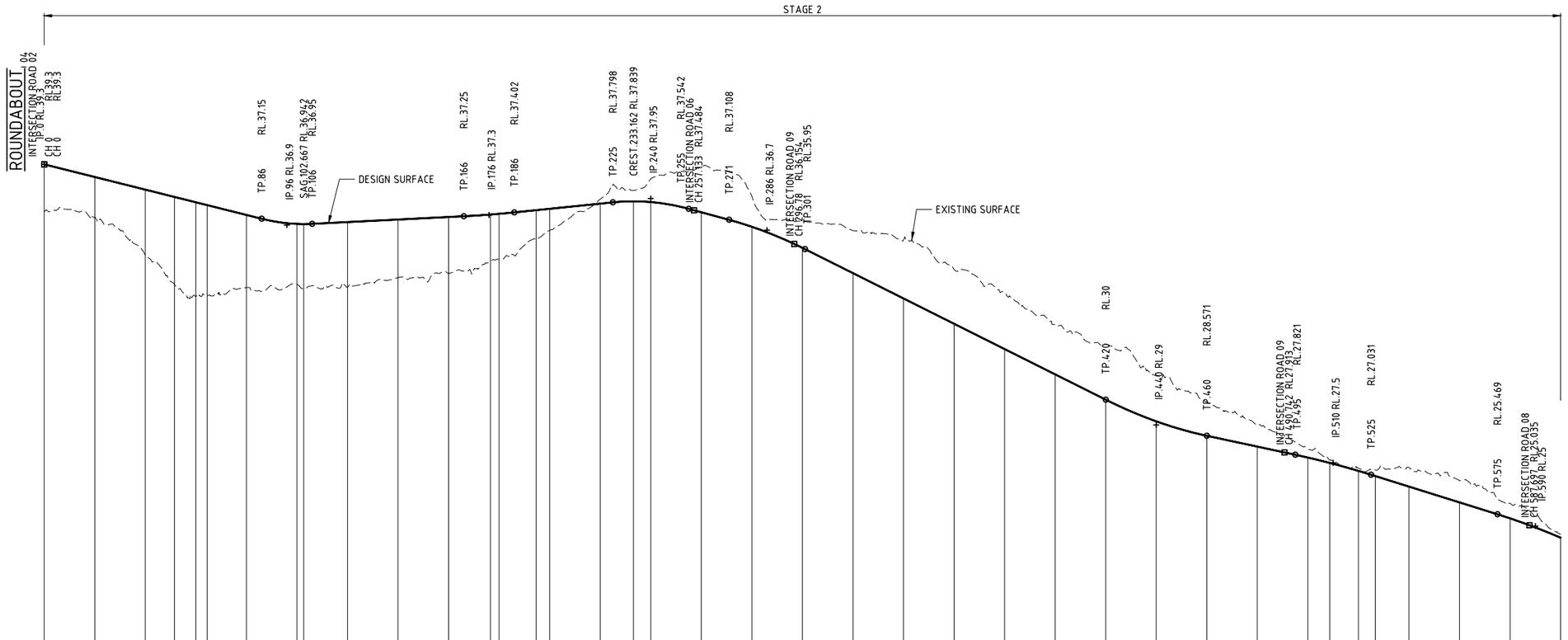
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PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

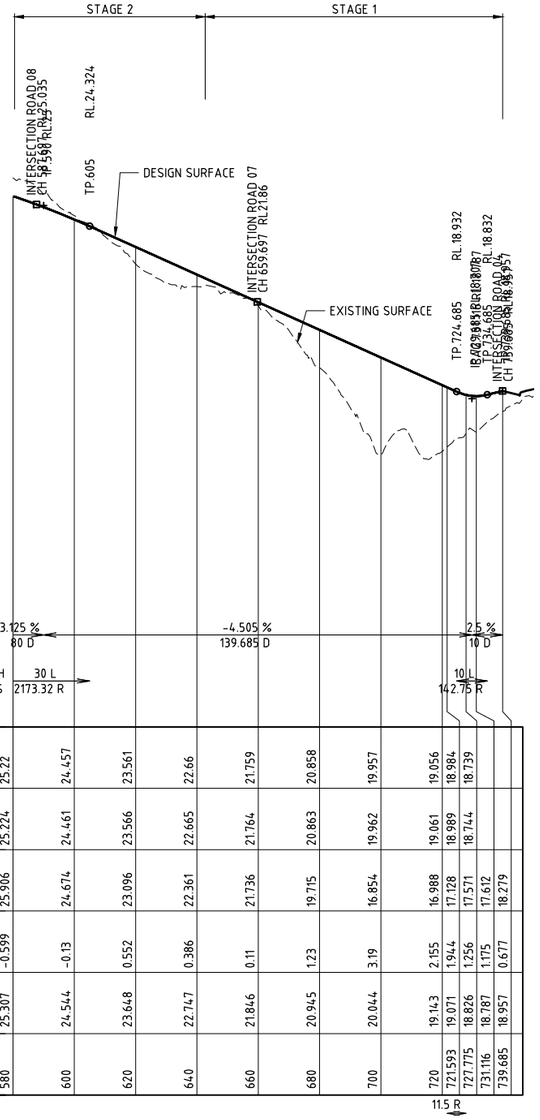
Project No.	Drawing No.	Rev
B00702	DA-CR08	A

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STAGE 2
ROUNDABOUT
INTERSECTION ROAD 02
IP 0 RL 39.3
CH 0
RL 39.3
TP 86
RL 37.15
IP 96 RL 36.9
SAG 102.667 RL 36.942
TP 106
RL 36.95
DESIGN SURFACE
TP 166
RL 37.25
IP 176 RL 37.3
TP 186
RL 37.402
TP 225
RL 37.798
CREST 233.162 RL 37.839
IP 240 RL 37.95
TP 255
RL 37.542
INTERSECTION ROAD 06
CH 257.133
RL 37.484
TP 271
RL 37.108
IP 286 RL 36.7
INTERSECTION ROAD 09
CH 296.78
RL 36.152
TP 301
RL 35.95
EXISTING SURFACE
RL 30
TP 420
IP 440 RL 29
TP 460
RL 28.571
INTERSECTION ROAD 09
CH 490.742
RL 27.913
TP 495
RL 27.821
IP 510 RL 27.5
TP 525
RL 27.031
RL 25.469
TP 575
INTERSECTION ROAD 08
CH 587.697
RL 25.035
IP 590 RL 25

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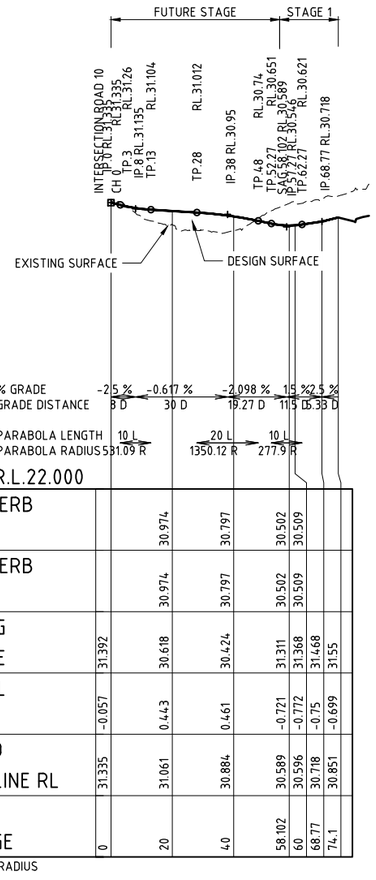
DATUM R.L.8.000

LIP OF KERB RHS	25.22		24.457		23.561		22.66		21.759		20.858	
LIP OF KERB LHS	25.224		24.461		23.566		22.665		21.764		20.863	
EXISTING SURFACE	25.906		24.674		23.096		22.361		21.736		19.715	
CUT/FILL DEPTH	-0.599		-0.13		0.552		0.386		0.11		1.23	
FINISHED CENTRELINE RL	25.307		24.544		23.648		22.747		21.846		20.945	
PEGGED CHAINAGE	580	600		620		640		660		680		700

HORIZ. CURVE RADIUS 11.5 R

ROAD 03 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)



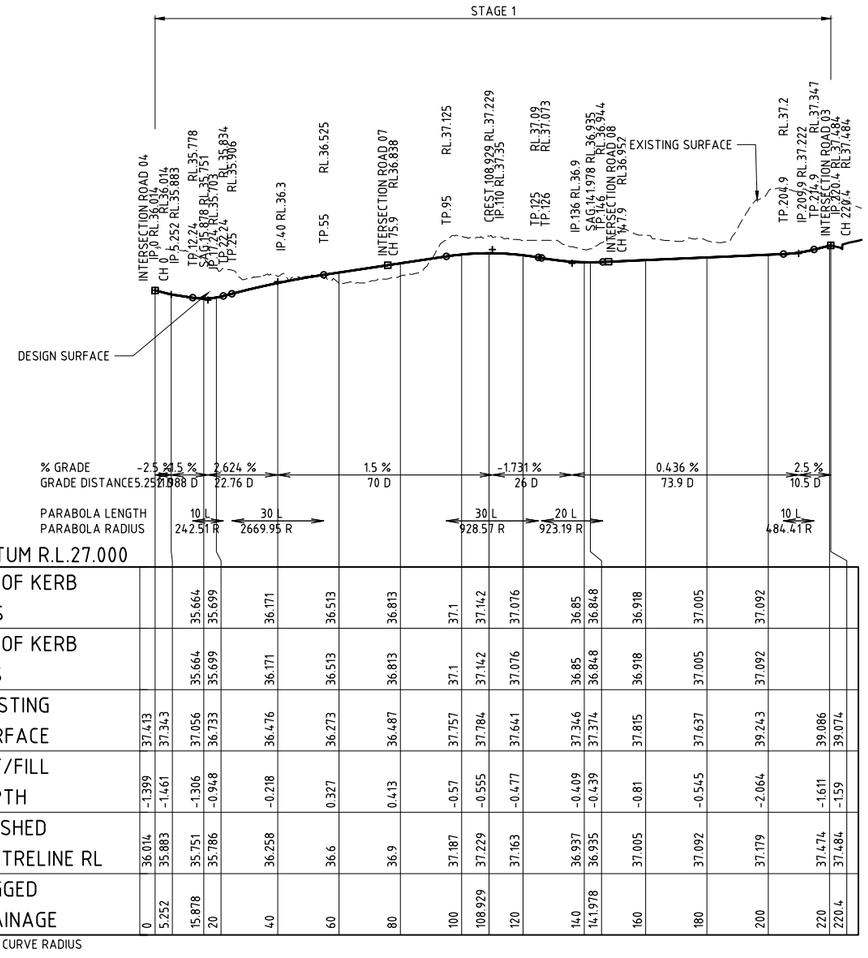
DATUM R.L.22.000

LIP OF KERB RHS		30.974		30.797		30.502	30.509		
LIP OF KERB LHS		30.974		30.797		30.502	30.509		
EXISTING SURFACE	31.392	30.618		30.424		31.311	31.368	31.468	31.55
CUT/FILL DEPTH	-0.057	0.443		0.461		-0.721	-0.772	-0.75	-0.699
FINISHED CENTRELINE RL	31.335	31.061		30.884		30.589	30.596	30.718	30.851
PEGGED CHAINAGE	0	20		40		58.102	60	68.77	74.1

HORIZ. CURVE RADIUS

ROAD 05 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)



DATUM R.L.27.000

LIP OF KERB RHS			35.664	35.699	36.171	36.513	36.813	37.1	37.142	37.076	36.85	36.848	36.918	37.005	37.092	
LIP OF KERB LHS			35.664	35.699	36.171	36.513	36.813	37.1	37.142	37.076	36.85	36.848	36.918	37.005	37.092	
EXISTING SURFACE	37.413	37.343	37.056	36.733	36.476	36.273	36.487	37.757	37.784	37.641	37.346	37.374	37.815	37.637	39.243	39.086
CUT/FILL DEPTH	-1.399	-1.461	-1.306	-0.948	-0.218	0.327	0.413	-0.57	-0.555	-0.477	-0.409	-0.439	-0.81	-0.545	-2.064	-1.611
FINISHED CENTRELINE RL	36.014	35.883	35.751	35.786	36.258	36.6	36.9	37.187	37.229	37.163	36.937	36.935	37.005	37.092	37.179	37.474
PEGGED CHAINAGE	0	5.252	15.878	20	40	60	80	100	108.929	120	140	141.978	160	180	200	220

HORIZ. CURVE RADIUS

ROAD 06 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)

SCALE 1:1000 (A1) 1:2000 (A3)

20 15 10 5 0 20 40 60 80 100m

2.0 1.5 1.0 0.5 0 2 4 6 8 10m

SCALE 1:100 (A1) 1:200 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingleman
Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ROAD LONGITUDINAL SECTION
SHEET 3 OF 6

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

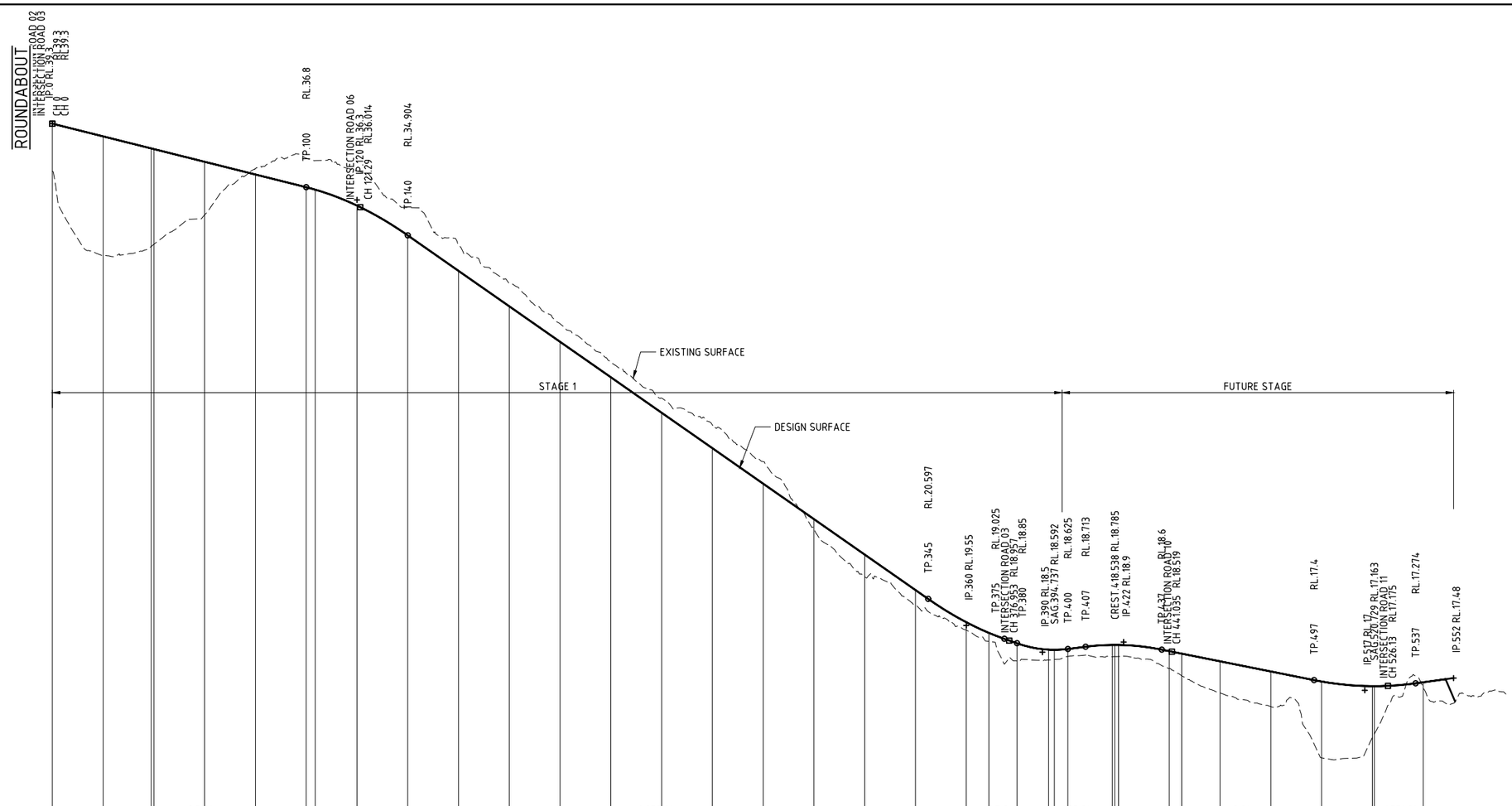
Project No. B00702-DA-CR10

Drawing No.

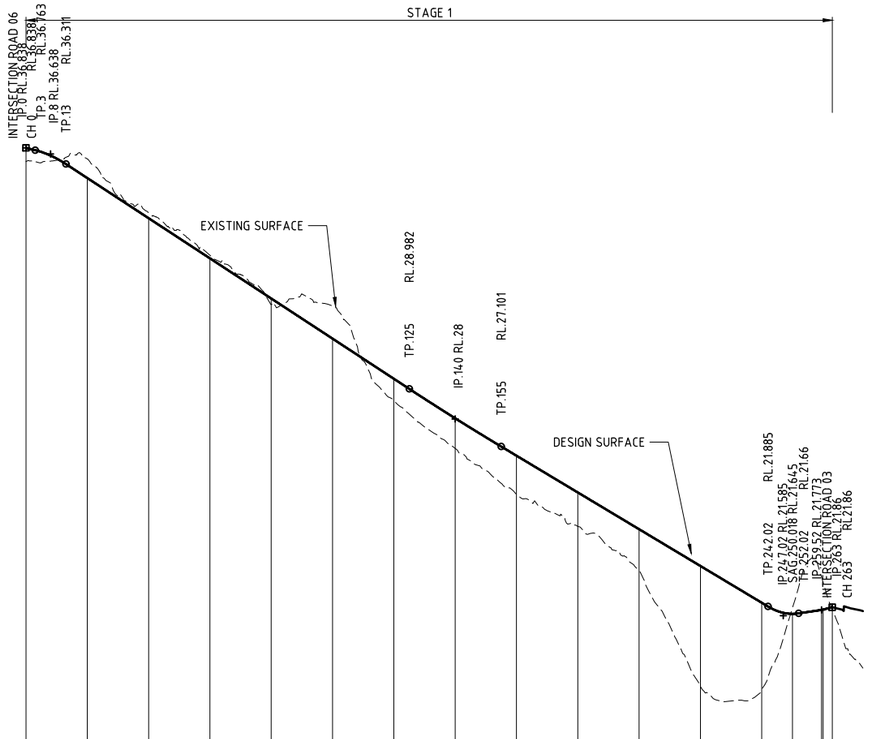
Rev A

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ROUNDABOUT
INTERSECTION ROAD 02
CH 0
RL 39.3
INTERSECTION ROAD 03
RL 39.3
RL 36.8
TP 100
INTERSECTION ROAD 06
IP 120 RL 36.3
CH 121.29
RL 36.014
RL 34.904
TP 140
EXISTING SURFACE
STAGE 1
FUTURE STAGE
DESIGN SURFACE
RL 20.597
TP 345
IP 360 RL 19.55
TP 375
INTERSECTION ROAD 03
CH 375.385 RL 18.85
TP 380
RL 19.025
IP 390 RL 18.5
SAG 394.737 RL 18.592
TP 400
RL 18.625
TP 407
RL 18.713
CREST 418.538 RL 18.785
IP 422 RL 18.9
TP 437
INTERSECTION ROAD 10
CH 441.035 RL 18.519
RL 18.6
TP 497
RL 17.4
IP 517 RL 17
SAG 520.729 RL 17.163
INTERSECTION ROAD 11
CH 526.113 RL 17.115
TP 537
RL 17.274
IP 552 RL 17.48

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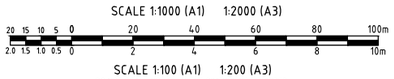
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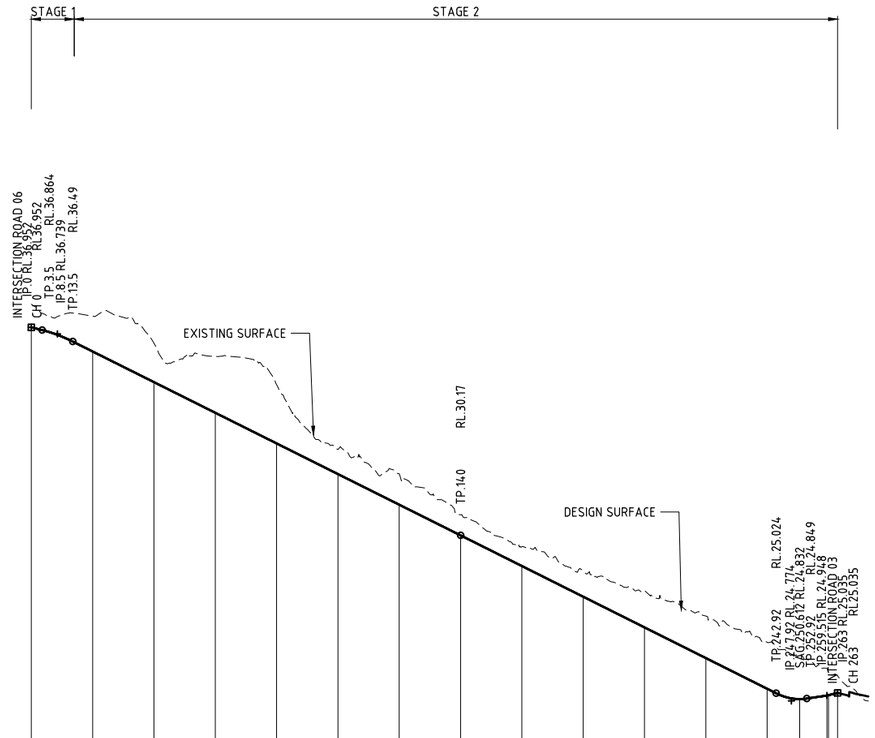
LIP OF KERB RHS			35.766	34.457	33.148	31.84	30.531	29.222	27.934	26.714	25.515	24.317	23.118	21.919	21.558			
LIP OF KERB LHS			35.766	34.457	33.148	31.84	30.531	29.222	27.934	26.714	25.515	24.317	23.118	21.919	21.558			
EXISTING SURFACE	36.391		36.475	34.718	33.337	31.723	31.685	28.58	27.037	25.535	24.498	23.058	19.283	19.174	21.851	22.835	22.677	21.786
CUT/FILL DEPTH	0.448		-0.622	-0.173	-0.102	0.204	-1.067	0.729	0.983	1.266	1.105	1.346	3.922	2.832	-0.205	-1.062	-0.893	0.074
FINISHED CENTRELINE RL	36.839		35.853	34.544	33.235	31.927	30.618	29.309	28.021	26.801	25.602	24.404	23.205	22.006	21.645	21.773	21.785	21.86
PEGGED CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	250.018	259.52	260	263	

HORIZ. CURVE RADIUS

ROAD 07 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)





DATUM R.L.19.000

LIP OF KERB RHS			36.078	35.079	34.08	33.08	32.081	31.082	30.083	29.083	28.083	27.083	26.083	25.083	24.745			
LIP OF KERB LHS			36.078	35.079	34.08	33.08	32.081	31.082	30.083	29.083	28.083	27.083	26.083	25.083	24.745			
EXISTING SURFACE	37.705		37.316	36.436	36.005	35.087	32.976	32.174	30.845	29.8	29.009	28.371	27.54	26.684	26.235	25.833	25.724	25.612
CUT/FILL DEPTH	-0.754		-1.152	-1.27	-1.838	-1.92	-0.808	-1.005	-0.675	-0.63	-0.839	-1.202	-1.37	-1.514	-1.403	-0.886	-0.764	-0.577
FINISHED CENTRELINE RL	36.952		36.165	35.166	34.167	33.167	32.168	31.169	30.17	29.17	28.17	27.17	26.17	25.17	24.832	24.948	24.96	25.035
PEGGED CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	250.612	259.515	260	263	

HORIZ. CURVE RADIUS

ROAD 08 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ROAD LONGITUDINAL SECTION
SHEET 5 OF 6

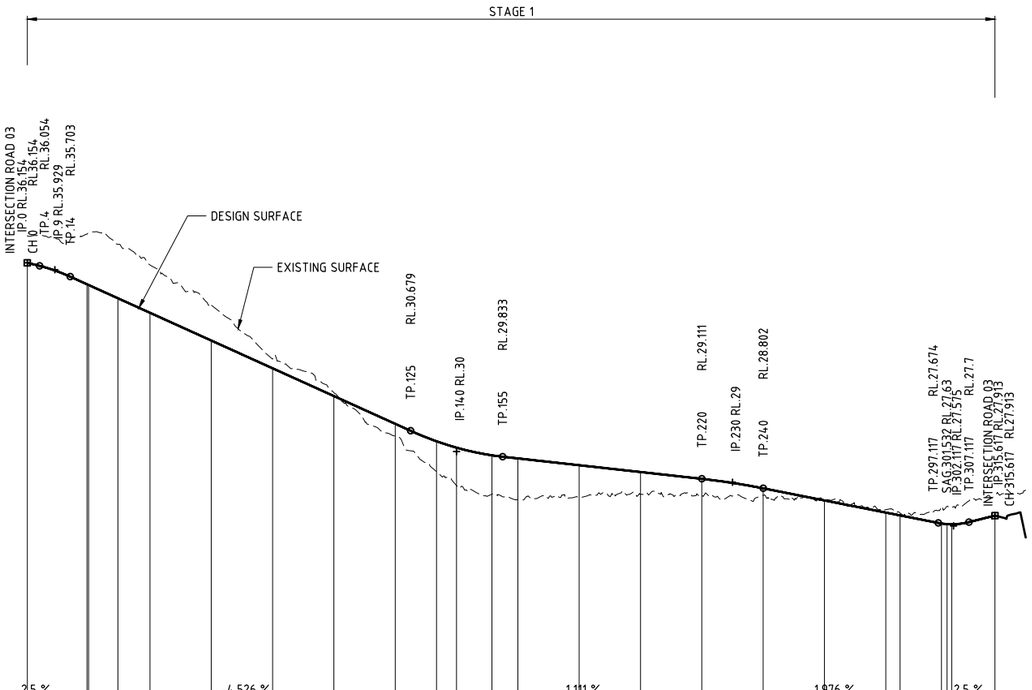
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PSM 79006
RL 67.474
(RCC) COORD

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Project No. B00702 | Drawing No. DA-CR12 | Rev A

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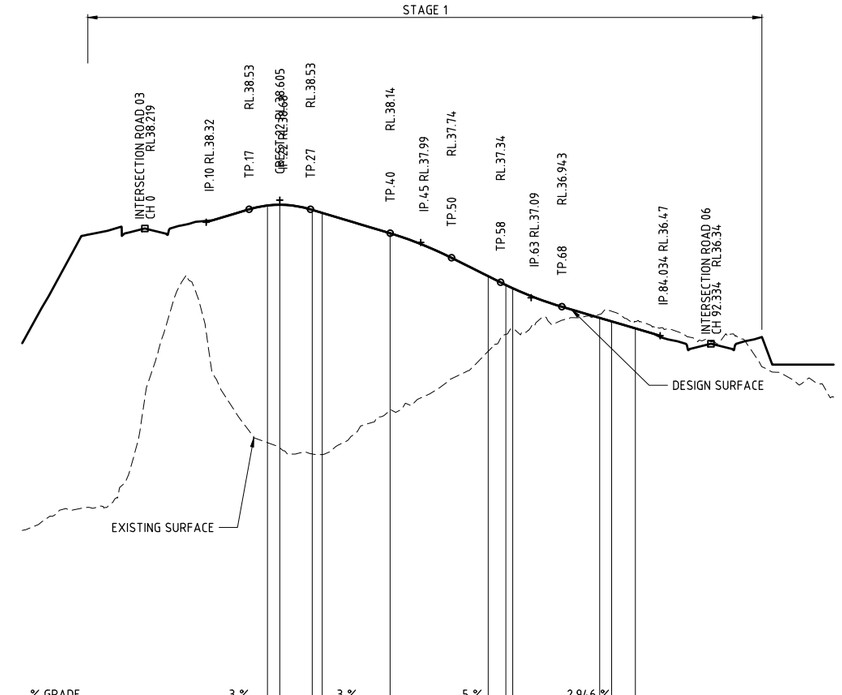


DATUM R.L.19.000

LIP OF KERB RHS			35.368	35.344	34.912	34.439	33.534	32.629	31.723	30.818	30.249	30.041	29.792	29.691	29.469	29.246	29.024	28.715	28.32	27.925	27.833	27.569	27.549	27.543	
LIP OF KERB LHS			35.373	35.349	34.917	34.444	33.538	32.633	31.728	30.823	30.254	30.046	29.796	29.695	29.473	29.251	29.029	28.72	28.325	27.93	27.838	27.573	27.553	27.548	
EXISTING SURFACE	37.042		37.092	37.133	36.754	36.088	34.78	33.02	31.922	30.502	29.348	28.893	28.607	28.435	28.502	28.603	28.569	28.573	28.419	28.106	27.995	28.185	28.214	28.17	28.572
CUT/FILL DEPTH	-0.888		-1.636	-1.702	-1.755	-1.562	-1.159	-0.304	-0.111	0.403	0.988	1.235	1.271	1.343	1.054	0.73	0.542	0.23	-0.012	-0.093	-0.075	-0.529	-0.578	-0.54	-0.66	
FINISHED CENTRELINE RL	36.154		35.455	35.431	34.999	34.526	33.621	32.716	31.81	30.905	30.336	30.128	29.879	29.778	29.556	29.333	29.111	28.802	28.407	28.012	27.92	27.656	27.636	27.63	27.913	
PEGGED CHAINAGE	0		19.474	20	29.545	40	60	80	100	120	133.478	140	151.542	160	180	200	220	240	260	280	284.66	298.15	300	301.532	315.617	
HORIZ. CURVE RADIUS			15 R								11.5 R									15 R					

ROAD 09 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)



DATUM R.L.29.000

EDGE OF CONCRETE RHS			38.662	38.674	38.59	38.541	38.209					37.509	37.366	37.313				36.829	36.772	36.658			
EDGE OF CONCRETE LHS			38.662	38.674	38.59	38.541	38.209					37.509	37.366	37.313				36.829	36.772	36.658			
EXISTING SURFACE	35.458		34.727	34.643	34.543	34.533	35.257					36.217	36.493	36.584				36.818	36.869	36.701			36.374
CUT/FILL DEPTH			3.866	3.962	3.978	3.939	2.883					1.223	0.805	0.66				-0.057	-0.166	-0.112			
FINISHED CENTRELINE RL			38.593	38.605	38.521	38.472	38.14					37.44	37.297	37.244				36.761	36.703	36.589			
PEGGED CHAINAGE	0		20	22	27.294	28.927	40					56.003	58.872	60				74.178	76.134	80			92.334
HORIZ. CURVE RADIUS								-10 R					-10 R				-10 R						

LANE 01 LONGITUDINAL SECTION

SCALE 1:100(VERT.) SCALE 1:1000(HORIZ.)

SCALE 1:1000 (A1) 1:2000 (A3)

20 15 10 5 0 20 40 60 80 100m
2.0 1.5 1.0 0.5 0 2 4 6 8 10m

SCALE 1:100 (A1) 1:200 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingerman
Registered Engineer
Date " "
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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: ROAD LONGITUDINAL SECTION
SHEET 6 OF 6

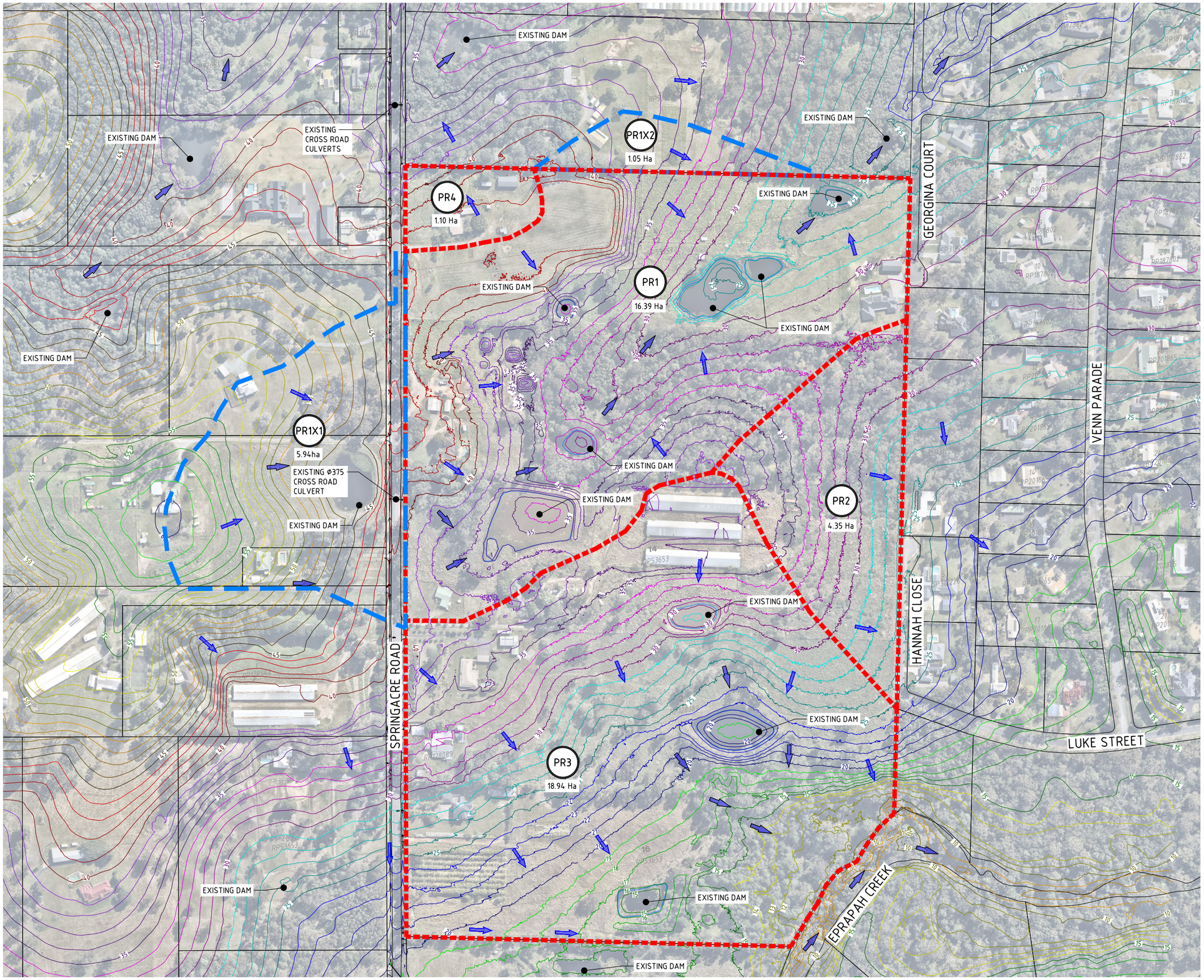
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RL 67.474
(RCC) COORD

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Project No. B00702 | Drawing No. DA-CR13 | Rev A

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CATCHMENT TABLE

INTERNAL		EXTERNAL	
CATCHMENT No.	AREA (Ha)	CATCHMENT NO.	AREA (Ha)
PR1	16.39 Ha	PR1X1	5.94 Ha
PR2	4.35 Ha	PR1X2	1.05 Ha
PR3	18.94 Ha		
PR4	1.10 Ha		

LEGEND

- EXISTING CONTOURS
- LOT BOUNDARY
- INTERNAL STORMWATER CATCHMENT
- EXTERNAL STORMWATER CATCHMENT
- PR1 — CATCHMENT NUMBER
- STORMWATER OVERLAND FLOW
- CONCENTRATED STORMWATER FLOW

0 40 80 120 160 200m

40 30 20 10

SCALE 1:2000 (A1) 1:4000 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingleman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: PRE DEVELOPMENT CATCHMENT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-SW01 | Rev A

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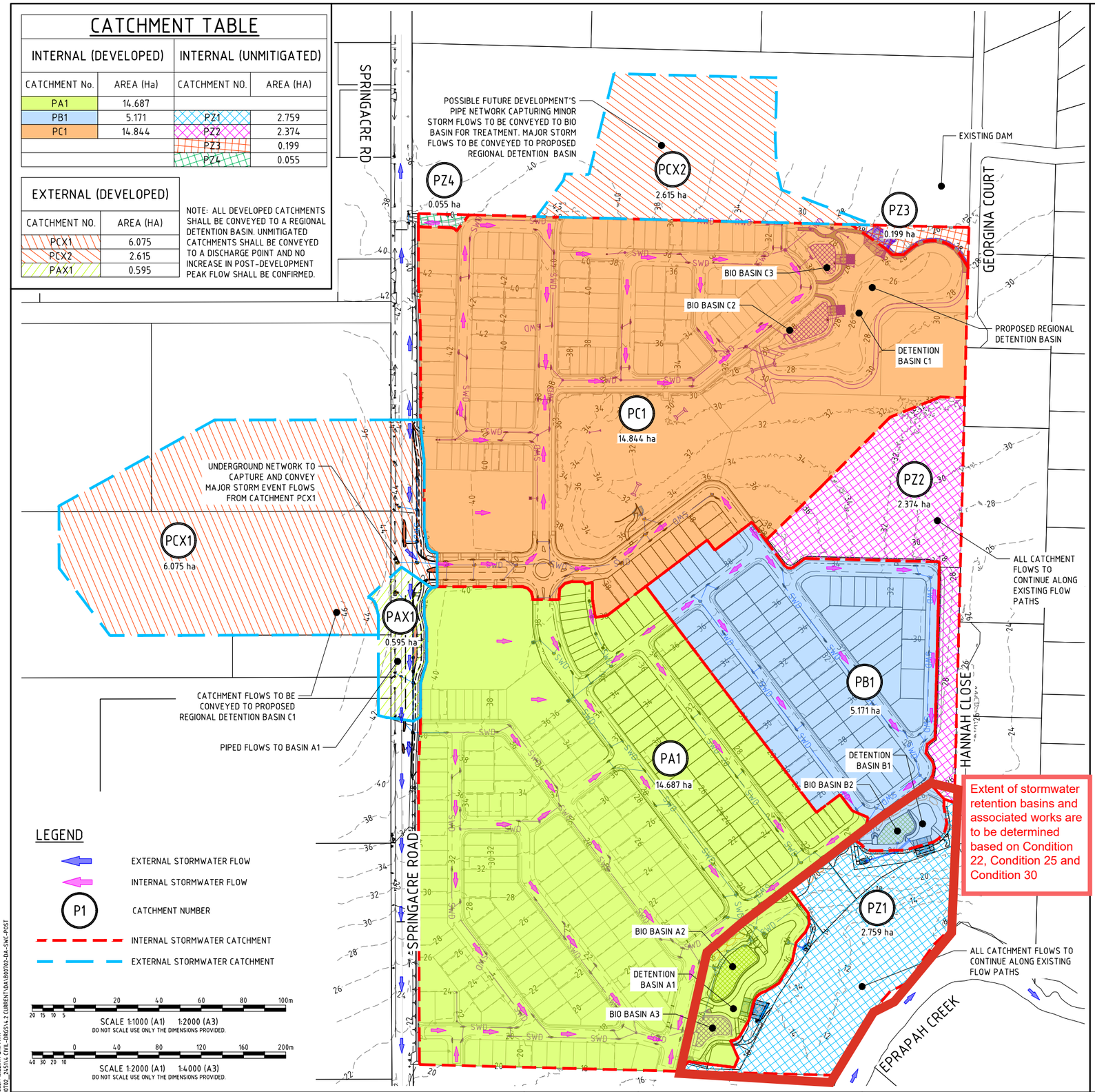
" "

CATCHMENT TABLE

INTERNAL (DEVELOPED)		INTERNAL (UNMITIGATED)	
CATCHMENT No.	AREA (Ha)	CATCHMENT NO.	AREA (HA)
PA1	14.687		
PB1	5.171	PZ1	2.759
PC1	14.844	PZ2	2.374
		PZ3	0.199
		PZ4	0.055

EXTERNAL (DEVELOPED)	
CATCHMENT NO.	AREA (HA)
PCX1	6.075
PCX2	2.615
PAX1	0.595

NOTE: ALL DEVELOPED CATCHMENTS SHALL BE CONVEYED TO A REGIONAL DETENTION BASIN. UNMITIGATED CATCHMENTS SHALL BE CONVEYED TO A DISCHARGE POINT AND NO INCREASE IN POST-DEVELOPMENT PEAK FLOW SHALL BE CONFIRMED.



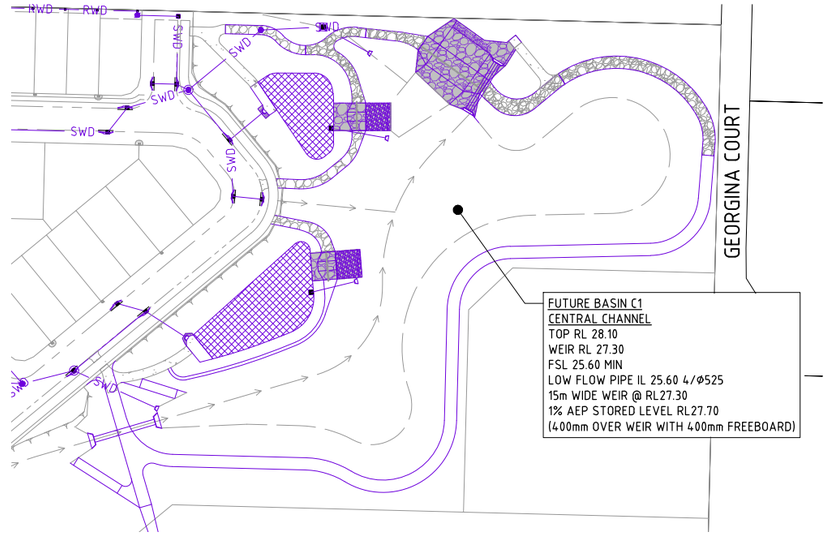
Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

LEGEND

- EXTERNAL STORMWATER FLOW
- INTERNAL STORMWATER FLOW
- P1 — CATCHMENT NUMBER
- INTERNAL STORMWATER CATCHMENT
- EXTERNAL STORMWATER CATCHMENT

0 20 40 60 80 100m
20 15 10 5
SCALE 1:1000 (A1) 1:2000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

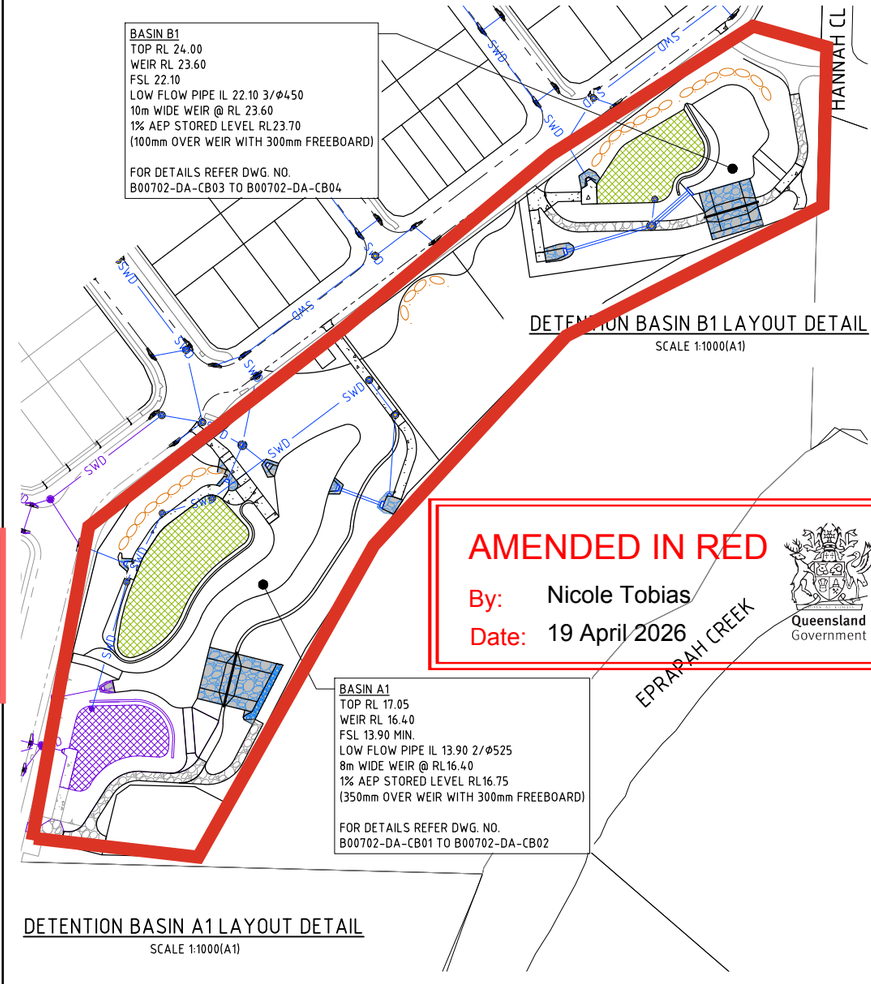
0 40 80 120 160 200m
40 30 20 10
SCALE 1:2000 (A1) 1:4000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.



FUTURE BASIN C1
CENTRAL CHANNEL
TOP RL 28.10
WEIR RL 27.30
FSL 25.60 MIN
LOW FLOW PIPE IL 25.60 4/ϕ525
15m WIDE WEIR @ RL27.30
1% AEP STORED LEVEL RL27.70
(400mm OVER WEIR WITH 400mm FREEBOARD)

DETENTION BASIN C1 LAYOUT DETAIL

SCALE 1:1000(A1)



BASIN B1
TOP RL 24.00
WEIR RL 23.60
FSL 22.10
LOW FLOW PIPE IL 22.10 3/ϕ450
10m WIDE WEIR @ RL 23.60
1% AEP STORED LEVEL RL23.70
(100mm OVER WEIR WITH 300mm FREEBOARD)

FOR DETAILS REFER DWG. NO.
B00702-DA-CB03 TO B00702-DA-CB04

DETENTION BASIN B1 LAYOUT DETAIL

SCALE 1:1000(A1)

BASIN A1
TOP RL 17.05
WEIR RL 16.40
FSL 13.90 MIN.
LOW FLOW PIPE IL 13.90 2/ϕ525
8m WIDE WEIR @ RL16.40
1% AEP STORED LEVEL RL16.75
(350mm OVER WEIR WITH 300mm FREEBOARD)

FOR DETAILS REFER DWG. NO.
B00702-DA-CB01 TO B00702-DA-CB02

DETENTION BASIN A1 LAYOUT DETAIL

SCALE 1:1000(A1)

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Angeleman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: POST DEVELOPMENT CATCHMENT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-SW02 | Rev A

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File Name: S:\Jobs\data\MANJOBS\N01\B00702_245114 CIVIL-DRGS\4.2 CURRENT\DA\B00702-DA-SWC-POST
User: WILLIAM GRIFFITH

" "

LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS)
- LOT BOUNDARY
- BARRIER TYPE KERB AND CHANNEL
- MOUNTABLE TYPE KERB AND CHANNEL
- TOP OF BATTER
- TOE OF BATTER
- STORMWATER MAINTENANCE HOLE
- STORMWATER CATCHPITS
- STORMWATER HEADWALL
- STORMWATER FIELD INLET
- SWD — STORMWATER DRAINAGE
- OPEN CHANNEL

CREDITABLE CATCHMENT FOR STORMWATER QUALITY TREATMENT

EXISTING DAM TO REMAIN

GEORGINA COURT

SPRINGACRE ROAD

CATCHMENT TO PROVIDE OWN STORMWATER QUALITY TREATMENT WITHIN THE SITE

CATCHMENT TO PROVIDE OWN STORMWATER QUALITY TREATMENT WITHIN THE SITE

PIPED FLOWS TO BIO A2

QCX2 2.471 ha

QC3 1.204 ha

QC2 5.262 ha

QC41 0.790 ha

QCX1 6.075 ha

QC4 1.282 ha

QAX1 0.595 ha

QA31 1.228 ha

QB2 4.847 ha

QA2 7.937 ha

QA3 4.579 ha

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

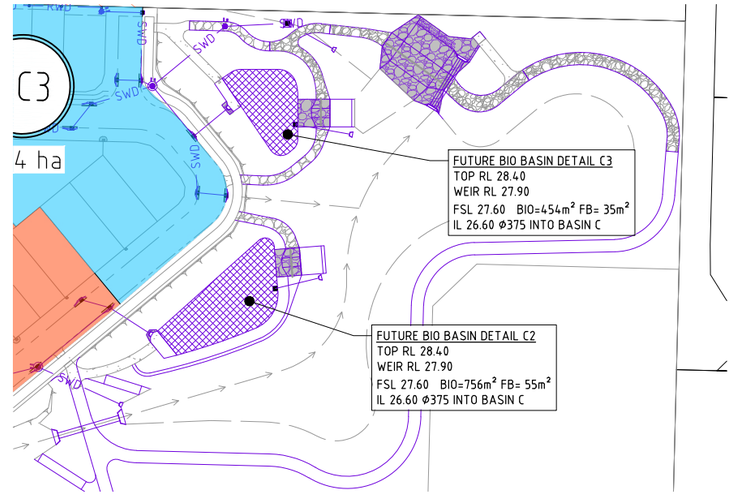
CATCHMENT TABLE

CATCHMENT No.	AREA (Ha)
INTERNAL	
QA31	1.228
QA2	7.937
QA3	4.579
QB2	4.847
QC3	1.204
QC2	5.262
QC4	1.282
QC41	0.790
EXTERNAL	
QAX1	0.595
QCX1	6.075
QCX2	2.471

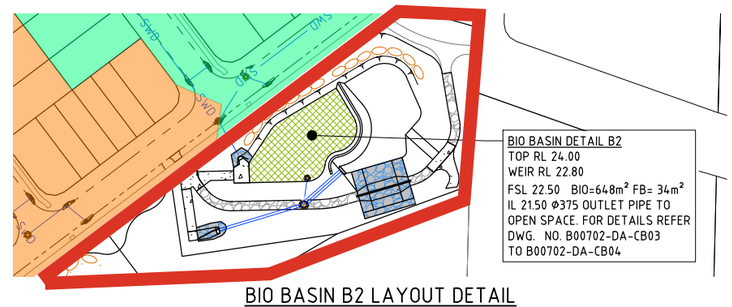
AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

DEPARTMENT OF TRANSPORT AND MAIN ROADS

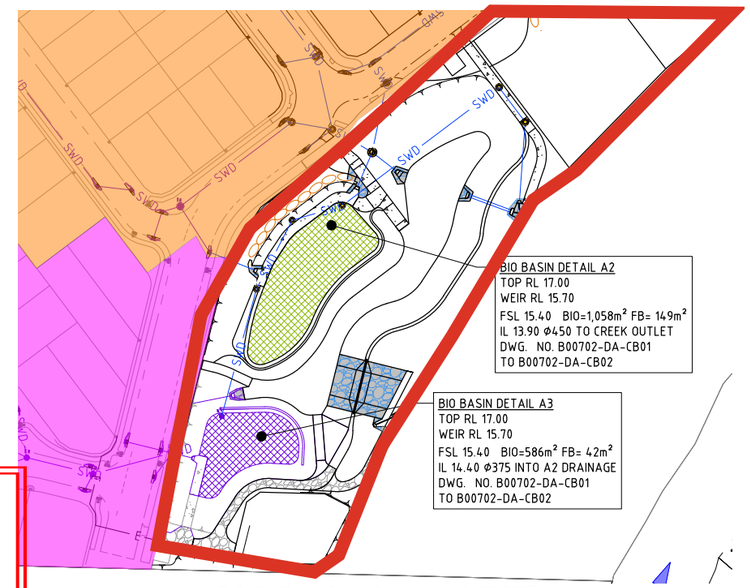
Queensland Government



FUTURE BIO BASIN C2 AND C3 LAYOUT DETAIL
SCALE 1:1000(A1)



BIO BASIN B2 LAYOUT DETAIL
SCALE 1:1000(A1)



BIO BASIN A2 AND A3 LAYOUT DETAIL
SCALE 1:1000(A1)

0 40 80 120 160 200m
40 30 20 10
SCALE 1:2000 (A1) 1:4000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

0 20 40 60 80 100m
20 15 10 5
SCALE 1:1000 (A1) 1:2000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Engelman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: STORMWATER QUALITY CATCHMENT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. DA-SW03
Rev A

" "

Plot Date: 12/12/2025 12:33:01 PM
File Name: S:\126x\data\MANUDSYNR\B00702_245114_CIVIL_DRGS\4.2 CURRENT\DA\B00702-DA-SWC-QUAL
User: WILLIAM GRIFFITH

STAGE 3

STAGE 4

ROAD 03

PROPOSED SHARED PATH 2.5m WIDE

HIGH FLOW BYPASS MANHOLE TO DIVERT LARGER STORMWATER FLOWS DIRECTLY INTO BASIN

BOULDER RETAINING WALL

ELECTRICAL PAD MOUNT TRANSFORMER SITE

REFER LANDSCAPE PACKAGE FOR VERGE FEATURES AND TREATMENTS

UNDER DRAINS CONNECTION POINT

BASIN A1

1% NOM SURFACE SLOPE TO OUTLET PIPES

1 IN 6 MAX INFORMAL ACCESS AREA

1 IN 6 MAX CONCRETE ACCESS RAMP

BIO BASIN A2
TOP RL 16.50
WEIR RL 15.70
FSL 15.40
IL 14.30

1 IN 3 MAX SLOPE

LOW FLOW OUTLET PIPES DISCHARGING TO OPEN SPACE

FUTURE HIGH FLOW BYPASS MANHOLE

UNDER DRAINS CONNECTION POINT

FUTURE BASIN

BIO BASIN A3
TOP RL 16.50
WEIR RL 15.70
FSL 15.40
IL 14.40

HIGH FLOW WEIR

1 IN 6 MAX CONCRETE ACCESS RAMP

UNDER DRAINS DISCHARGE TO OPEN SPACE

ELECTRICAL PAD MOUNT TRANSFORMER SITE

SEWER PUMP STATION

1 IN 6 MAX INFORMAL ACCESS AREA

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

LEGEND

- 57.50 — FINISHED SURFACE CONTOURS (0.25m INTERVALS)
- STORMWATER MAINTENANCE HOLE
- STORMWATER CATCHPITS
- STORMWATER HEADWALL
- STORMWATER FIELD INLET
- SWD — STORMWATER DRAINAGE
- BARRIER TYPE KERB AND CHANNEL
- MOUNTABLE TYPE KERB AND CHANNEL
- EDGE OF SURFACING
- TOP OF BATTER
- TOE OF BATTER
- OPEN CHANNEL
- SLOTTED PVC PIPES
- UNDERDRAINAGE PIPES
- BIO-RETENTION FILTER AREA
- CONCRETE
- LANDSCAPING
- GROUTED ROCK PITCHING
- GRAVEL TRACK 150mm TYPE 2.3 ROAD BASE
- SANDSTONE BOULDER RETAINING WALL
- LOT BOUNDARY

0 5 10 15 20 25m
5 3.75 2.5 1.25

SCALE 1:250 (A1) 1:500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

DETENTION BASIN A1 AND BIORETENTION BASINS A2 AND A3 – LAYOUT PLAN
SCALE 1:250 (A1) 1:500 (A3)

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: BIORETENTION BASIN A2 AND A3 LAYOUT PLAN

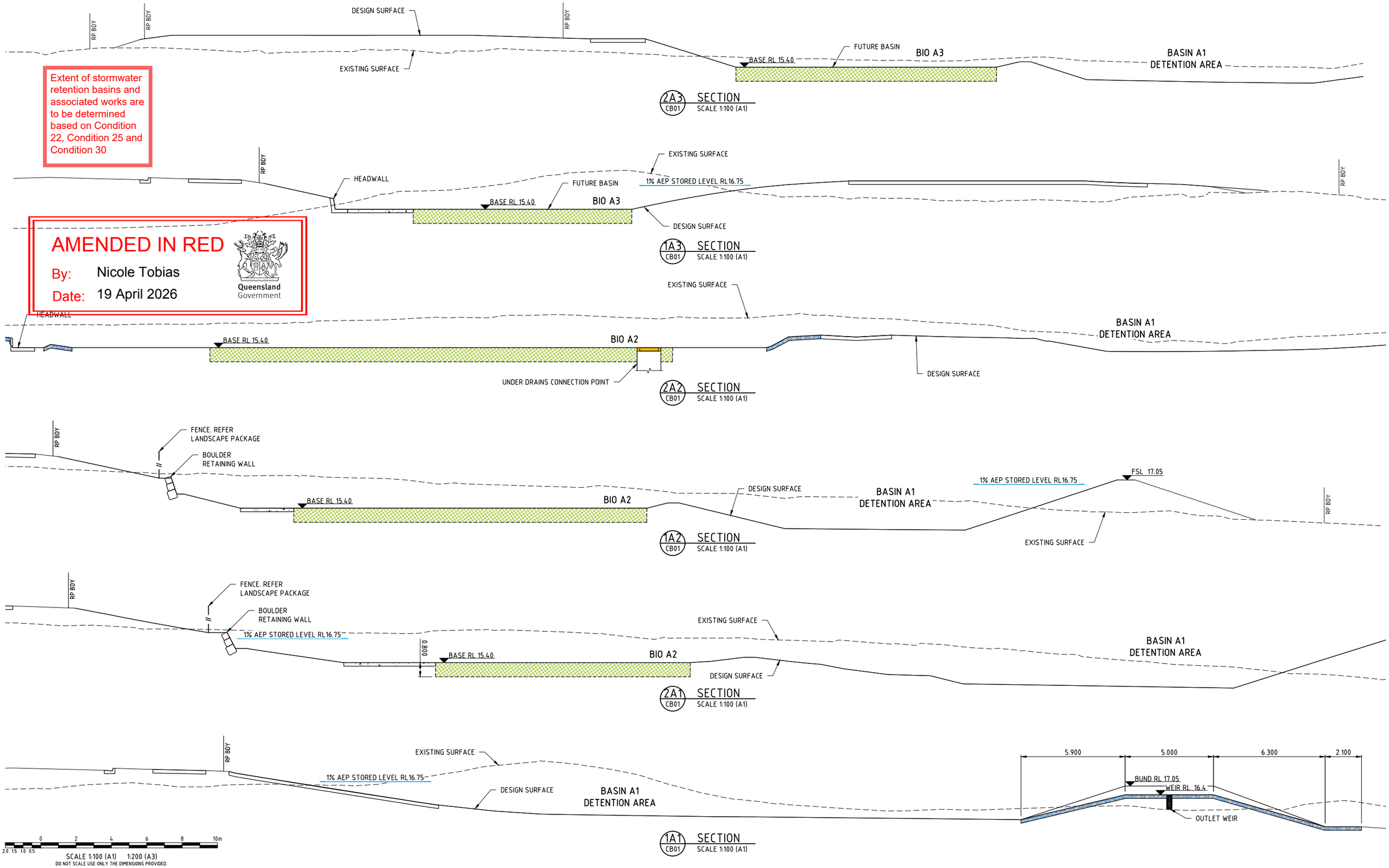
Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-CB01 | Rev A

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User: WILLIAM GRIFFITH



No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Engelman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: BIORETENTION BASIN A2 AND A3 CROSS SECTIONS

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CB02	A

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File Name: S:\126x\data\MANDS\YNOR\B00792_24511\4 CIVIL-DRGS\4.2 CURRENT\0A\B00702-DA-B0L-1

LEGEND

- FINISHED SURFACE CONTOURS (0.25m INTERVALS) — 57.50
- STORMWATER MAINTENANCE HOLE
- STORMWATER CATCHPITS
- STORMWATER HEADWALL
- STORMWATER FIELD INLET
- SWD — STORMWATER DRAINAGE
- BARRIER TYPE KERB AND CHANNEL
- MOUNTABLE TYPE KERB AND CHANNEL
- EDGE OF SURFACING
- TOP OF BATTER
- TOE OF BATTER
- OPEN CHANNEL
- SLOTTED PVC PIPES
- UNDERDRAINAGE PIPES
- BIO-RETENTION FILTER AREA
- CONCRETE
- LANDSCAPING
- GROUTED ROCK PITCHING
- GRAVEL TRACK 150mm TYPE 2.3 ROAD BASE
- SANDSTONE BOULDER RETAINING WALL
- LOT BOUNDARY

ROAD 08
ROAD 03
ROAD 07
HANNAH CLOSE
LUKE STREET
PROPOSED SHARED PATH 2.5m WIDE
BOULDER RETAINING WALL
BASIN DETAIL B1
TOP RL 24.00
WEIR RL 23.60
FSL 22.10
IL 22.10
EMERGENCY EGRESS AND SHARED PATH CONNECTION FO LUKE STREET
BIO BASIN B2
TOP RL 24.00
WEIR RL 22.80
FSL 22.50
IL 21.50
1% NOM SURFACE SLOPE TO OUTLET PIPES
1 IN 6 MAX INFORMAL ACCESS AREA
1 IN 6 MAX CONCRETE ACCESS RAMP
UNDER DRAINS CONNECTION POINT
HIGH FLOW WEIR
LOW FLOW OUTLET PIPES DISCHARGING TO OPEN SPACE
2B1 CB04
2B2 CB04
1B2 CB04
1B1 CB04
SWD
OMS
REFER LANDSCAPE PACKAGE FOR VERGE FEATURES AND TREATMENTS

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

DETENTION BASIN B1 AND BIORETENTION BASIN B2 - LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

0 5 10 15 20 25m
5 3.75 2.5 1.25
SCALE 1:250 (A1) 1:500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX
EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: BIORETENTION BASIN B2 LAYOUT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-CB03 | Rev A

Plot Date: 12/12/2025 12:34:02 PM
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User: WILLIAM GRIFFITH

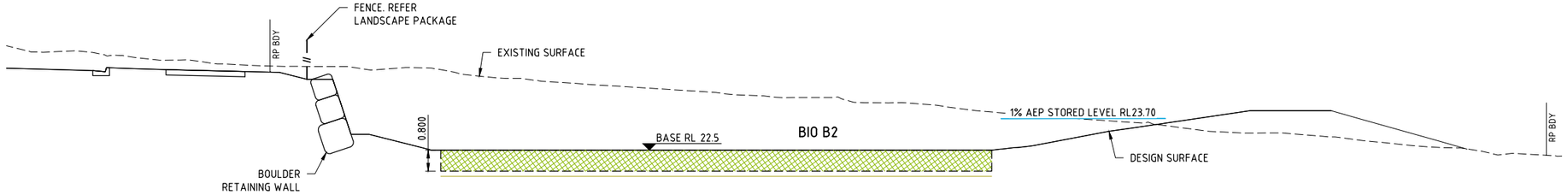
AMENDED IN RED

By: Nicole Tobias

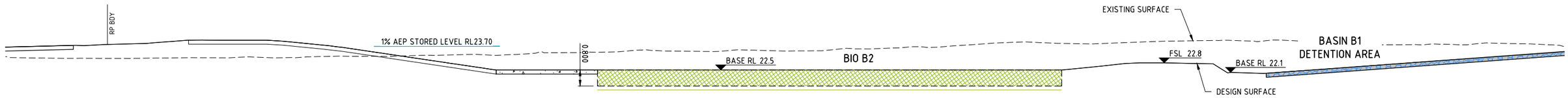
Date: 19 April 2026

Queensland Government

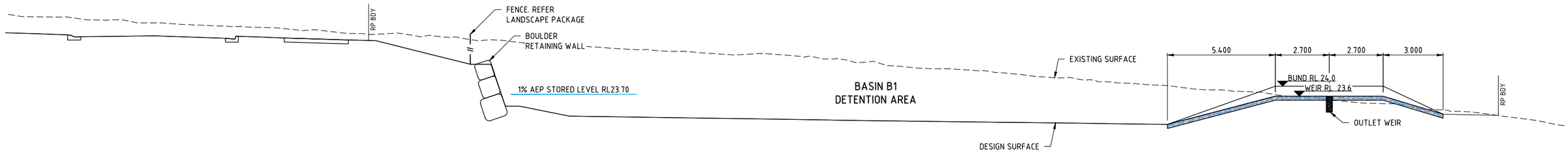
Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30



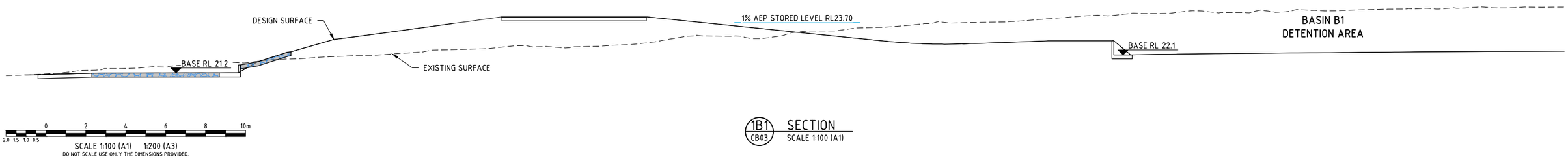
2B2 CB03 SECTION
SCALE 1:100 (A1)



1B2 CB03 SECTION
SCALE 1:100 (A1)



2B1 CB03 SECTION
SCALE 1:100 (A1)



SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

1B1 CB03 SECTION
SCALE 1:100 (A1)

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: BIORETENTION BASIN B2 CROSS SECTIONS

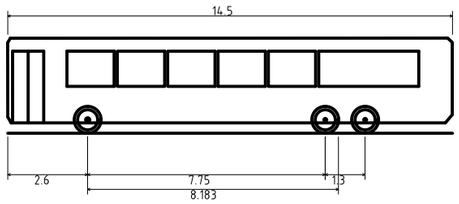
Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

NOT FOR CONSTRUCTION

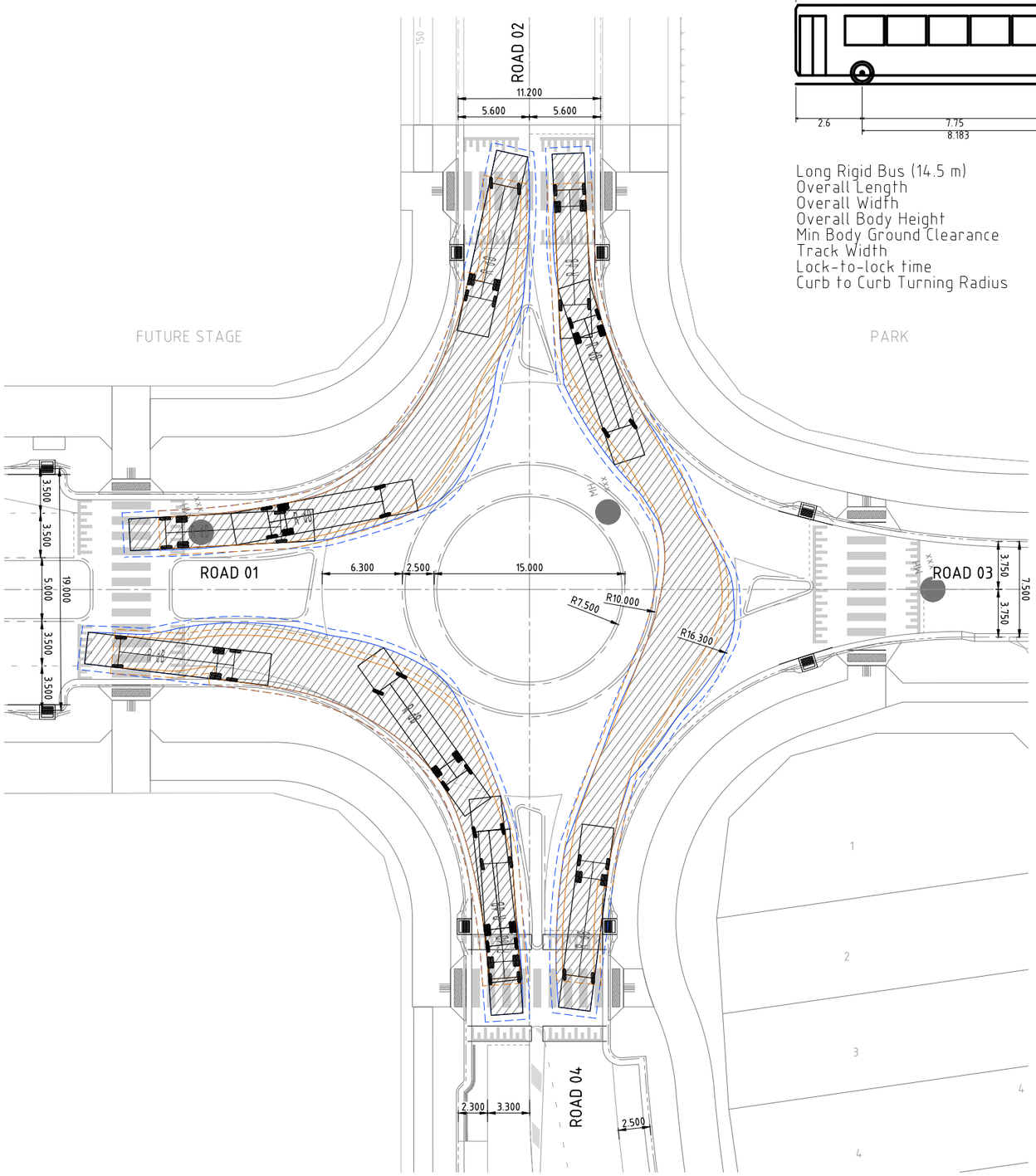
Project No. B00702 | Drawing No. DA-CB04 | Rev A

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Plot Date: 12/12/2025 12:34:09 PM
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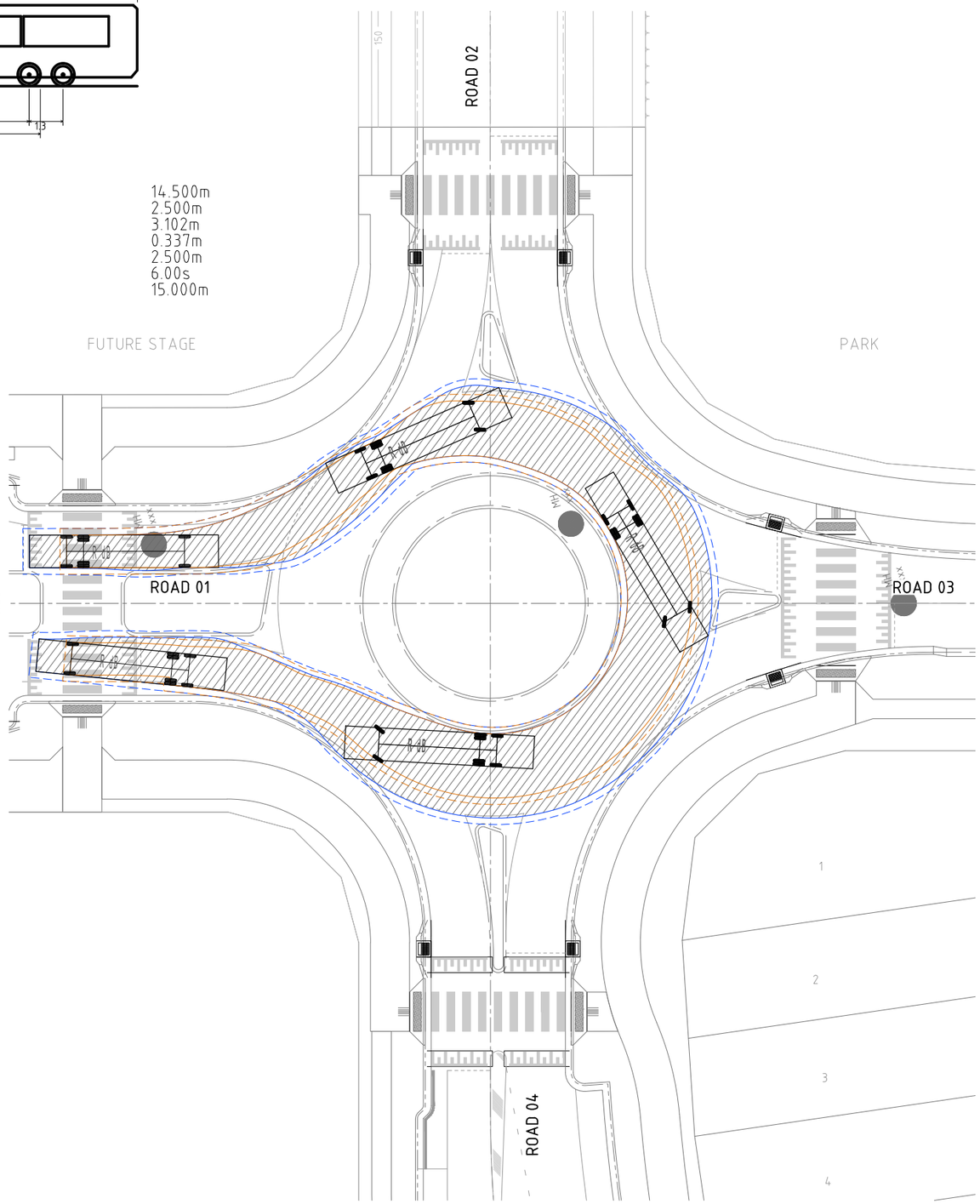


Long Rigid Bus (14.5 m)	
Overall Length	14.500m
Overall Width	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.337m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m



14.5m BUS TURNING TEMPLATE – ROAD 01, 02, 04

SCALE 1:200



14.5m BUS TURNING TEMPLATE – ROAD 01 to ROAD 01

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

NOTE

14.5m BUS CHECK VEHICLE FOR REFERENCE ONLY

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Engelman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
DESIGN VEHICLE 14.5M BUS
SHEET 1 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

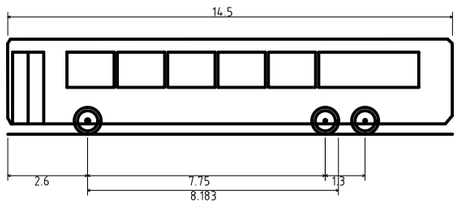
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NOT FOR CONSTRUCTION

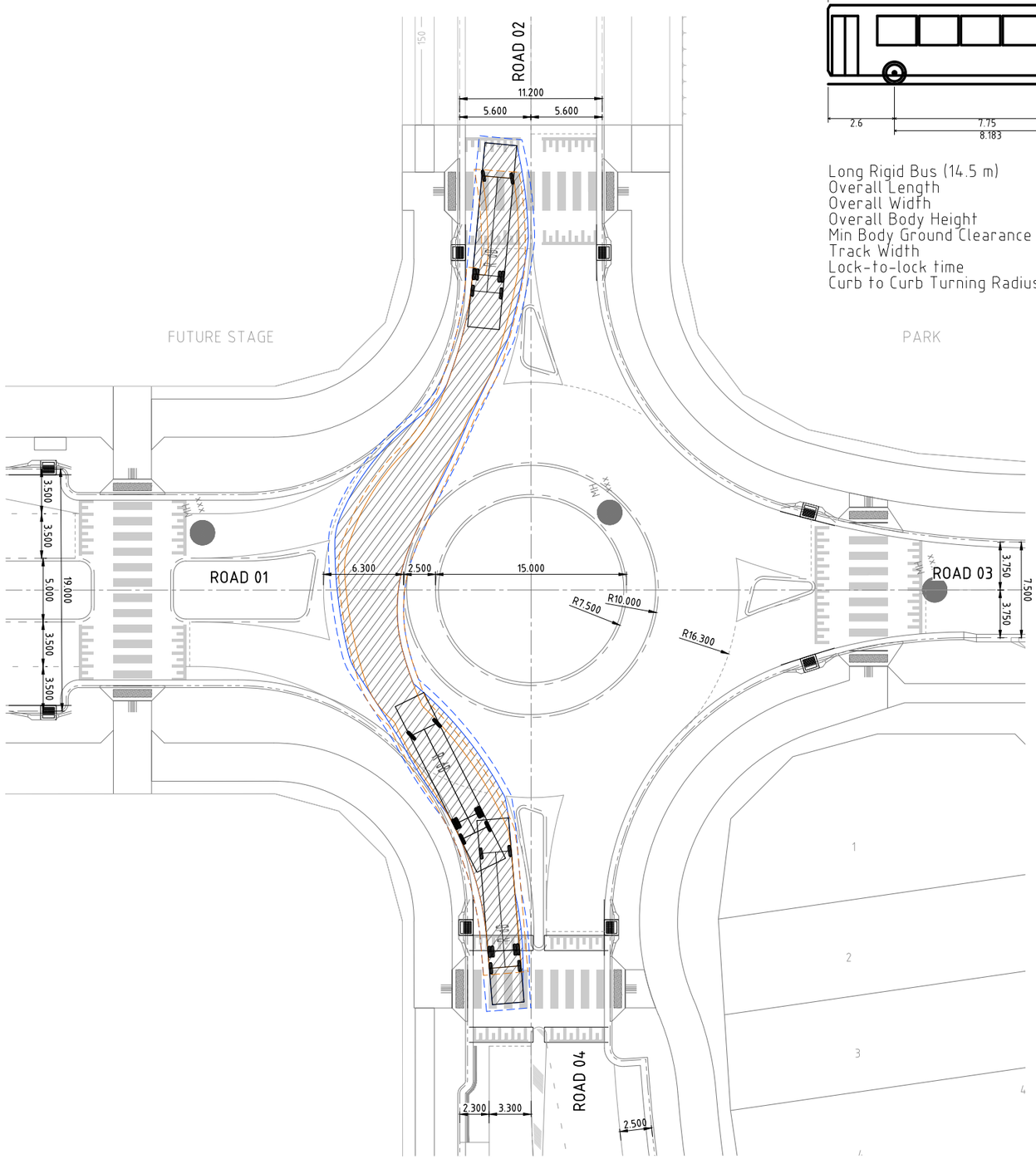
Project No. B00702 | Drawing No. B00702-DA-CT01 | Rev A

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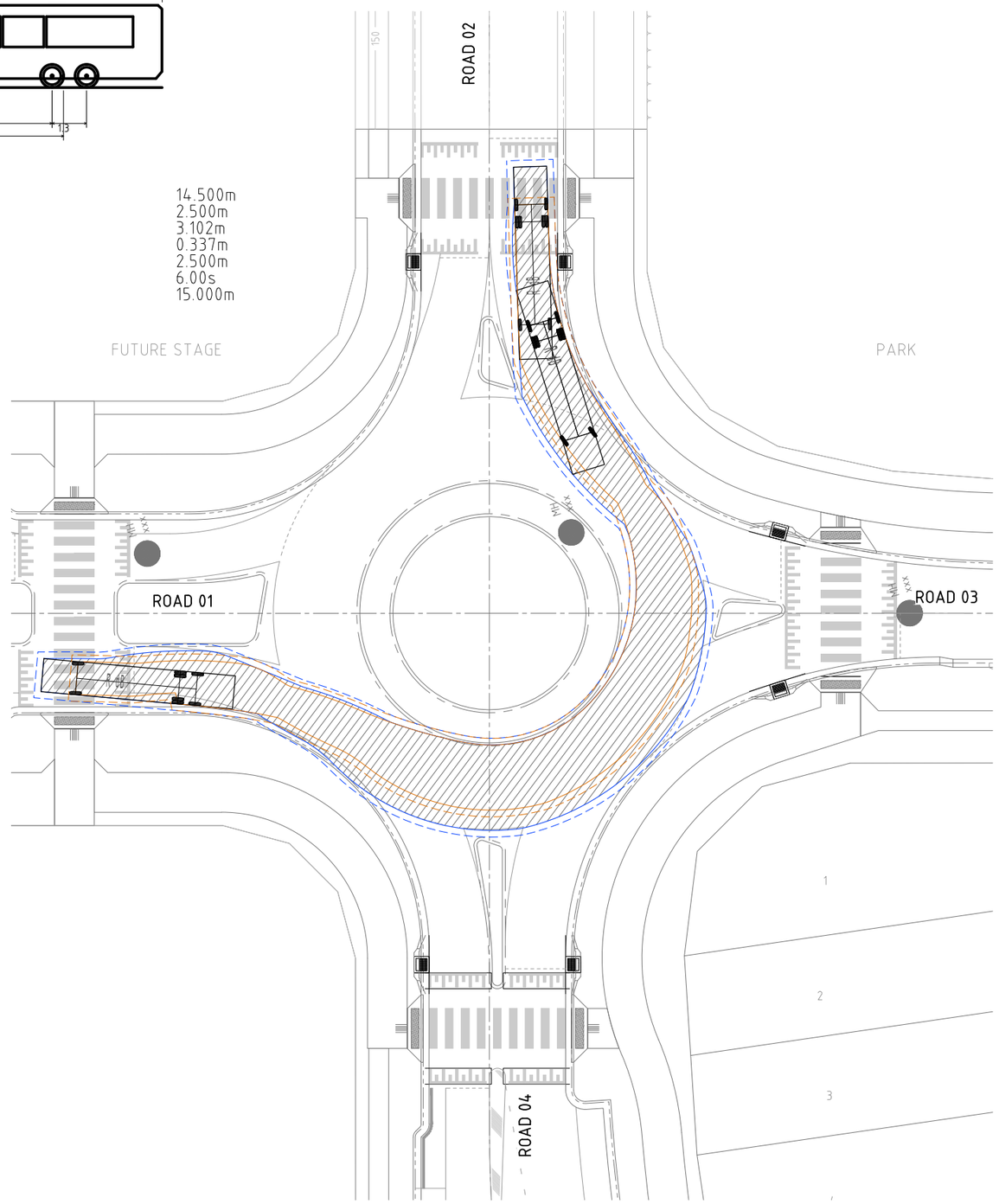
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File Name: S:\126x\data\MAN\205SYNTH\B00702_24514 CIVIL_DRGS\4.2 CURRENT\DA\B00702-DA-TURNING



Long Rigid Bus (14.5 m)	
Overall Length	14.500m
Overall Widfh	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.337m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m



14.5m BUS TURNING TEMPLATE - ROAD 04 to ROAD 02
SCALE 1:200



14.5m BUS TURNING TEMPLATE - ROAD 02 to ROAD 01
SCALE 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200 (A1) 1:400 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

NOTE
14.5m BUS CHECK VEHICLE FOR REFERENCE ONLY

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: TURNING TEMPLATE
DESIGN VEHICLE 14.5M BUS
SHEET 2 OF 4

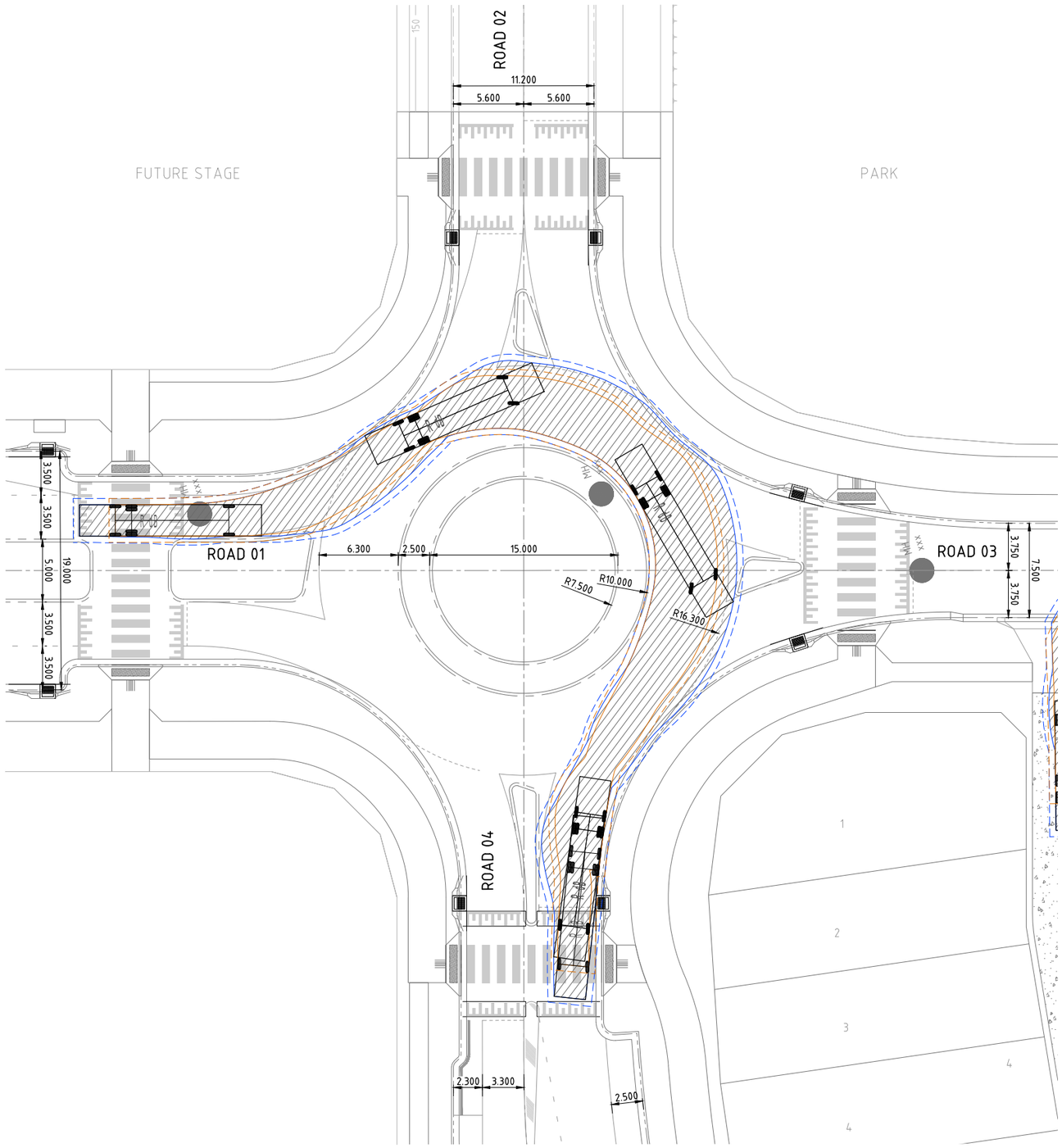
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RL 67.474
(RCC) COORD

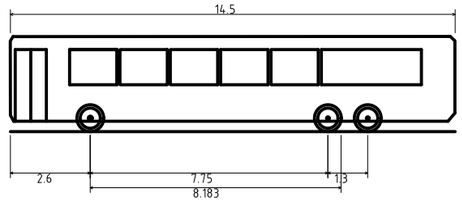
NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. -DA-CT02
Rev A

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User: WILLIAM GRIFFITH
File Name: S:\12dsData\MANUDSYN\tB00702_24514 CIVIL-DRGS\4.2 CURRENT\DA\B00702-DA-TURNING





Long Rigid Bus (14.5 m)	
Overall Length	14.500m
Overall Widfh	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.337m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

14.5m BUS TURNING TEMPLATE - ROAD 01 to ROAD 04

SCALE 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200 (A1) 1:400 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

NOTE
14.5m BUS CHECK VEHICLE FOR REFERENCE ONLY

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingleman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: TURNING TEMPLATE
DESIGN VEHICLE 14.5M BUS
SHEET 3 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

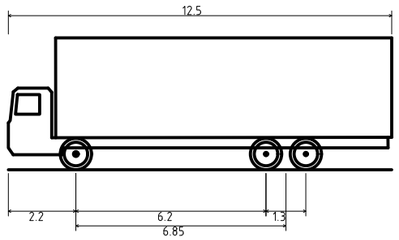
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NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. DA-CT03
Rev A

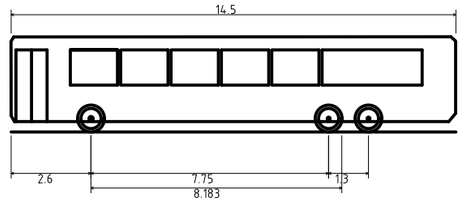
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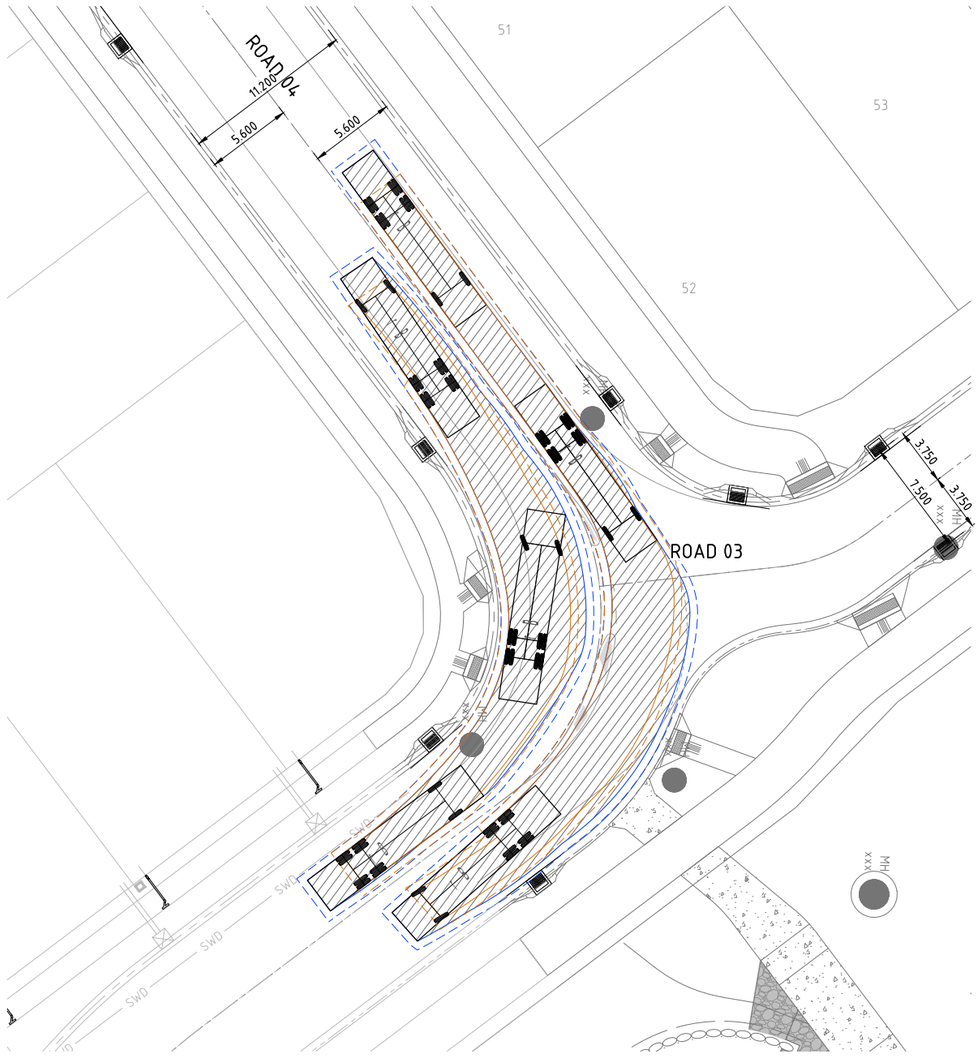
Single Unit Truck/Bus (12.5 m)

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



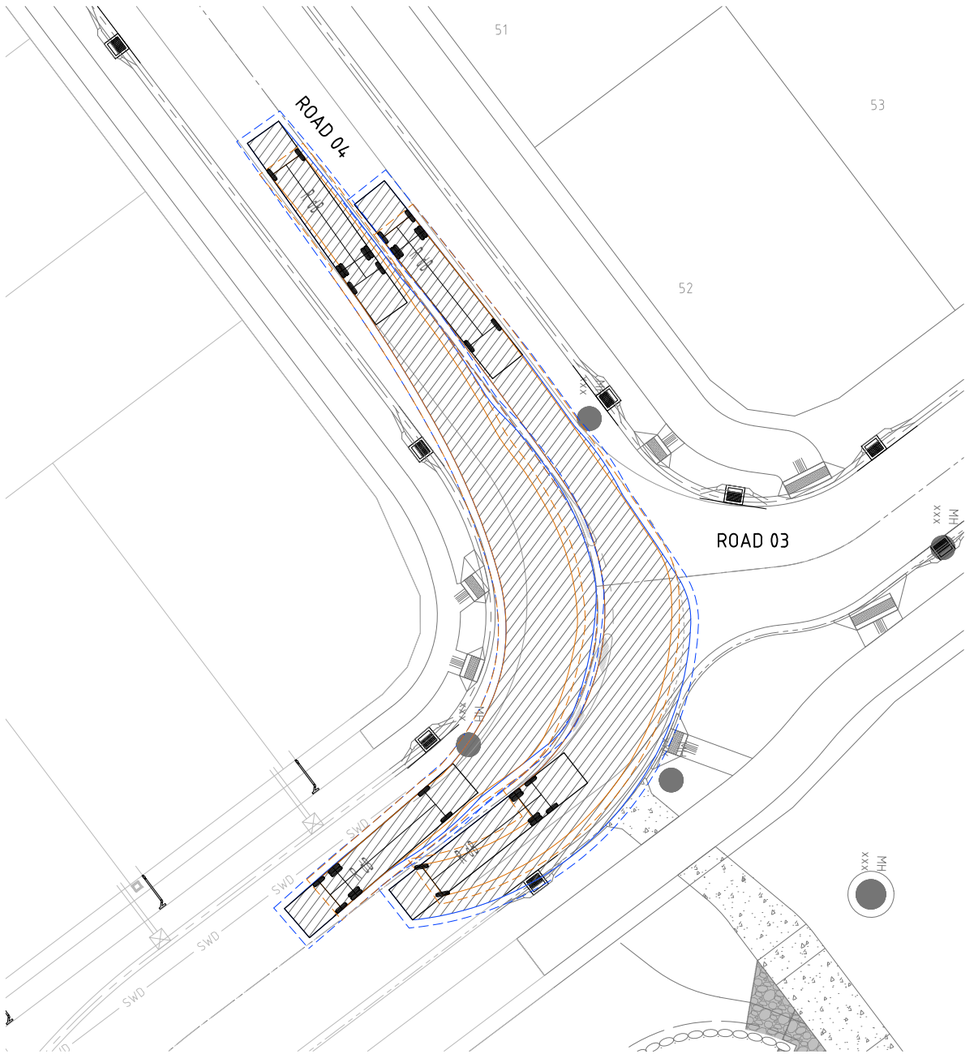
Long Rigid Bus (14.5 m)

Overall Length	14.500m
Overall Width	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.337m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m



12.5m TRUCK/BUS TURNING TEMPLATE - ROAD 04

SCALE 1:200



14.5m BUS TURNING TEMPLATE - ROAD 04

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

NOTE

14.5m BUS CHECK VEHICLE FOR REFERENCE ONLY

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Angelman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
DESIGN VEHICLE 14.5M BUS
SHEET 4 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

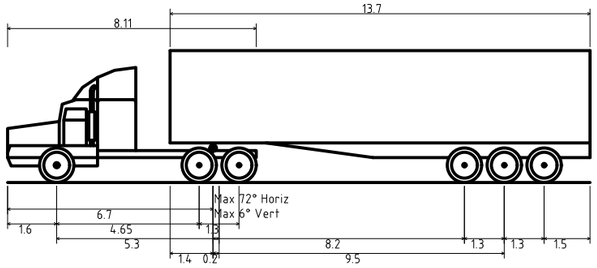
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NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CT04	A

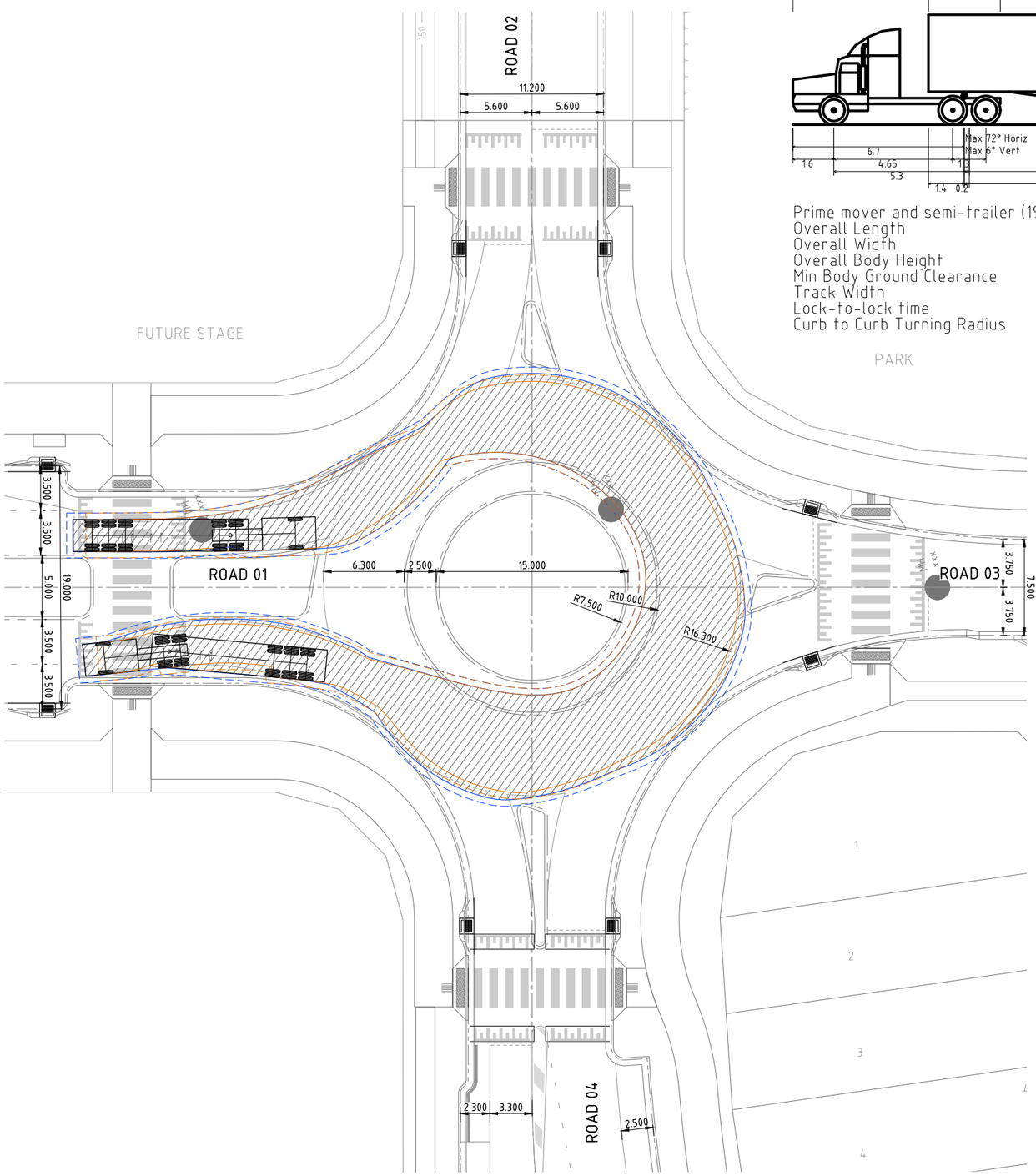
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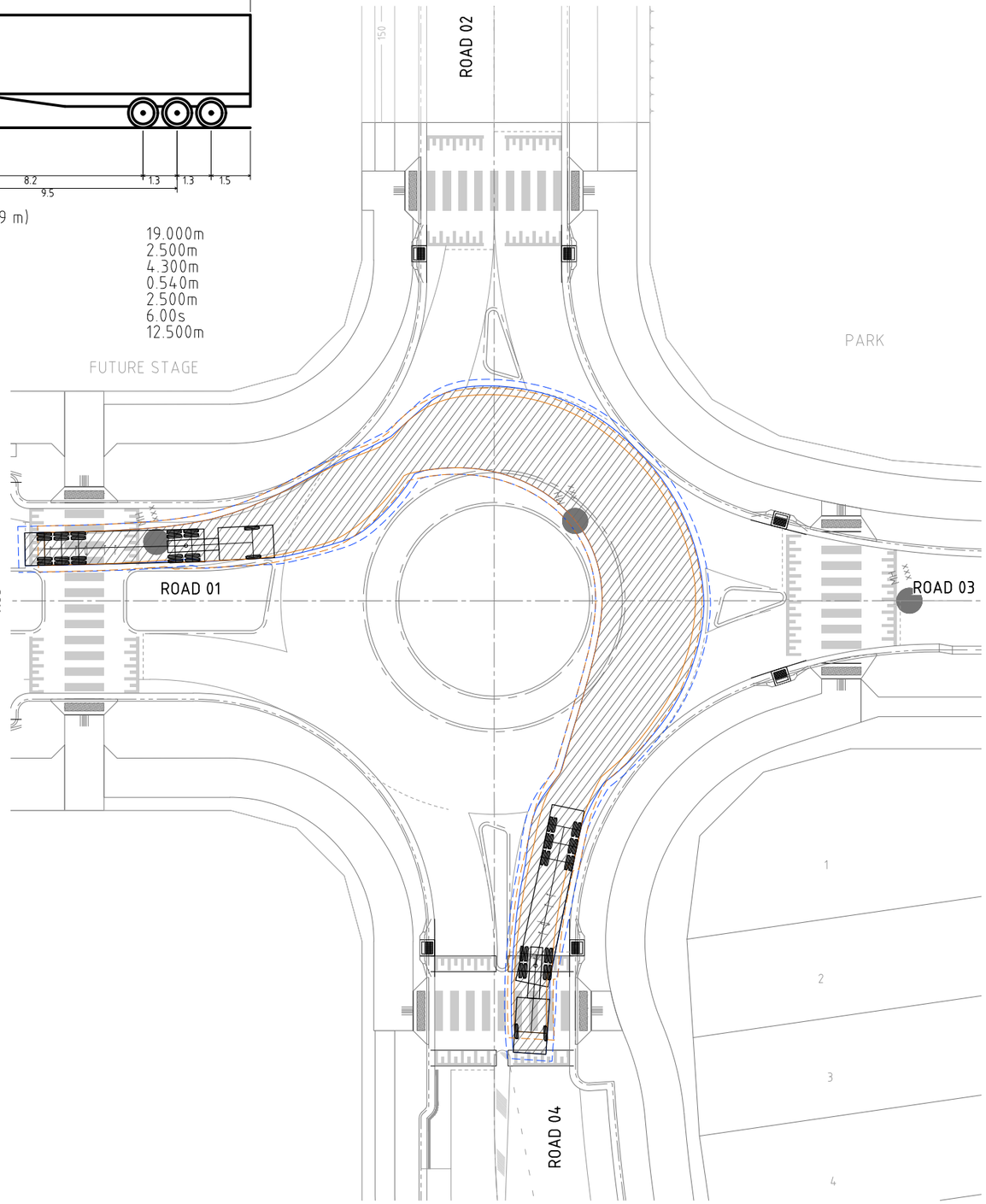
Prime mover and semi-trailer (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



19m CHECK VEHICLE TURNING TEMPLATE - ROAD 01 to ROAD 01

SCALE 1:200



19m CHECK VEHICLE TURNING TEMPLATE - ROAD 01 to ROAD 04

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Engelman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
CHECK VEHICLE 19M SEMI TRUCK
SHEET 1 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

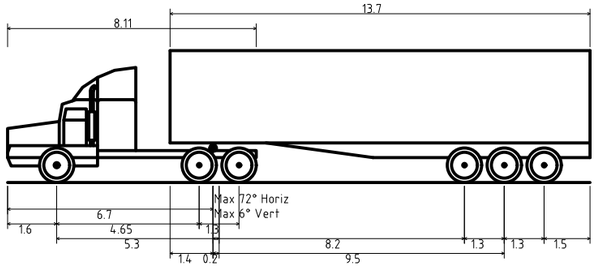
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NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CT05	A

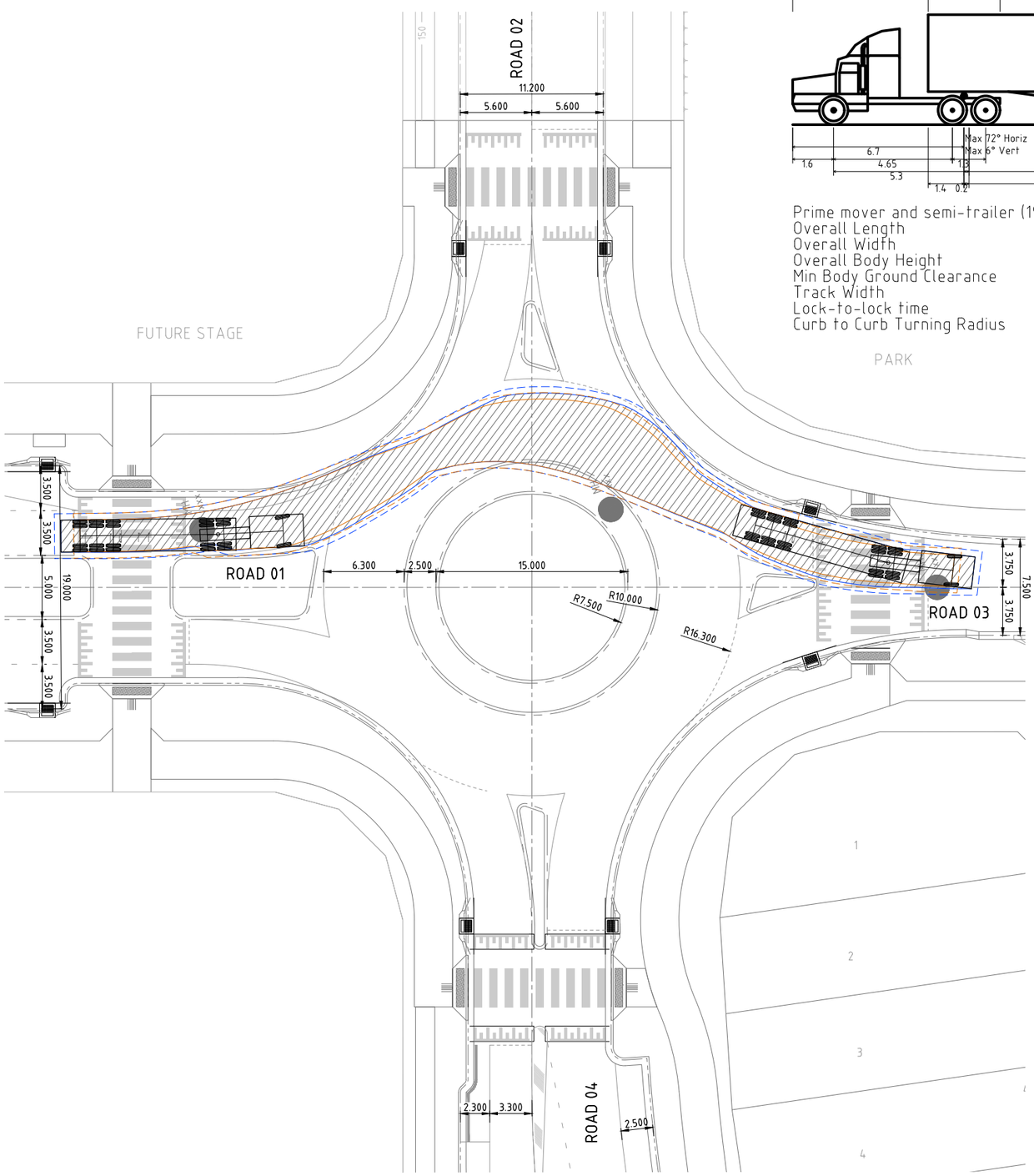
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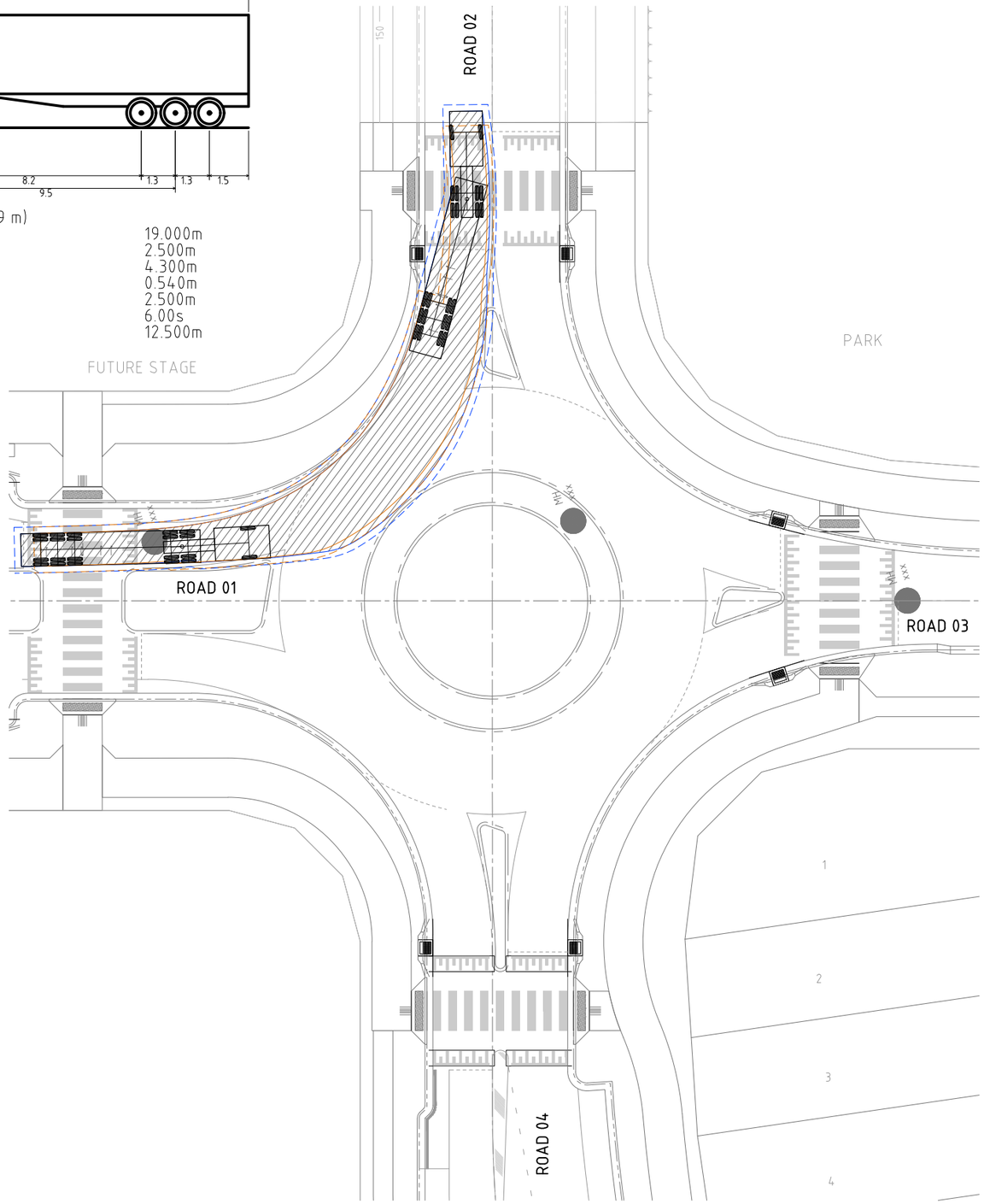
Prime mover and semi-trailer (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



19m CHECK VEHICLE TURNING TEMPLATE - ROAD 01 to ROAD 03

SCALE 1:200



19m CHECK VEHICLE TURNING TEMPLATE - ROAD 01 to ROAD 02

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Engelman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
CHECK VEHICLE 19M SEMI TRUCK
SHEET 2 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

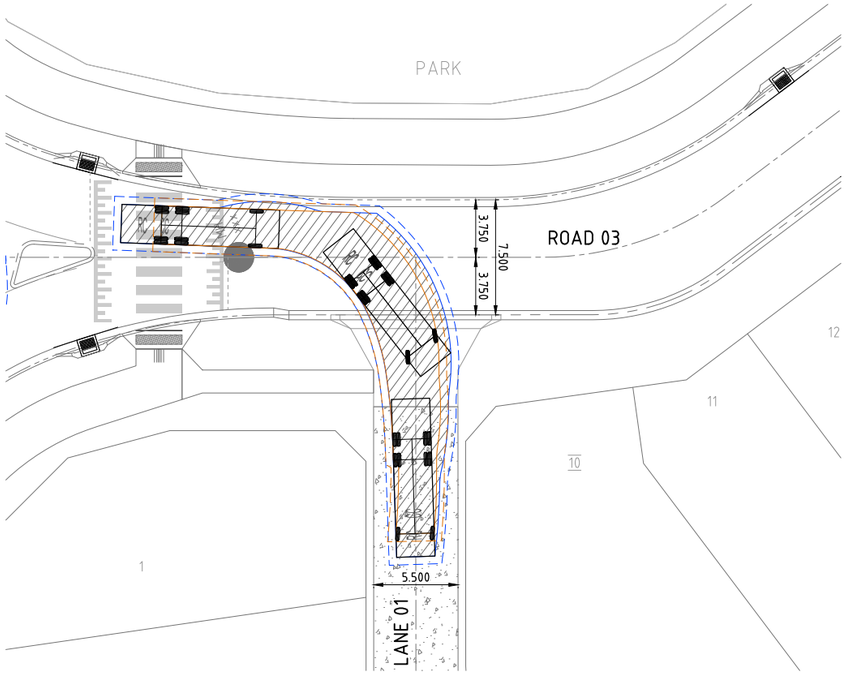
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Project No. B00702 | Drawing No. -DA-CT06 | Rev A

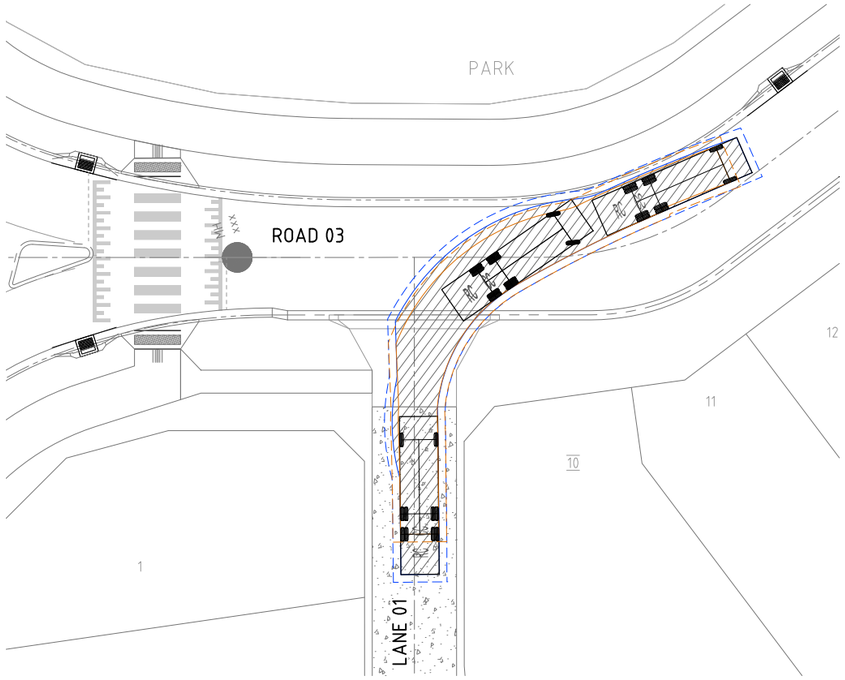
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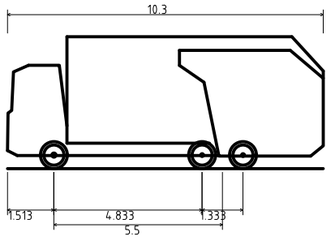
10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 03 to LANE 01

SCALE 1:200



10.3m SERVICE VEHICLE TURNING TEMPLATE - LANE 01 to ROAD 03

SCALE 1:200



RCV (ACCO 2350 10.3 m) 5km/h R 9.757 kerb

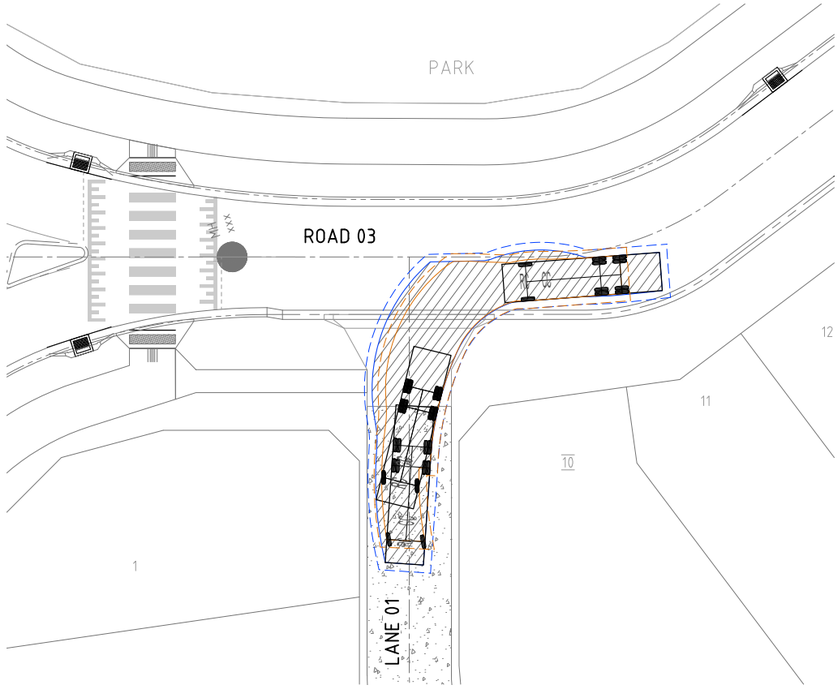
Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.



10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 03 to LANE 01

SCALE 1:200

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingerman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
SERVICE VEHICLE 10.3M TRUCK
SHEET 1 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

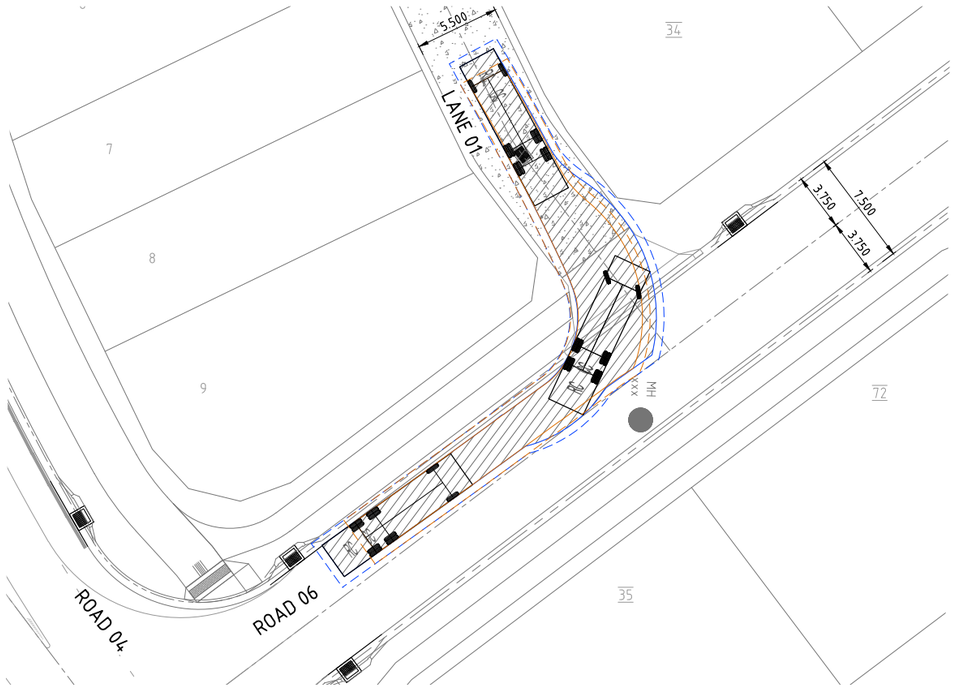
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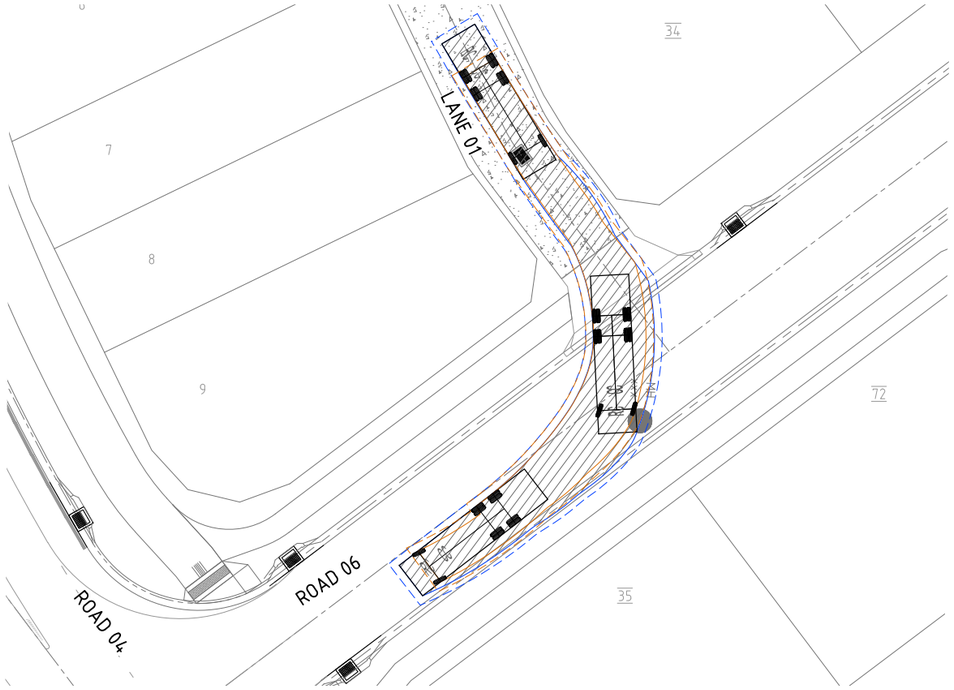
Project No. B00702 | Drawing No. DA-CT07 | Rev A

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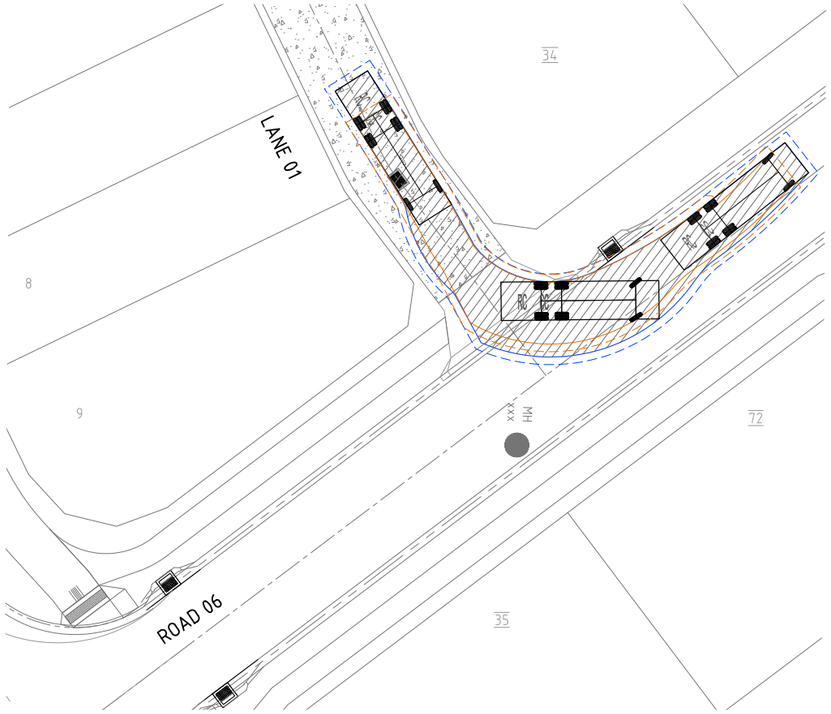
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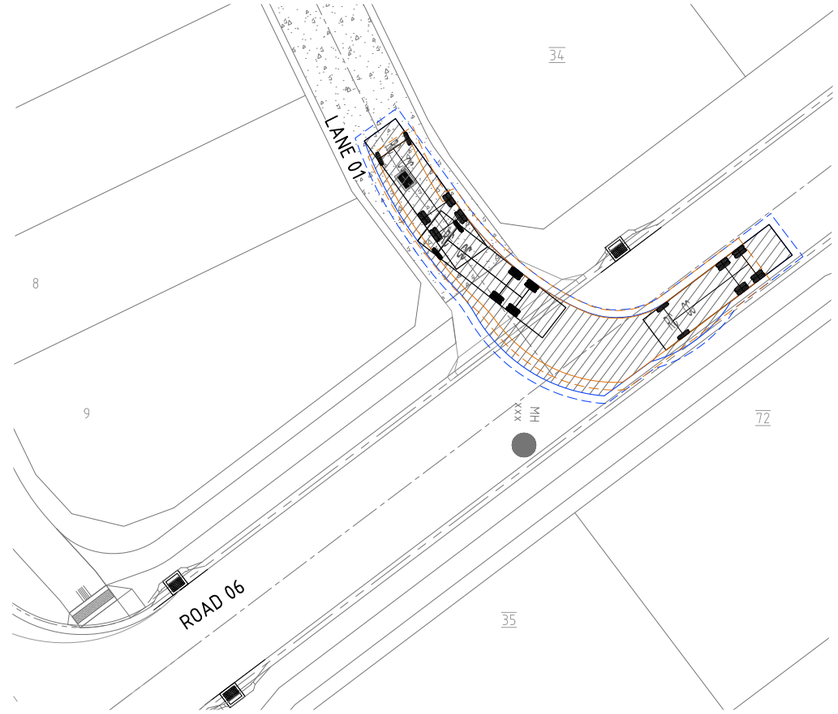
10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 06 to LANE 01
SCALE 1:200



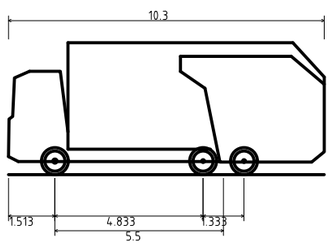
10.3m SERVICE VEHICLE TURNING TEMPLATE - LANE 01 to ROAD 06
SCALE 1:200



10.3m SERVICE VEHICLE TURNING TEMPLATE - LANE 01 to ROAD 06
SCALE 1:200



10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 06 to LANE 01
SCALE 1:200



RCV (ACCO 2350 10.3 m) 5km/h R 9.757 kerb

Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200 (A1) 1:400 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX
EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: TURNING TEMPLATE
SERVICE VEHICLE 10.3M TRUCK
SHEET 2 OF 4

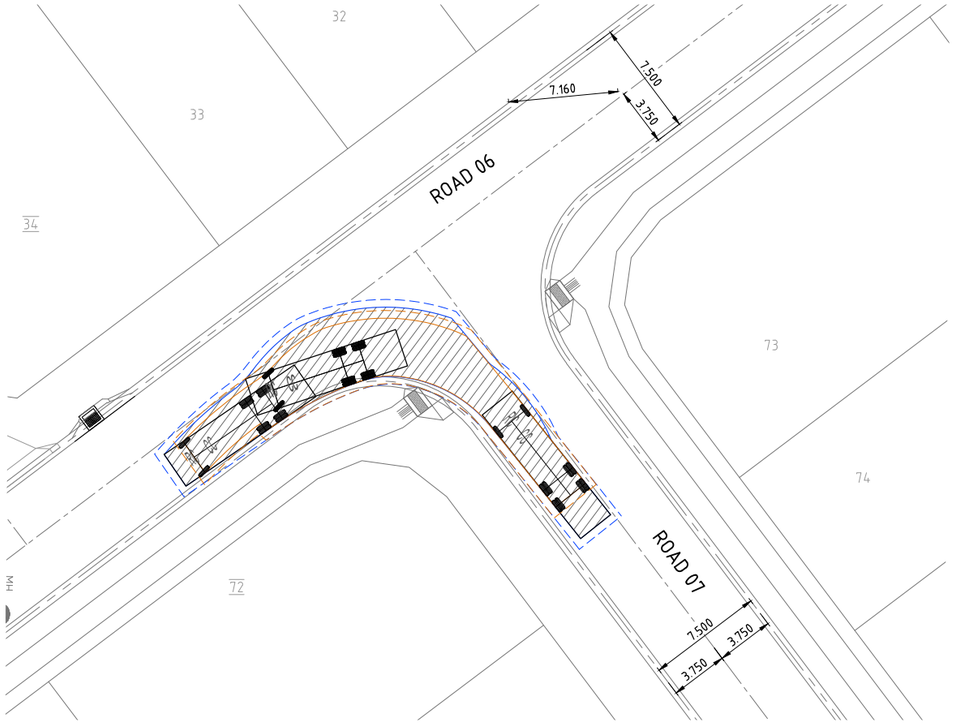
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RL 67.474
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NOT FOR CONSTRUCTION

Project No. B00702
Drawing No. DA-CT08
Rev A

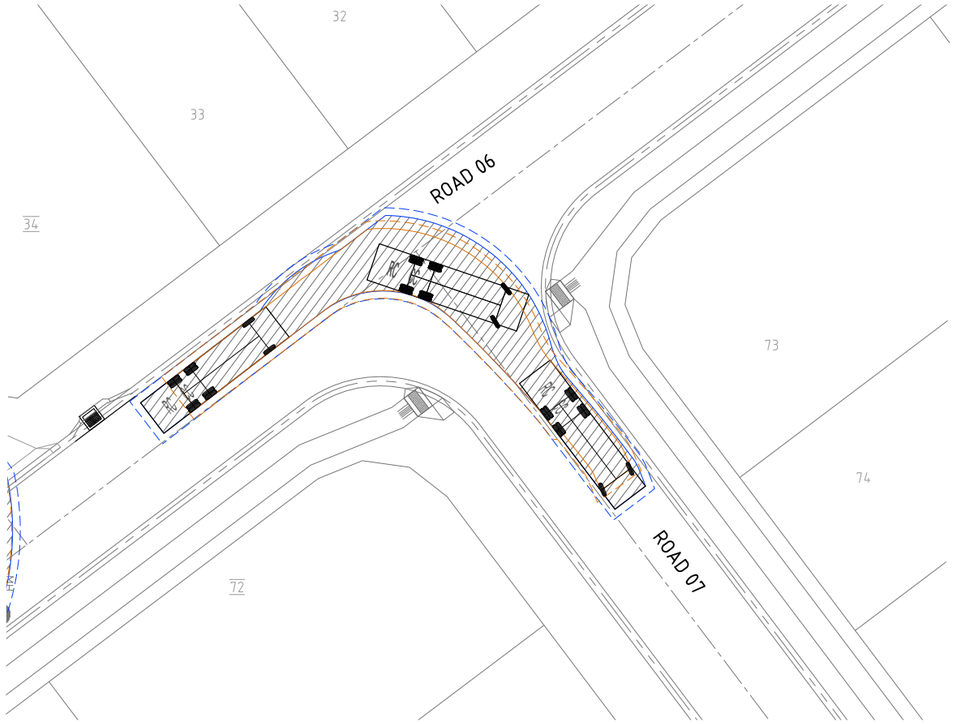
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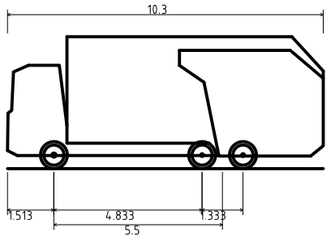
10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 07 to ROAD 06

SCALE 1:200



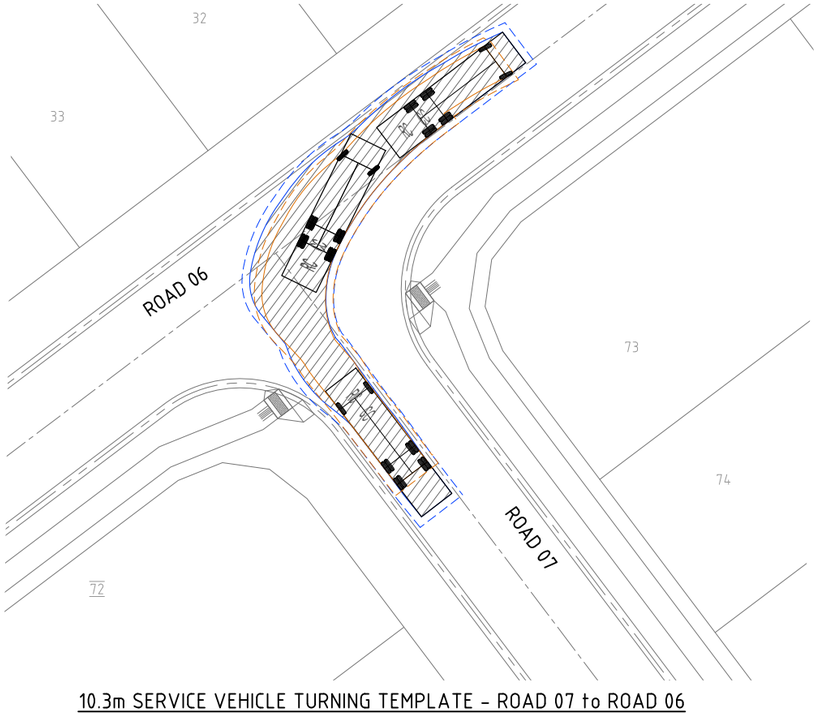
10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 06 to ROAD 07

SCALE 1:200



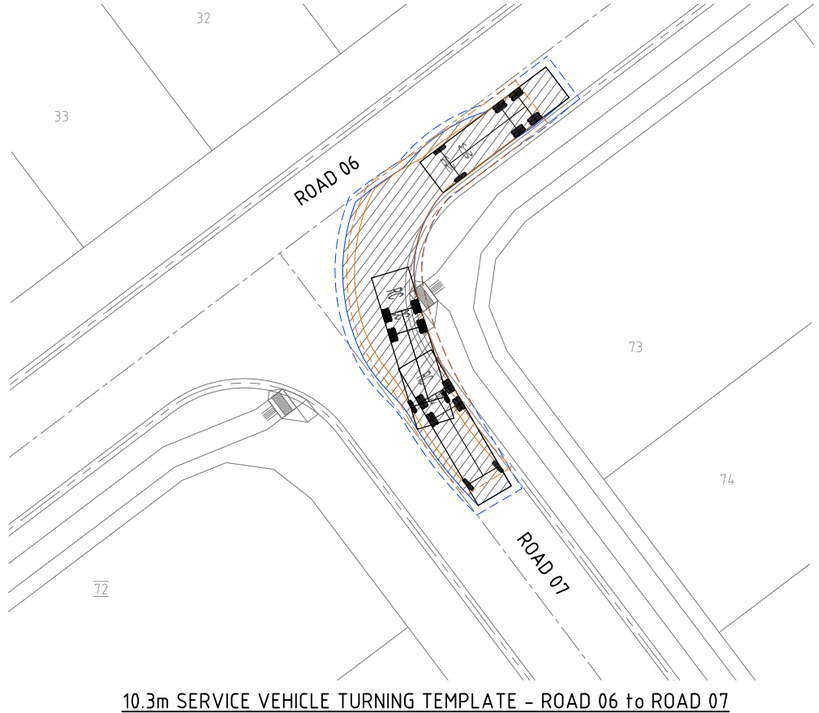
RCV (ACCO 2350 10.3 m) 5km/h R 9.757 kerb

Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m



10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 07 to ROAD 06

SCALE 1:200



10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 06 to ROAD 07

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ORIGINAL ISSUE	ES	PDW	PDW	PI	12/12/25

ENGINEERING CERTIFICATION

Peter Ingerman

Registered Engineer

Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
SERVICE VEHICLE 10.3M TRUCK
SHEET 3 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

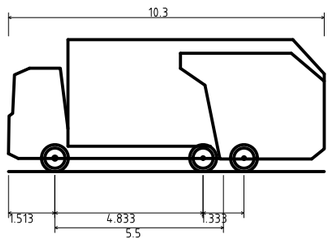
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NOT FOR CONSTRUCTION

Project No.	Drawing No.	Rev
B00702	DA-CT09	A

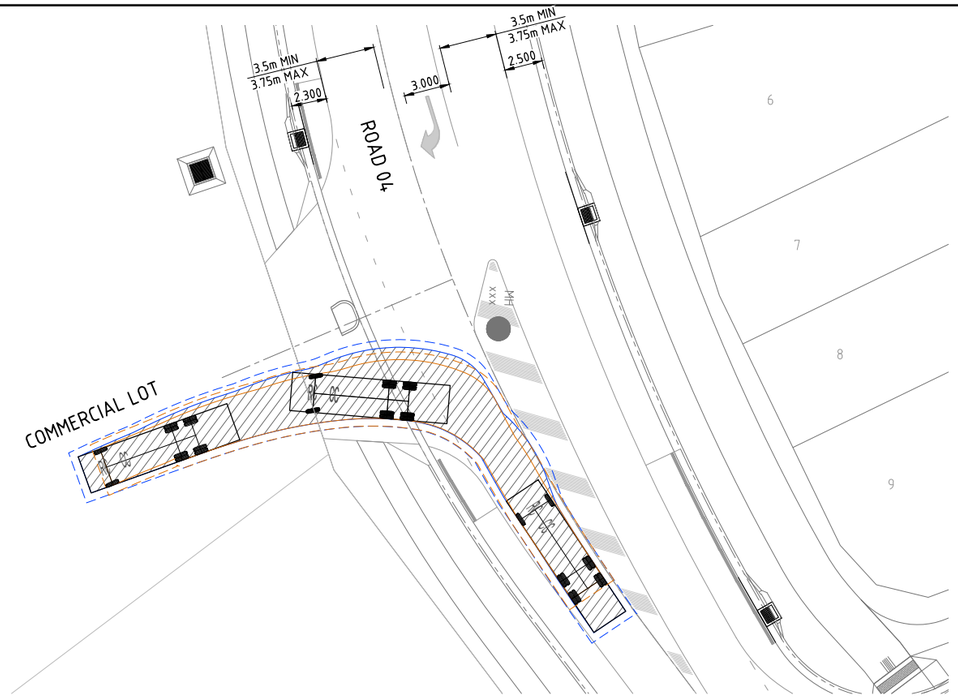
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User: WILLIAM GRIFFITH
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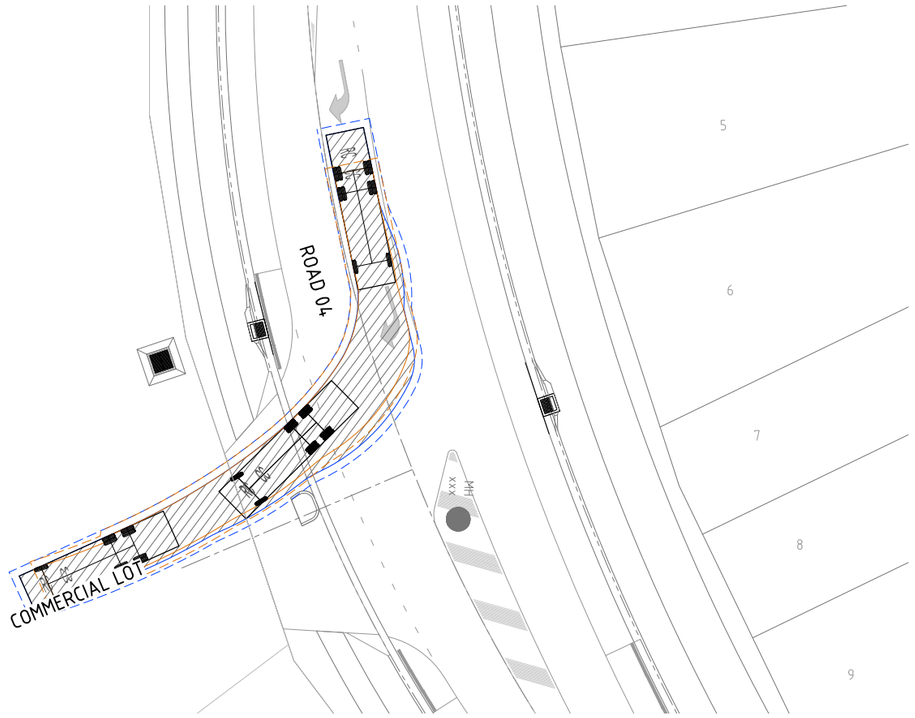
RCV (ACCO 2350 10.3 m) 5km/h R 9.757 kerb

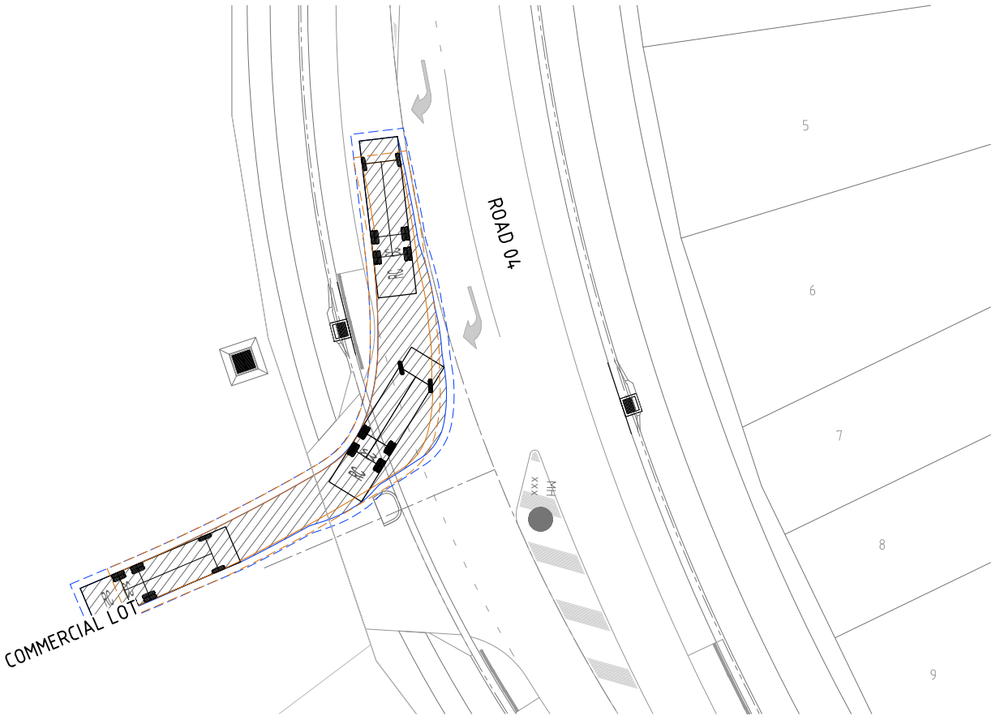
Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.410m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m



10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 04 to COMMERCIAL DRIVEWAY

SCALE 1:200





0 4 8 12 16 20m

4 3 2 1

SCALE 1:200 (A1) 1:400 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

10.3m SERVICE VEHICLE TURNING TEMPLATE - ROAD 04 to COMMERCIAL DRIVEWAY

SCALE 1:200

10.3m SERVICE VEHICLE TURNING TEMPLATE - COMMERCIAL DRIVEWAY to ROAD 04

SCALE 1:200

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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ENGINEERING CERTIFICATION

Peter Ingleman

Registered Engineer

Date " "

Registered Accreditation

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EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
SERVICE VEHICLE 10.3M TRUCK
SHEET 4 OF 4

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

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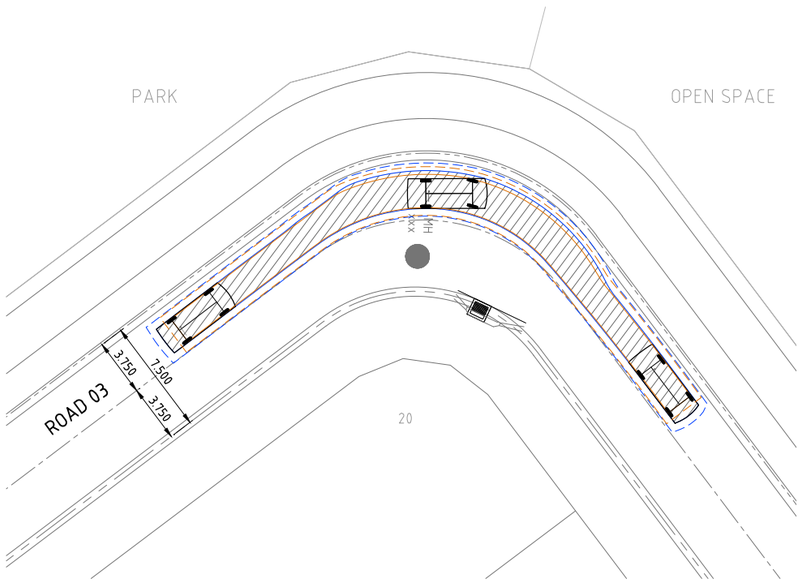
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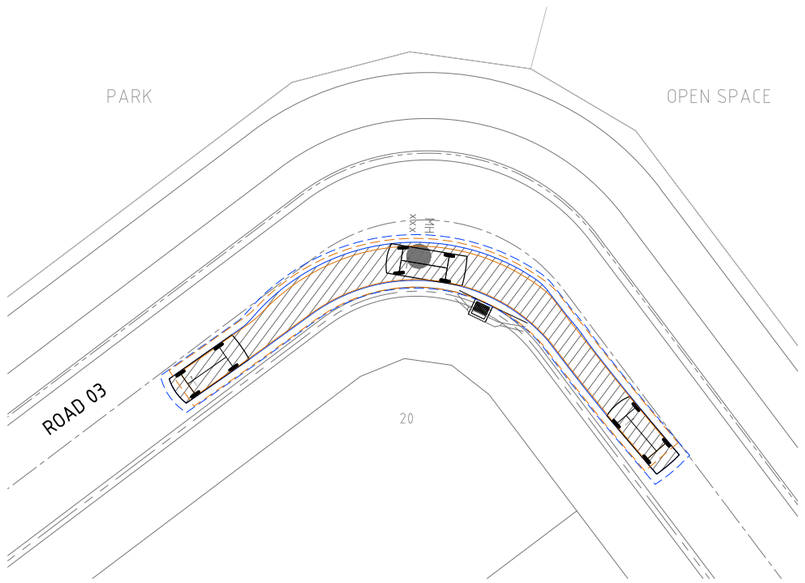
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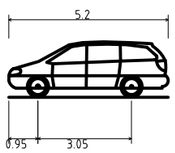
5.2m PASSENGER VEHICLE TURNING TEMPLATE - ROAD 03

SCALE 1:200

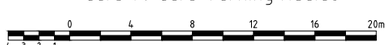


5.2m PASSENGER VEHICLE TURNING TEMPLATE - ROAD 03

SCALE 1:200



Passenger vehicle (5.2 m)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.300m



SCALE 1:200 (A1) 1:400 (A3)

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Registered Engineer

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: TURNING TEMPLATE
DESIGN VEHICLE 5.2M CAR

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

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Project No.	Drawing No.	Rev
B00702	DA-CT11	A

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FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

CONNECTION POINT FOR FUTURE STAGE 4 DEVELOPMENT

POSSIBLE FUTURE SEWER CONNECTIONS UNDER SPRINGACRE ROAD TBC

PIPE STUB FOR POSSIBLE FUTURE CONNECTION

CONNECTION POINT FOR FUTURE STAGE 3 DEVELOPMENT

POSSIBLE FUTURE SEWER CONNECTIONS UNDER SPRINGACRE ROAD TBC

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

SEWER OFFSET INCREASES TO A 2.4m BOUNDARY OFFSET WHEN ON THE SAME SIDE AS WATER RETICULATION

SEWER OFFSET INCREASES TO A 2.4m BOUNDARY OFFSET WHEN ON THE SAME SIDE AS WATER RETICULATION

FUTURE CONNECTION THROUGH OPEN SPACE FOR DISCHARGE FROM FUTURE STAGES 5 AND 6

SEWER RISING MAIN

SPRINGACRE ROAD

HANNAH CLOSE

LUKE STREET

907

900

ROAD 01

ROAD 03

ROAD 04

ROAD 06

ROAD 07

ROAD 08

ROAD 09

LANE 01

STAGE 1

STAGE 2

2.000

2.400

3.530

LEGEND

- LOT BOUNDARY
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EDGE OF SURFACING
- S — SEWER RETICULATION
- RM — INITIAL SEWER RISING MAIN
- FUTURE LOT BOUNDARY
- S — FUTURE SEWER RETICULATION
- RM — FUTURE SEWER RISING MAIN

0 15 30 45 60 75m

15 11.25 7.5 3.75

SCALE 1:750 (A1) 1:1500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

JOINS TO DRAWING No. B00702-DA-CS02

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: CONCEPT SEWER RETICULATION PLAN SHEET 1 OF 2

Datum: AHD PSM 79006 RL 67.474 (RCC) COORD

NOT FOR CONSTRUCTION

Project No. B00702 | Drawing No. DA-CS01 | Rev A

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SPRINGACRE ROAD

HANNAH CLOSE

LUKE STREET

ROAD 03

ROAD 04

ROAD 07

SEWER RISING MAIN

SEWER OFFSET INCREASES TO A 2.4m BOUNDARY OFFSET WHEN ON THE SAME SIDE AS WATER RETICULATION

SEWER RISING MAIN

SEWER OFFSET INCREASES TO A 2.4m BOUNDARY OFFSET WHEN ON THE SAME SIDE AS WATER RETICULATION

PIPE STUB FOR POSSIBLE FUTURE CONNECTION

FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

POSSIBLE FUTURE SEWER CONNECTIONS UNDER SPRINGACRE ROAD TBC

PIPE STUB FOR POSSIBLE FUTURE CONNECTION

PIPE STUB FOR POSSIBLE FUTURE CONNECTION

OVERFLOW OUTLET

PROPOSED SEWER PUMP STATION

EPRAPAH CREEK

901

902

903

904

905

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED
By: Nicole Tobias
Date: 19 April 2026

Queensland Government

LEGEND
- LOT BOUNDARY
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EDGE OF SURFACING
- S — SEWER RETICULATION
- RM — INITIAL SEWER RISING MAIN
- FUTURE LOT BOUNDARY
- S — FUTURE SEWER RETICULATION
- RM — FUTURE SEWER RISING MAIN

0 15 30 45 60 75m
15 11.25 7.5 3.75
SCALE 1:750 (A1) 1:1500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: CONCEPT SEWER RETICULATION PLAN SHEET 2 OF 2

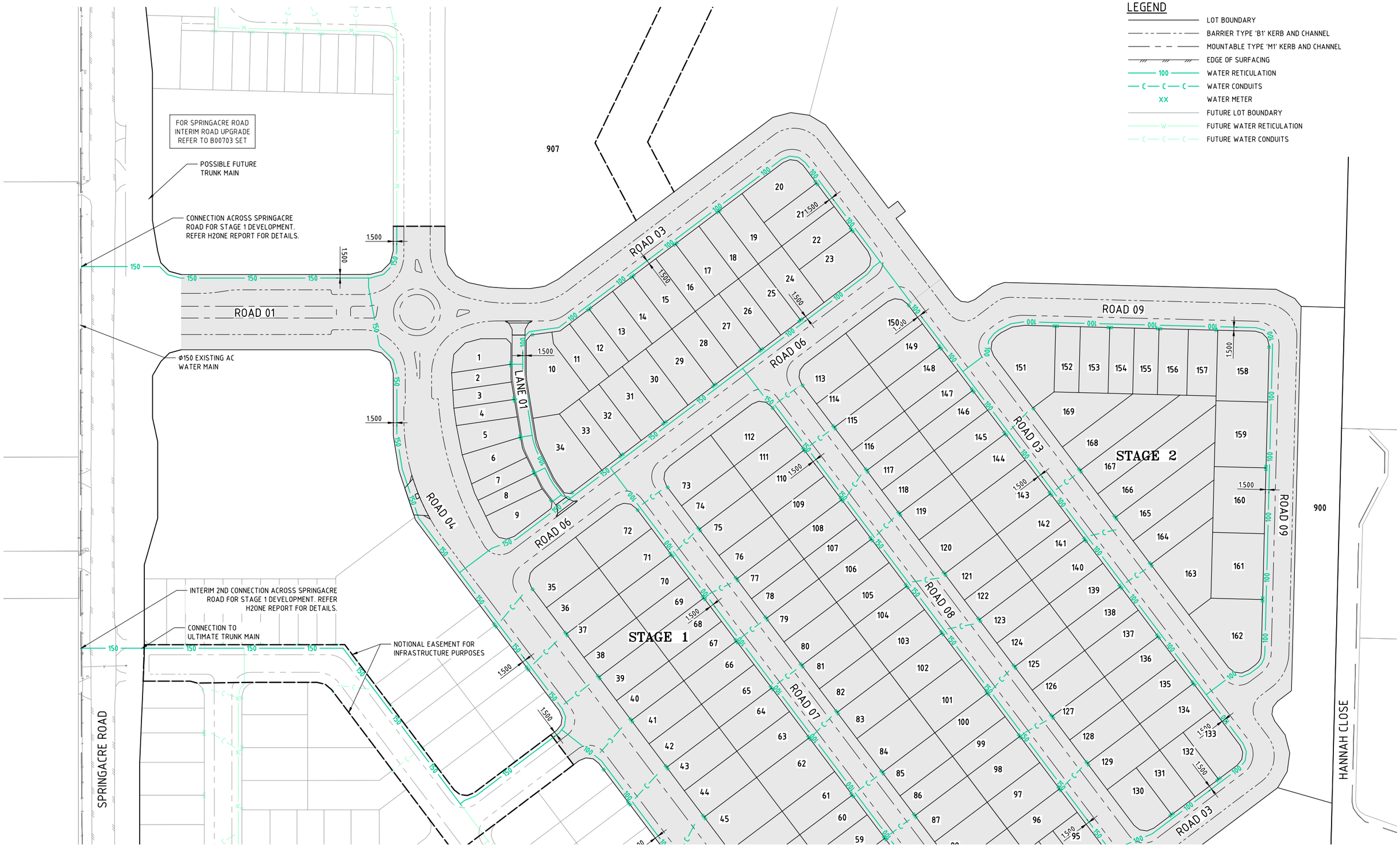
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JOINS TO DRAWING No. B00702-DA-CW02

0 15 30 45 60 75m
15 11.25 7.5 3.75
SCALE 1:750 (A1) 1:1500 (A3)
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No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: CONCEPT WATER RETICULATION PLAN SHEET 1 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

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Drawing No. DA-CW01
Rev A

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User: WILLIAM GRIFFITH

JOINS TO DRAWING No. B00702-DA-CW01

SPRINGACRE ROAD

HANNAH CLOSE

ROAD 03

ROAD 04

ROAD 07

POSSIBLE FUTURE TRUNK MAIN

Ø150 EXISTING AC WATER MAIN

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

POSSIBLE FUTURE CONNECTION TO ULTIMATE TRUNK MAIN

FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

PROPOSED SEWER PUMP STATION

EPRAPAH CREEK

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

LEGEND

- LOT BOUNDARY
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EDGE OF SURFACING
- 100 WATER RETICULATION
- C C C WATER CONDUITS
- XX WATER METER
- FUTURE LOT BOUNDARY
- W FUTURE WATER RETICULATION
- C C C FUTURE WATER CONDUITS

0 15 30 45 60 75m

15 11.25 7.5 3.75

SCALE 1:750 (A1) 1:1500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Title: CONCEPT WATER RETICULATION PLAN SHEET 2 OF 2

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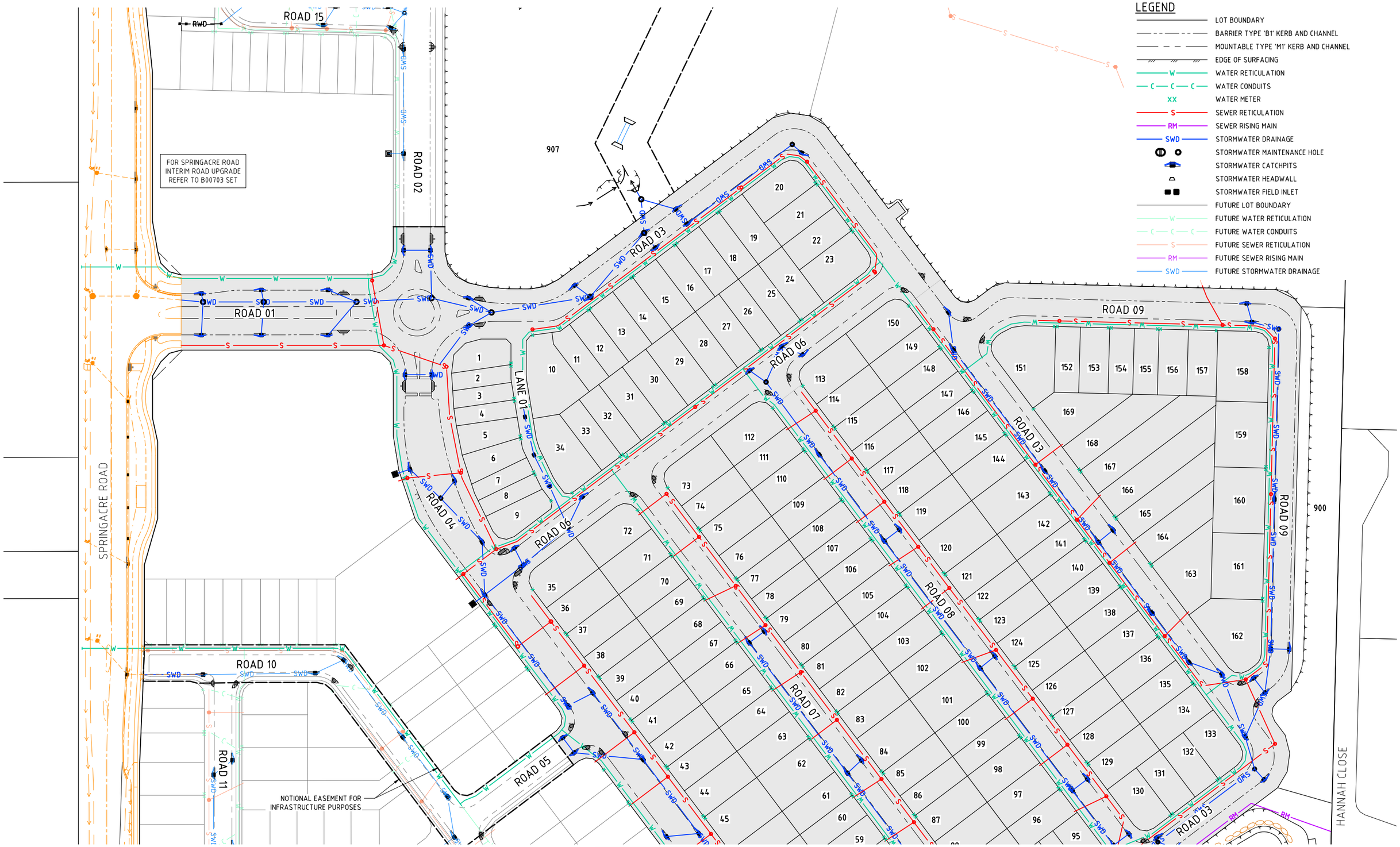
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Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: COMBINED SERVICES PLAN
SHEET 1 OF 2

Datum: AHD
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ROAD 10
ROAD 11
ROAD 12
ROAD 13
ROAD 14
ROAD 05
ROAD 07
ROAD 04
ROAD 03
SPRINGACRE ROAD
HANNAH CLOSE
EPRAPAH CREEK

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

NOTIONAL EASEMENT FOR INFRASTRUCTURE PURPOSES

Extent of stormwater retention basins and associated works are to be determined based on Condition 22, Condition 25 and Condition 30

FOR SPRINGACRE ROAD INTERIM ROAD UPGRADE REFER TO B00703 SET

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

0 15 30 45 60 75m

SCALE 1:750 (A1) 1:1500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

LEGEND

- LOT BOUNDARY
- BARRIER TYPE 'B1' KERB AND CHANNEL
- MOUNTABLE TYPE 'M1' KERB AND CHANNEL
- EDGE OF SURFACING
- W WATER RETICULATION
- C C C WATER CONDUITS
- XX WATER METER
- S SEWER RETICULATION
- RM SEWER RISING MAIN
- SWD STORMWATER DRAINAGE
- STORMWATER MAINTENANCE HOLE
- STORMWATER CATCHPITS
- STORMWATER HEADWALL
- STORMWATER FIELD INLET
- FUTURE LOT BOUNDARY
- FUTURE WATER RETICULATION
- FUTURE WATER CONDUITS
- FUTURE SEWER RETICULATION
- FUTURE SEWER RISING MAIN
- FUTURE STORMWATER DRAINAGE

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL

Title: COMBINED SERVICES PLAN
SHEET 2 OF 2

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

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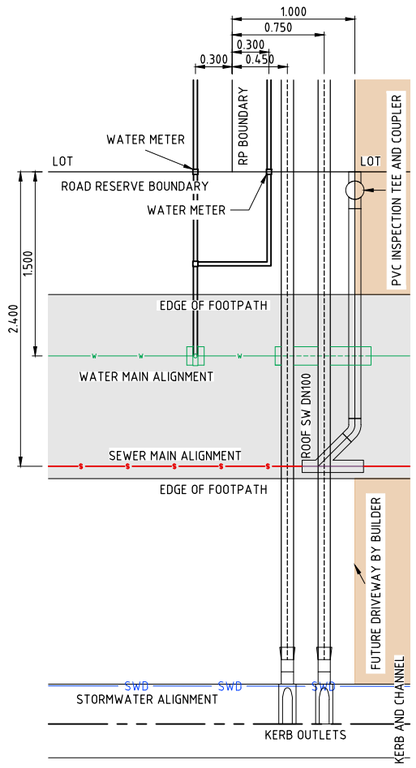
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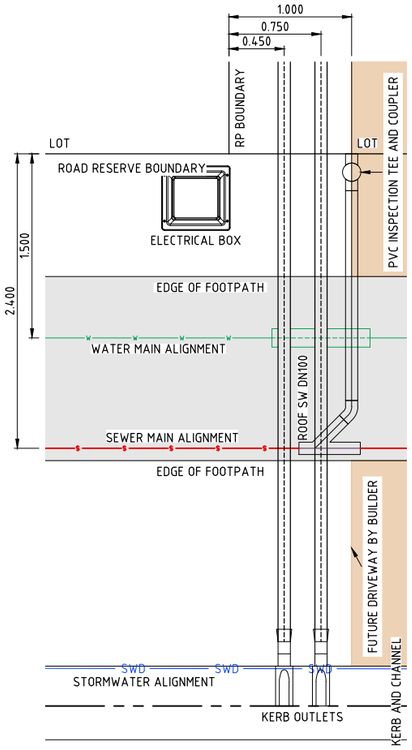
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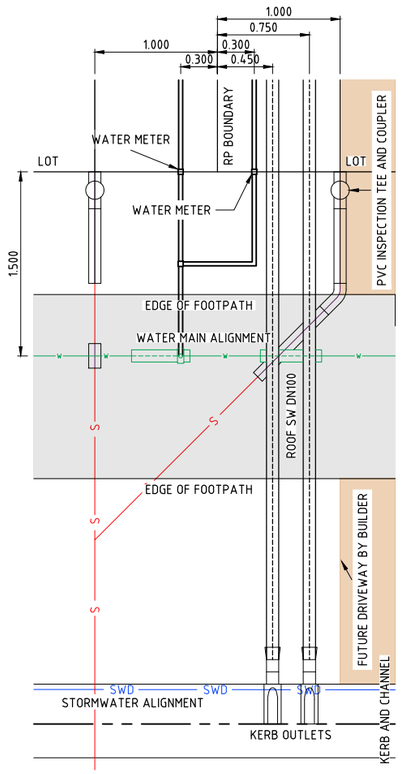
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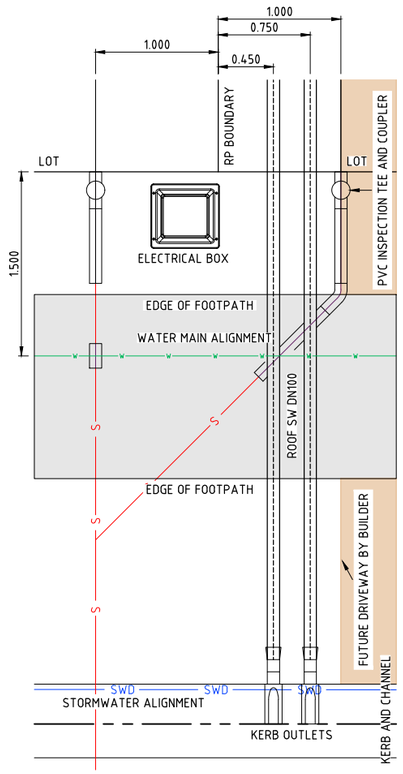
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SCALE 1:25



2 CM03 TYPICAL DETAIL
SCALE 1:25



3 CM03 TYPICAL DETAIL
SCALE 1:25



4 CM03 TYPICAL DETAIL
SCALE 1:25

0 0.5 1 1.5 2 2.5m
0.5 0.25 0.375 0.125
SCALE 1:25 (A1) 1:50 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1 - ST 1 & 2 RAL
Title: COMBINED SERVICES PLAN
TYPICAL DETAILS - SHEET 1 OF 1

Datum: AHD
PSM 79006
RL 67.474
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Project No. B00702
Drawing No. DA-CM03
Rev A

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User: WILLIAM GRIFFITH

" "

Amended Stormwater management plan required

Appendix D. Stormwater Management Plan

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

EMPOWER

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ENGENY

URBEX

Southern Thornlands

Site Based Stormwater Management Plan – Early Release Stages

BNE01174_0005-REP-001-1

11 DECEMBER 2025

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Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	10/12/2025	Client Issue	Ramya Srinivasan	Kelsey Mundt	Kelsey Mundt RPEQ 32142	Daniel Niven
0	10/12/2025	Client Issue	Ramya Srinivasan	Kelsey Mundt	Kelsey Mundt RPEQ 32142	Daniel Niven
Signatures:						

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1. INTRODUCTION

Engeny Australia Pty Ltd (Engeny) have been engaged by Urbex Pty Ltd to provide the stormwater management strategy as supporting information to the development application for the Early Release stages (the Site) of the proposed Southern Thornlands Priority Development Area (PDA). This report outlines the ultimate stormwater infrastructure plan for the proposed development in accordance with the Redland City Council (RCC) City Plan.

The layout for the proposed development which consists of multiple delivery stages for multiple catchments is shown within Appendix A.

This document has been prepared with the following objectives:

- Provide a stormwater treatment train which aims to protect receiving waters by limiting the quantity of key pollutants discharged in stormwater from urban developments.
- Prevent potential instream erosion downstream of urban developments by controlling the magnitude and duration of sediment transporting flows.
- Provide protection to instream ecosystems from significant effects of increased runoff frequency by capturing the initial portion of runoff from impervious areas. This approach aims to ensure the frequency of hydraulic disturbance to instream ecosystems in developed catchments is similar to that of the undeveloped catchment.
- Demonstrate compliance with non-worsening of stormwater quantity for modelled events over any existing discharge points to the site.

Stormwater quality and quantity will be demonstrated in compliance with the following documents and planning schemes:

- Redland City Plan Version 10
- Australian Rainfall and Runoff 2019 v4.2
- Redland City Council Planning Scheme Policy 2 – Infrastructure Works
- Queensland State Planning Policy 2017
- Queensland Urban Drainage Manual (QUDM) 2017
- Water by Design MUSIC Modelling Guidelines - November 2018.
- Economic Development Guidelines 13 – Engineering Standards – September 2017.

2. SITE DESCRIPTION

2.1 Site Location

The proposed early release development site is located on the eastern side of Springacre Road, Thornlands on five allotments. The street address and RP descriptions of the allotments are listed in Table 2.1 below.

TABLE 2.1: PROPERTY DATA

Item	Street Address	RP Description
1	62 - 74 Springacre Road, Thornlands	Lot 12 on RP 53653
2	76 - 94 Springacre Road, Thornlands	Lot 13 on RP 53653
3	96 - 108 Springacre Road, Thornlands	Lot 14 on RP 53653
4	110 - 118 Springacre Road, Thornlands	Lot 2 on RP 128089
5	124 - 138 Springacre Road, Thornlands	Lot 16 on RP 53653

The Site is bounded by public road to the west (Springacre Road) and Eprapah Creek to south-east, with potential for future urban residential on lots to the north, west and south, as part of a future Priority Development Area (PDA).



Figure 2.1: Aerial Photo of the Proposed Development Sites and Surrounds

2.2 Site Condition

2.2.1 Existing

The existing site has a combined area of approximately 40.4 ha and is currently occupied by a combination of pasture and cultivated fields, native and exotic vegetation, small and large farming sheds, farm dams and single dwelling houses. The Site also has several unsealed internal access tracks. There are several dams onsite however based on the provided survey information none the dams have low flows pipes or formed overflow weirs and as such are not considered to attenuate flows in the predevelopment scenario.

The existing properties and allotments on the western side of Springacre Road are not part of this early release development application. Figure 2.2 below details the existing structures and vegetation of the Site.



Figure 2.2: Proposed Development Sites Existing Condition

2.2.2 Proposed Development

The proposed development is to consist of internal road networks, residential lots of mixed sizes and density, parks, open space conservation zones, and stormwater management zones. All engineering services are to be provided to each allotment as part of the proposed development. This includes the following:

- Access via Springacre Road and the internal road network.
- Stormwater drainage.
- Sewer connection.
- Reticulated water connection.
- Electrical and communication services.

2.3 Local Government Infrastructure Plan

The Stormwater Local Government Infrastructure Plan (LGIP) for Redland City Council details the proposed major infrastructure items to service the region. An extract of the LGIP can be seen in Figure 2.3 below. As shown in Figure 2.3, there are no LGIP items within or adjacent to the proposed development site.

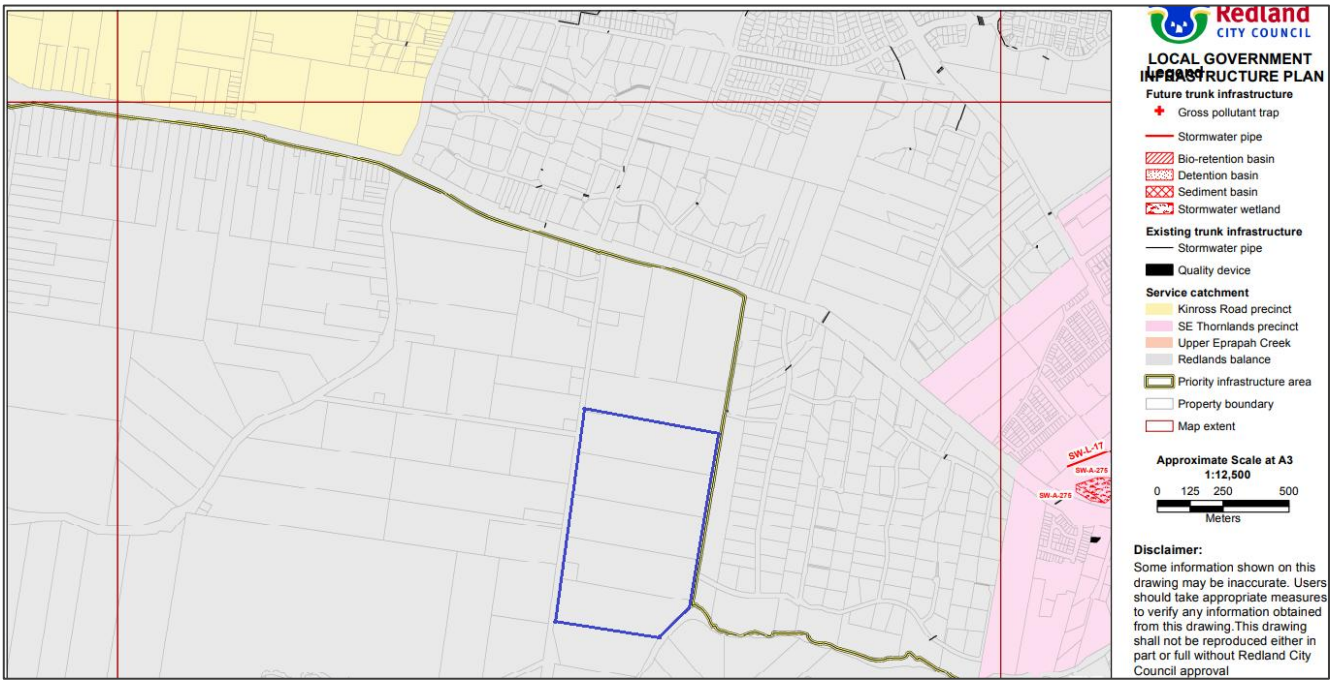


Figure 2.3: Extraction from the RCC LGIP for Stormwater

2.4 Topography and Site Drainage

The Site is divided by a central ridge which runs east-west and splits the Site into two distinct north/south catchments. The levels across the northern part of the site vary from RL 44.0 at the western boundary to RL 39.5 at the southern boundary and RL 25.0 at the north-eastern boundary.

The levels across the southern part of the site vary from RL 39.5 at the northern boundary to RL 15.0 at the south-eastern boundary.

The site falls with an approximate grade of 6.0% on average with surface water currently flowing to four discharge locations across the sites:

- The north-eastern boundary of the development discharging to an existing private property (40-60 Springacre Road) and channel near Georgina Court.
- The eastern boundary of the development discharging to the existing drainage infrastructure adjacent to Hannah Close and ultimately Eprapah Creek.
- The southern boundary of the development drains towards Eprapah Creek.
- The north-western boundary of the development discharging to an existing property (40-60 Springacre Road) and road reserve adjacent to Springacre Road.

It is noted that there is an external catchment which flows naturally to the proposed development site from the west via cross drainage under Springacre Road and overland flow.

For the purposes of stormwater modelling it shall be assumed that external flows entering the Site are doing so at undeveloped flow rates in the pre-development scenario. However, due to the nature of the potential for the upstream catchment to be developed as part of an overall PDA, the post development flow from this catchment shall be assumed to be developed in a similar nature to the internal catchments, to allow for conveyance through the Site and stormwater detention of the regional flows.

This information is shown in Figure 2.4 below.

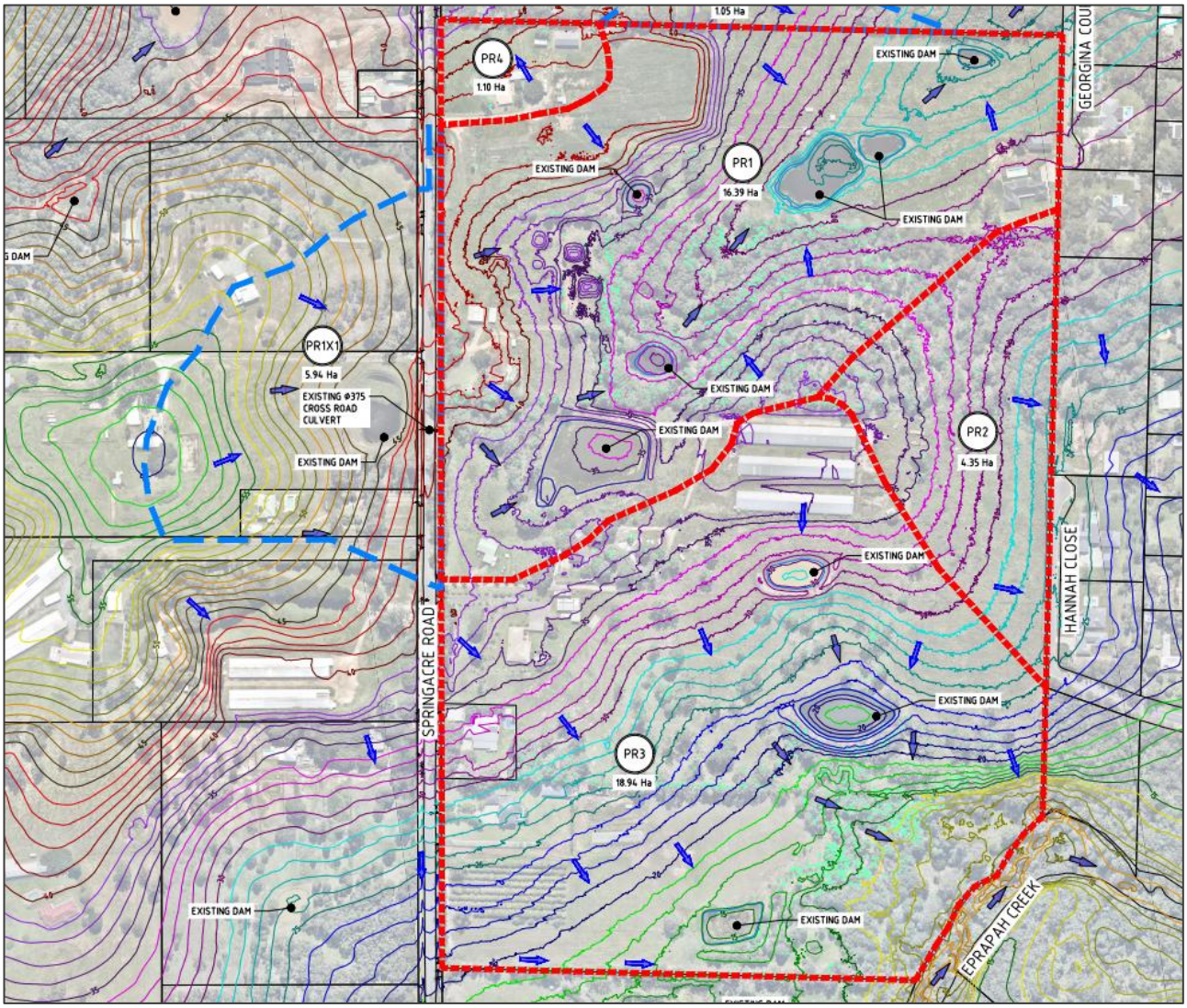


Figure 2.4: Catchment Diagram and Discharge Points

2.5 Base Data

Detailed survey of the proposed development site has been used for the purpose of determining catchments and stormwater modelling associated with this conceptual report.

2.6 Lawful Points of Discharge

The Site is separated by a ridge line which is shown in Figure 2.4 above. The proposed development site has four distinct discharge points:

- North-Eastern discharge point to defined waterway on adjacent private property and future development area (40-60 Springacre Road).
- Eastern discharge point to the existing drainage infrastructure adjacent to Hannah Close and ultimately Eprapah Creek.
- Southern discharge point via Eprapah Creek.
- North-Western discharge point to Springacre Road reserve and future development area (40-60 Springacre Road).

It is not proposed to create any additional points of discharge as part of the proposed development.

It is noted that at discharge point 4 nominated above, the north-western Discharge point to Springacre Road reserve and future development area, shall not be utilised in the post development scenario.

2.7 Earthworks and Soils

To assist in the stormwater management within the catchments of the proposed development sites, bulk earthworks will be required. Earthworks for the proposed development will ensure, where possible, all lots fall towards the street to alleviate the need for rear of lot roof water drainage systems and the associated easements.

A detailed geotechnical investigation is yet to be undertaken for the proposed development site. Given the reduced levels of the site, acid sulphate soils have not been considered. Should acid sulphate soils be identified during the construction phase of this development an acid sulphate soils management plan is to be developed and this stormwater management plan is to be revised.

2.8 Waterways

Stormwater which is discharged through the north-eastern discharge point is conveyed to the defined waterway on the adjacent private property / future development area and ultimately north-east under Boundary Road and ultimately Moreton Bay.

Stormwater discharged from the eastern and southern discharge points is discharged directly to Epapah Creek and ultimately Moreton Bay.

As part of the proposed development, stormwater quantity and quality are to be managed to ensure the likelihood of any potential adverse impacts to the downstream waterways are avoided.

2.9 Vegetation

The Site consists of a mixture of grassed areas with scattered trees and vegetation, with some isolated pockets of dense trees. There are also several dams located onsite. As part of the proposed development the Site is to be predominantly cleared. Vegetation is to be retained wherever possible in the future greenspace and conservation areas of the site.

2.10 Asset Handover

The proposed bioretention/detention systems are not to be planted out until such time as 80% of the upstream catchment is developed. It is proposed that bioretention/detention systems are to be taken on as an asset, monitored and maintained by the Council after acceptance off maintenance. Following excavation and revegetation works, the detention basins are to be maintained by Council.

2.11 Flooding

In accordance with Redland City Council's REDeMAP interface, the proposed development site is subject to flooding from Eprapah Creek as part of the City Plan's "Flood and Storm Tide Hazard Overlay" however the extents of the creek flooding are not within the area of the Site being developed. Furthermore, internal overland flow is identified within the northern section of the Site and the conveyance of this overland flow within the pit, pipe and channel network will be included in the overall detailed design of the development. A preliminary assessment of the ultimate development flows and the subsequent containment within the central channel to the detention basin can be found in section 3 of this report.

An extract of the REDeMAP "Flood and Storm Tide Hazard Overlay" is provided in the figure below.

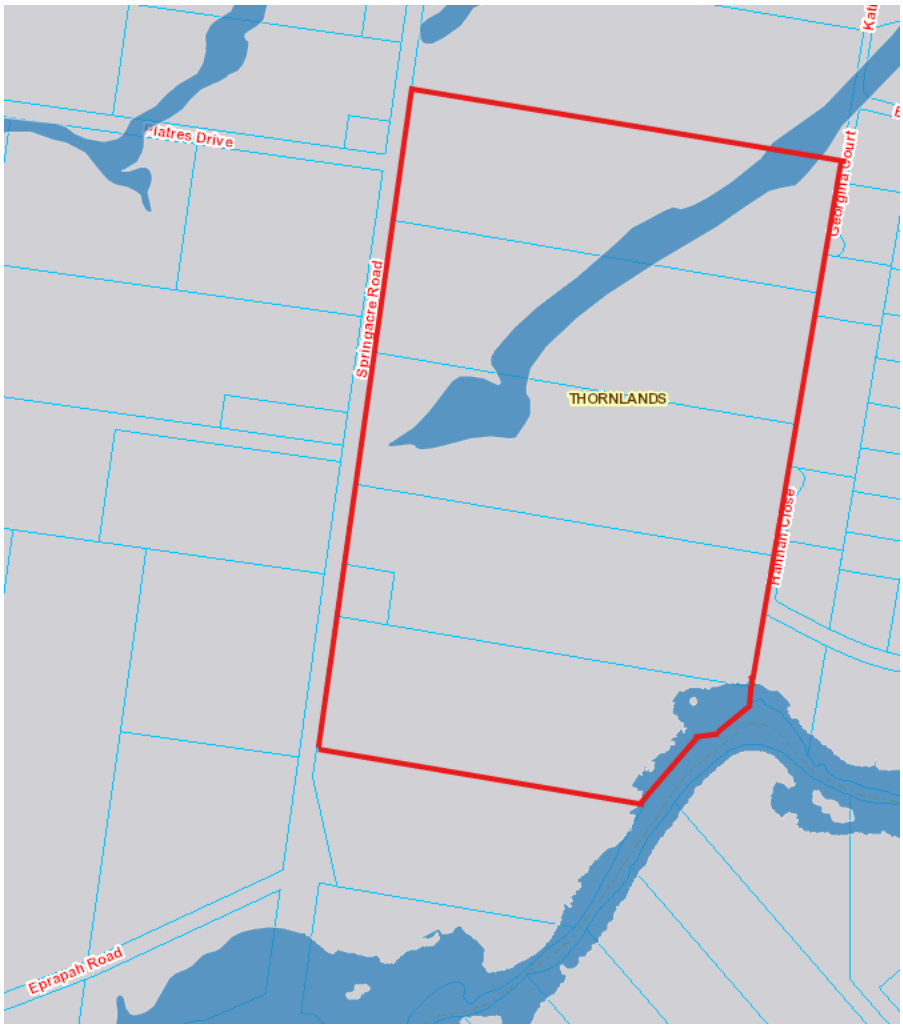


Figure 2.5: REDeMAP - Flood and Storm Tide Hazard Overlay

3. STORMWATER QUANTITY MANAGEMENT

3.1 General Stormwater Strategy

The earthworks design for the proposed development site shall look to retain the natural topography on-site and direct flow towards the existing discharge points. Where pre-development discharge is exceeded in the post development condition, it is proposed to install appropriately sized detention basins to ensure that the post development peak flows are mitigated to pre-development flow rates for the modelled events. This strategy shall ensure compliance with non-worsening of pre-development flows.

3.2 Proposed Catchment Hydrology

The proposed development increases the impervious area when compared with the pre-development scenario. Road pit and pipe drainage will collect the minor flows (1:2 AEP) generated by the development, while the road reserve will collect major flows (1:100 AEP) and convey stormwater towards the proposed discharge points. A conservative impervious fraction has been assigned to all areas of the development to best model the density of the proposed development in accordance with Redland City Council's Planning Scheme policy for Infrastructure. The impervious fraction selected for all developed catchments has been taken as 85%. The proposed post development catchment plan as well as the summary of predevelopment and post development catchments can be seen in Table 3.1 and Table 3.2, and Figure 3.1 and Figure 3.2 below.

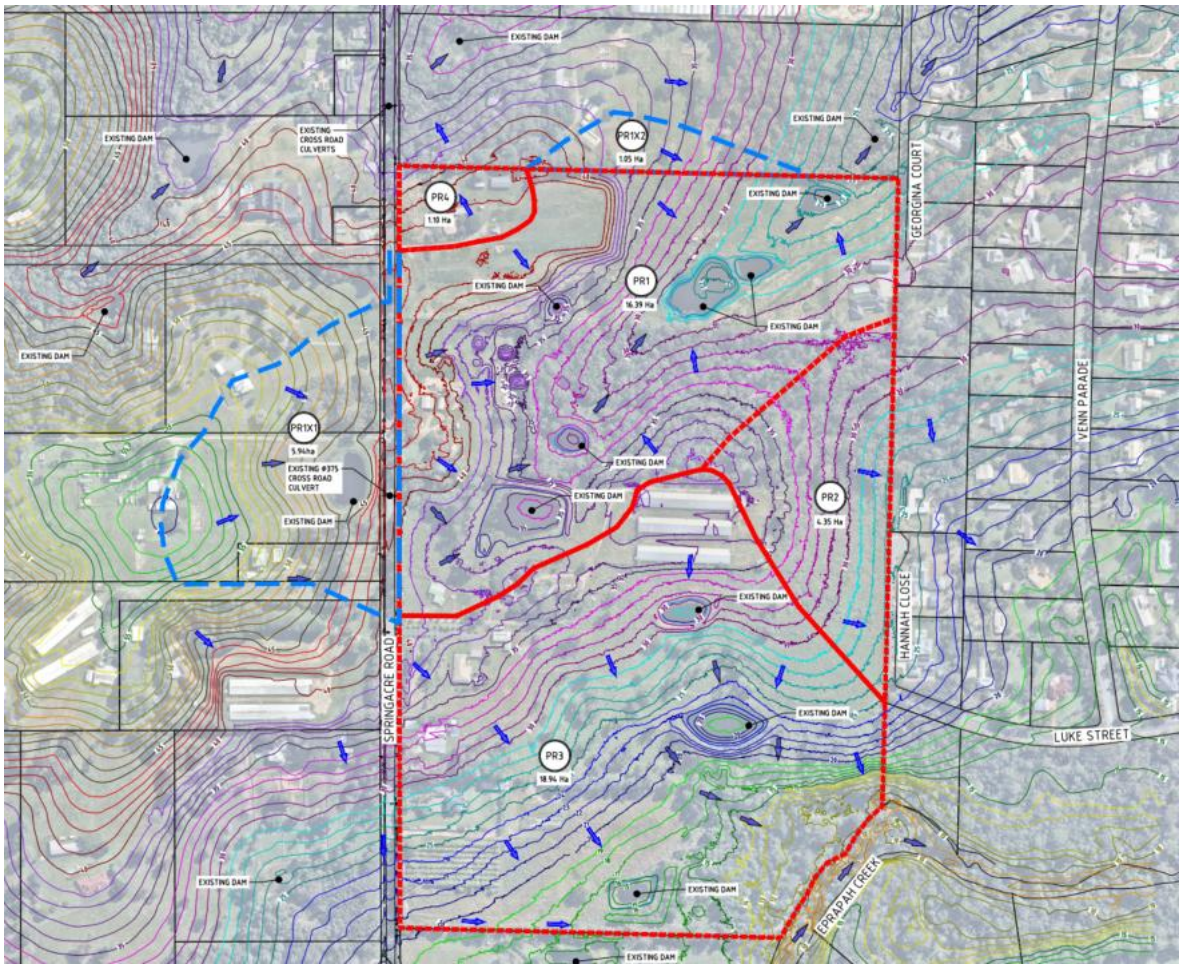


Figure 3.1: Pre-Development Catchment Plan

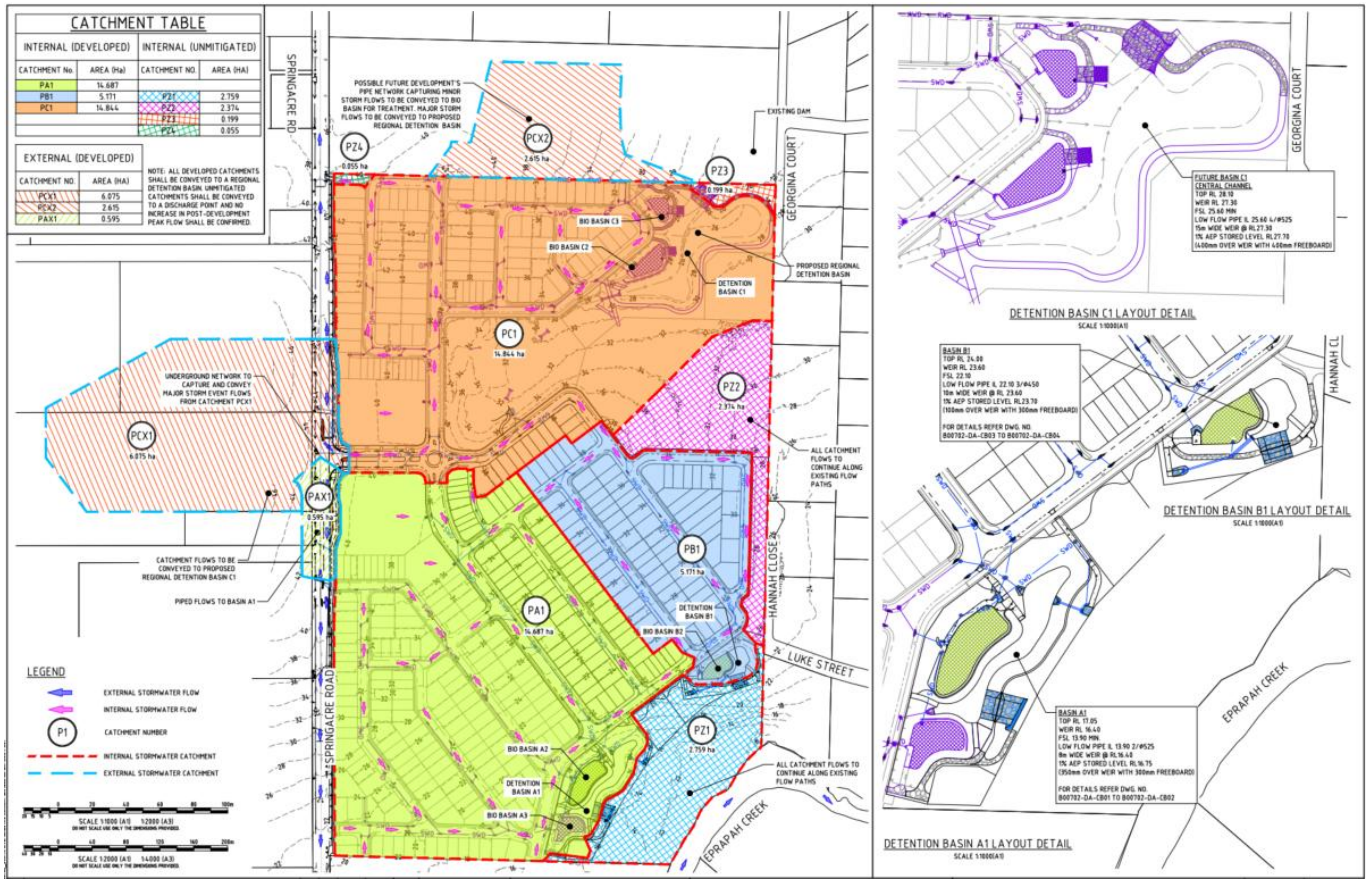


Figure 3.2: Post Development Catchment Plan

TABLE 3.1: PRE-DEVELOPMENT CATCHMENT DATA SUMMARY

	Catchment	Area (ha)	Average Slope (%)	Impervious (%)	Impervious Area (ha)	Pervious Area (ha)
Internal	Pre PR1	16.39	6.00	5%	0.82	15.57
	Pre PR2	4.35	6.00	5%	0.22	4.13
	Pre PR3	18.94	6.50	10%	1.89	17.05
	Pre PR4	1.10	6.50	10%	0.11	0.99
External	Pre PR1X1	5.94	8.50	5%	0.30	5.64
	Pre PR1X2	1.05	5.50	5%	0.05	1.00

TABLE 3.2: POST-DEVELOPMENT CATCHMENT DATA SUMMARY

Catchment		Area (ha)	Average Slope (%)	Impervious (%)	Impervious Area (ha)	Pervious Area (ha)
Internal	PST PA1	14.58	5.00	85%	12.39	2.19
	PST PB1	5.17	3.00	85%	4.40	0.78
	PST PZ1	2.87	4.00	5%	0.14	2.73
	PST PZ2	2.37	6.00	5%	0.12	2.26
	PST PC1	14.84	3.00	85%	12.62	2.23
	PST PZ3	0.20	3.00	5%	0.01	0.19
External	PST PCX1	6.08	4.00	85%	5.16	0.91
	PST PCX2	2.62	4.00	85%	2.22	0.39
	PST PAX1	0.60	3.00	85%	0.51	0.09

3.3 Detailed Assessment

3.3.1 Hydrological Model Parameters

The hydrologic software package XPRAFTS was utilised to determine the peak discharge for a range of storm durations between 5 minutes and 3 hours. The analysis utilises the principles outlined in the Australian Rainfall and Runoff Guidelines 2019 v4.2 to determine the undeveloped and developed peak flows. Peak flows for each design storm event in the pre-development case and post-development case were determined in the model.

Storm rainfall losses adopted for the pre-developed (existing) and post-developed (proposed) catchments are listed in Table 3.3 and Table 3.4 below. Consistent with the recommendations in the Australian Rainfall and Runoff Guidelines, initial and continuing loss rates have been included within the model.

TABLE 3.3: RAINFALL LOSS DATA

Design Scenarios	Pervious Areas Initial Loss (mm)	Pervious Areas Continuing Loss (mm/hr)	Impervious Areas Initial Loss (mm)	Impervious Areas Continuing Loss (mm/hr)
1:2 – 1:100 AEP	26.5	1.8	1.0	0.0

TABLE 3.4: CATCHMENT MANNING'S "N" VALUE

Design Scenarios	Impervious Mannings n	Pervious Mannings n
Pre Development	0.025	0.050
Post Development	0.030	0.060

3.3.2 External Catchment Considerations

As shown in Figure 3.2 above, external catchments to the west and north of the Site have been included within the stormwater model. Each of the external catchments have been described below:

- Catchment PCX1
  - The Location of the likely ultimate Crest of Springacre Road will result in all flows from Catchment PCX1 being directed into the proposed development site. On this basis, this catchment has been assumed to be fully developed in the post-development scenario with an impervious fraction of 85%. It is assumed that all flows up to the 1:100 AEP design event are captured and conveyed under Springacre Road to the proposed development site.
- Catchment PCX2
  - Based on the existing ridgeline, it is reasonable to expect that the ultimate development of the property to the north shall result in Catchment PCX2 discharging to the proposed development site. On this basis, this catchment has been assumed to be fully developed in the post-development scenario with an impervious fraction of 85%. It is assumed that all flows up to the 1:100 AEP design event are captured and conveyed to the proposed development site.
- Catchment PAX1
  - Based on the likely vertical geometry of Springacre Road, it is reasonable to expect that flows from external catchment PAX1 shall ultimately be directed to the proposed development site. On this basis, this catchment has been assumed to be fully developed in the post-development scenario with an impervious fraction of 85%. It is assumed that all flows up to the 1:100 AEP design event are captured and conveyed under Springacre Road to the proposed development site.

3.3.3 Model Discharge Points

The XP-Rafts Model considers the peak discharge at the three main discharge points for the site, as shown in Figure 3.3 below. The four discharge points modelled in the pre-development scenario can be described as:

- Discharge Point 1 - north-eastern corner of site, discharge to existing waterway
- Discharge Point 2 - eastern boundary of site, discharge to Road Reserve
- Discharge Point 3 – south-eastern corner of site, discharge to Eprapah Creek
- Discharge Point 4 - north-western corner of site, discharge to Springacre Road.

It is noted that Discharge Point 4 conveys flow from a small catchment in the pre-development scenario (1.1 Ha) which shall be re-directed to Discharge Point 1 as part of the development works. Discharge Point 4 shall not be retained in the post development scenario.

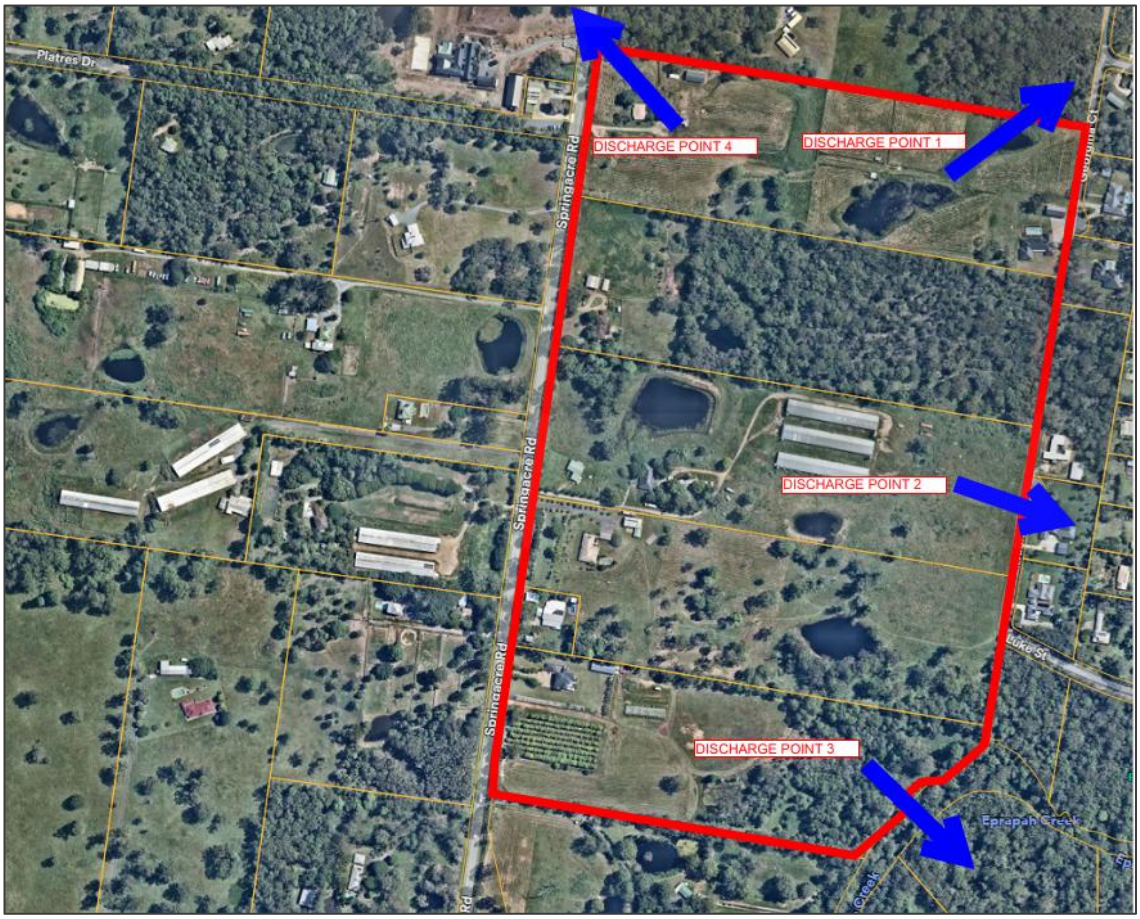


Figure 3.3: Discharge Point Summary

3.4 Hydrologic Model Validation

Validation of peak flows from the XPRAFTS hydrologic model was undertaken using the Rational Method in accordance with the Queensland Urban Drainage Manual (QUDM 2016). The Rational Method provides peak flow estimations based on the catchment area, a catchment dependent coefficient of discharge, the time of concentration (estimated time for flow from the highest point of the catchments to reach the outlet) and its corresponding rainfall intensity. Validation was undertaken for two pre-development catchments and one post-development catchment, with relevant inputs shown in Table 3.5.

TABLE 3.5: RATIONAL METHOD INPUTS

Catchment ID	Area (ha)	C_{10}	Time of Concentration (mins)
PR1 (Pre-Development)	23.4	0.45	21
PR3 (Pre-Development)	18.9	0.40	18
PA1 (Post-Development)	14.6	0.86	17

Table 3.6 provides the results of the validation assessment. Peak flows from the XPRAFTS model are within 37% of the Rational Method peak flow estimates for all modelled design events, with most being within 20% or less. The XPRAFTS model is therefore considered suitable to assess the flows and mitigation sizing for this proposed development.

TABLE 3.6: PEAK FLOW COMPARISON

Catchment ID	Design Event (1:x AEP)	XPRAFTS Peak Flow (m^3/s)	Rational Method Peak Flow Estimate (m^3/s)	Difference (%)
PR1 (Pre-Development)	1:2	2.69	2.99	-10%
	1:5	4.32	4.26	1%
	1:10	5.35	5.05	6%
	1:20	6.76	6.17	9%
	1:50	8.18	7.56	8%
	1:100	9.36	8.53	10%
PR3 (Pre-Development)	1:2	2.22	2.38	-7%
	1:5	3.49	3.40	3%
	1:10	4.36	4.01	9%
	1:20	5.54	4.91	13%
	1:50	6.54	5.98	9%
	1:100	7.50	6.74	11%
PA1 (Post-Development)	1:2	5.67	4.13	37%
	1:5	7.15	5.91	21%
	1:10	8.21	6.97	18%
	1:20	9.38	8.53	10%
	1:50	10.86	10.38	5%
	1:100	12.02	11.67	3%

3.5 Detention Basin Design Parameters

A series of detention basins were implemented to mitigate peak flows across the full range of events modelled. The location of these basins are shown in Figure 3.2 and Appendix A. Through an iterative design process, the detention basins were given the discharge parameters outlined within Table 3.5 below. Concept design of the basins is provided in Appendix B. 300 mm freeboard from the 1:100 AEP stored water level to the crest has been achieved.

TABLE 3.7: DETENTION BASIN SUMMARY

Detention Basin Name	A1	B1	C1
Catchment ID	PA1	PB1	PAX1, PCX1, PC1, PCX2
Basin Characteristics			
Basin Base Level	RL 13.9	RL 22.1	RL 25.6
Top of Crest Level	RL 17.05	RL 24.0	RL 28.1
Basin Maximum Depth to Crest	2.85	1.60	2.10
Water Volume Stored in 1% AEP Flood Event	9,200 m^3	2,200 m^3	9,800 m^3
Water Level in 1% AEP Flood Event	16.75	23.7	27.7

Detention Basin Name	A1	B1	C1
Low Flow Discharge			
Pipe Size and Type	DN 525 RCP	DN 450 RCP	DN 525 RCP
No. Barrels	2	3	4
High Flow Discharge			
Weir Crest Level	RL 16.4	RL 23.6	RL 27.3
Weir Width	8.0 m	10.0 m	15.0 m

3.6 Peak Flow Reporting

A summary of the peak flows at each discharge point, for the pre-development, post-development, and post-development mitigated scenarios are provided in Table 3.8 to Table 3.11. As shown in the below tables, the development is expected to increase peak flows discharging from site, but with incorporation of the proposed detention basins, peak flows are mitigated. Preliminary sizing of the detention basins and integration in the overall proposed site layout indicate that there are sufficient space and volume available within the development to facilitate appropriate attention of the stormwater flows.

TABLE 3.8: PEAK FLOW REPORTING – DISCHARGE POINT 1 (NORTH-EAST)

Design Event (1:x AEP)	Pre-development Scenario Peak Flow (m^3/s)	Post-development Scenario Peak Flow (m^3/s)	Post-development Mitigated Scenario Peak Flow (m^3/s)	% Reduction (Mitigated – Pre-Development)
1:2	2.72	7.20	2.61	-4.1%
1:5	4.37	9.09	3.07	-29.8%
1:10	5.44	10.53	4.61	-15.3%
1:20	6.93	12.06	6.52	-5.9%
1:50	8.86	14.44	8.27	-6.7%
1:100	10.19	16.02	9.65	-5.3%

TABLE 3.9: PEAK FLOW REPORTING – DISCHARGE POINT 2 (EAST)

Design Event (1:x AEP)	Pre-development Scenario Peak Flow (m^3/s)	Post-development Scenario Peak Flow (m^3/s)	Post-development Mitigated Scenario Peak Flow (m^3/s)	% Reduction (Mitigated – Pre-Development)
1:2	0.62	0.34	0.34	-45.5%
1:5	0.99	0.54	0.54	-45.7%
1:10	1.23	0.67	0.67	-45.7%
1:20	1.47	0.80	0.80	-45.5%
1:50	1.74	0.95	0.95	-45.6%
1:100	2.04	1.11	1.11	-45.7%

TABLE 3.10: PEAK FLOW REPORTING – DISCHARGE POINT 3 (SOUTH-EAST)

Design Event (1:x AEP)	Pre-development Scenario Peak Flow (m^3/s)	Post-development Scenario Peak Flow (m^3/s)	Post-development Mitigated Scenario Peak Flow (m^3/s)	% Reduction (Mitigated – Pre-Development)
1:2	2.83	7.72	2.76	-2.3%
1:5	3.49	9.69	3.21	-8.0%
1:10	4.45	11.41	3.62	-18.7%
1:20	5.61	13.00	4.52	-19.4%
1:50	6.70	15.50	6.16	-8.1%
1:100	7.52	17.12	7.31	-2.8%

TABLE 3.11: PEAK FLOW REPORTING – DISCHARGE POINT 4 (NORTH-WEST)

Design Event (1:x AEP)	Pre-development Scenario Peak Flow (m^3/s)	Post-development Scenario Peak Flow (m^3/s)	Post-development Mitigated Scenario Peak Flow (m^3/s)	% Reduction (Mitigated – Pre-Development)
1:2	0.21	0.01	N/A	-95.1%
1:5	0.29	0.02	N/A	-94.9%
1:10	0.35	0.02	N/A	-94.0%
1:20	0.48	0.03	N/A	-94.6%
1:50	0.53	0.03	N/A	-94.5%
1:100	0.60	0.03	N/A	-94.4%

3.7 Eprapah Creek Impacts

Due to the substantial difference in size of the Eprapah Creek catchment compared to the Site local catchment, the critical duration for Eprapah Creek is expected to be significantly longer than the Site local catchment critical duration. The relative catchment sizes and expected time of concentrations are summarised below:

- Local Catchment – 24 ha. Critical duration of 1 hour.
- Eprapah Creek Catchment (sub-catchment reporting to Site boundary) - 1,470 ha. Critical duration of 3 hours (informed by *Upper Eprapah Creek Catchment Study* (Engeny, 2012)).

Due to the above differences in time of concentration, this would result in the peak flows from the Site local catchment discharging prior to the peak flows from Eprapah Creek, meaning that no observed increases to Eprapah Creek peak flows or levels are expected. Therefore, a hydrologic assessment showing local catchment peak flow mitigation from the Site is sufficient to demonstrate no external impacts and a hydraulic assessment is not needed.

3.8 Flooding and Overland Flow

An analysis of the current Redland City Council City Plan - Flood and Stormtide Hazard Overlay indicates that all the proposed Early Release works are outside of the Flood Overlay extent. Furthermore, the creek flooding on the south-east site boundary is set back significantly from the proposed lots and stormwater detention infrastructure. The overlay indicates a flood level of approximately 11.5m RL while the development site is generally above 17.5m RL, with only minor stormwater infrastructure below this level at approximately 14.5m RL. As such, a flood assessment has not been undertaken during this phase of the development.

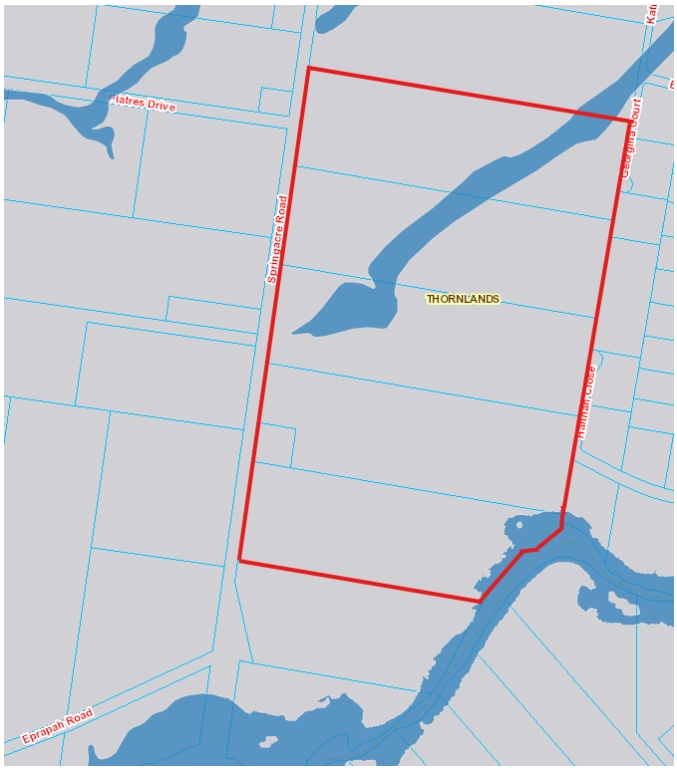


Figure 3.4: Redland City Council City Plan - Flood and Stormtide Hazard Overlay

It is anticipated that a flood model and associated reporting will be undertaken as part of the overall Southern Thornlands Priority Development Area (PDA) in the future. This report will deal with not only the extents of flooding and overland flow within the PDA, but also the afflux on adjacent properties with the potential to reduce the number and extent of detention basins throughout the overall catchment.

Overland flow within the proposed development is to be contained wholly within the road reserve and the drainage reserves. As part of the current application, a preliminary 2D analysis of the development flows during a 1:100 AEP event has been undertaken by others, including preliminary sizing of major culverts, as well as determining the flood extents of the main centre channel.

Additionally, as part of the operational works submission, a detailed hydraulic/hydrologic model shall be prepared to confirm the overland flow characteristics within the central drainage channel of the proposed development site, including confirmation of the major culverts and subsequent immunity levels.

Based on the information within the above sections, the storage area provided internally within the road reserve and within the drainage channel / detention basins shall be sufficient to convey both internal flows and flows generated within the developed external catchment.

4. STORMWATER QUALITY MANAGEMENT

4.1 Stormwater Quality Management Strategy

4.1.1 Environmental Values

The proposed development site flows to a number of discharge points, as identified in above sections of this report. All flow discharged from the Site is eventually conveyed to nearby waterways and subsequently discharged to Moreton Bay. The development of the Site will involve land disturbance for the purpose of creating residential and commercial lots and the associated access roads. During the construction phase, the most significant water quality objective will be that of suspended solids. To ameliorate any environmental harm that may occur, it is proposed that a series of bunded areas and sediment control devices within the sites be used to control stormwater quality during the construction period.

Dedicated temporary sediment basins will also be installed on the bottom of each catchment and will have sufficient capacity to contain the treatment within the sites. These temporary sediment basins, for construction phase erosion and sediment control, will be designed in accordance with Appendix B of Best Practise Erosion and Sediment Control (IECA Australasia, Nov 2008). Where practical, it is planned that the sediment basins will be decommissioned and replaced with bio-retention/detention basins when construction of a majority (>80%) of residential dwellings and commercial buildings has been completed. If sedimentation basins are not to be converted to bioretention they are to be de-watered, de-silted and decommissioned in accordance with the IECA Guidelines.

During the operational phase, pollutants from a development of this type are not expected to be a significant concern. As per the RCC City Plan and to be consistent with best practices with respect to water quality, the MUSIC modelling package has been used for the water quality objective analysis.

4.1.2 Water Quality Objectives

The treatment train performance will also be assessed against the State Planning Policy 2017 (SPP) Stormwater Management Design Objectives, as the SPP benchmarks have been triggered by the proposed development. As such the development will adopt formal stormwater quality treatment in accordance with the Water by Design guidelines.

The applicable Water Quality treatment objectives are:

TABLE 4.1: WATER QUALITY OBJECTIVES

Indicator	% Reduction
TSS (Total Suspended Solids)	80%
TP (Total Phosphorus)	60%
TN (Total Nitrogen)	45%
GP (Gross Pollutants)	90%

4.1.3 Strategy

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC), version 6.3.0, developed by eWater, has been used to quantify the water quality output for the developed catchment. The model's algorithms are based on the known performance characteristics of common stormwater quality improvement measures and modelled based on the Water by Design – MUSIC Modelling Guidelines Version 3.0 – 2018.

For the post-developed condition, water sensitive urban design has been employed using Stormwater Quality Improvement Devices. The stormwater management strategy is summarised as follows:

- Internal Catchment
  - Stormwater which falls within the internal catchment shall fall towards the pit and pipe network
  - Stormwater shall be conveyed via a pit and pipe network to a number of appropriately sized bioretention cells located within the central drainage channel in the case of the northern catchment, and in the combined quality / quantity stormwater pods located around the development discharge points for the southern catchment.
  - Once appropriately treated, stormwater shall be discharged from the stormwater quality treatment basins and subsequently from site.
- External Catchment
  - It is assumed that any treatment of the major western external catchments shall be undertaken by the adjacent landowner prior to discharge to the proposed development site.
  - Given the catchment characteristics and limited potential for treatment of the future northern external catchment, it has been assumed that the current proposed development will treat the post development stormwater runoff of the minor external catchment to the north. Refer to the Quality Catchment plan within the Appendix A.
  - All stormwater from external catchments discharged into the proposed development site shall be conveyed via pit and pipe network and overland flow through the site to the drainage corridor and discharged from site.

In order to control course sediment and gross pollutants entering the bio-retention system, a pre-treatment course sediment forebay will be installed at the pipe inlets to each of the bio-retention basins.

Access to the bioretention zones for the combined bioretention/detention basins will be provided.

4.1.4 Climate Data

Climate data for the catchment was sourced from the Bureau of Meteorology (BoM). Rainfall data was obtained from Redlands HRS Station (Station ID: 40265) for the 10 years between 1997 and 2006 at six (6) minute intervals as specified by MUSIC Modelling Guidelines for South East Queensland (Water By Design, 2018).

4.1.5 Catchment Properties

The catchment areas for the water quality are based on the proposed development layout and is presented in Appendix A. A lumped catchment approach was considered appropriate and adopted for the assessment of the urban residential catchments. Catchment QC4 discharges directly to the local flow path through the Site, and is therefore modelled as bypassing treatment by bioretention in the MUSIC model.

Rainfall-runoff and pollutant export parameters were adopted from the recommended values identified in Tables 3.8 and Table 3.9 Music Modelling Guidelines for South East Queensland (Water by Design, 2018).

Table 4.2 provides a summary of the MUSIC Modelling parameters adopted with the various land uses throughout the study area. Fraction impervious was adopted based on the recommended values provided by MUSIC Modelling Guidelines for South East Queensland (Water by Design, 2018).

TABLE 4.2: MUSIC MODEL CATCHMENT PARAMETERS

Catchment ID	MUSIC Land Use	Area (ha)	Impervious Fraction (%)	Basin
QCX3	Urban Residential	2.473	65% (Based on Table3.7, Water by Design MUSIC Modelling guidelines, 2018)	C3
QC3	Urban Residential	1.207	65%	
QC2	Urban Residential	5.261	65%	C2
QC41	Urban Residential	0.79	65%	
QB2	Urban Residential	5.171	65%	OFF-SITE
QA3	Urban Residential	4.582	65%	A3
QA2	Urban Residential	7.936	65%	A2
QAX1	Urban Residential	0.595	65%	
QA31	Urban Residential	1.228	65%	
QC4	Urban Residential	1.283	65%	Bypasses Treatment

A summary of the catchments can be seen in Figure 4.1 below.



Figure 4.1: Water Quality Catchment Layout

The network diagram of the MUSIC Model can be seen in Figure 4.2 below.

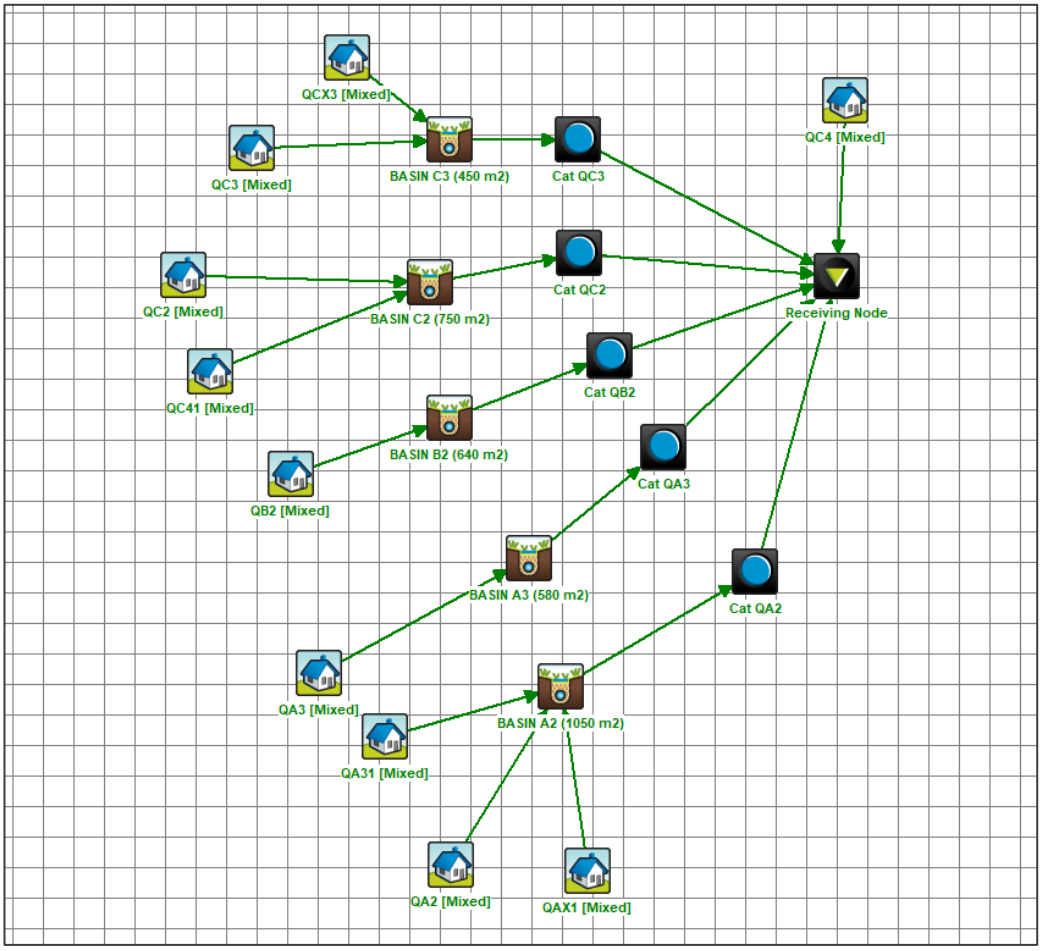


Figure 4.2: MUSIC Model Network Diagram

4.2 Developed Treated Case

Water Sensitive Urban Design (WSUD) aims to minimise the impact of a subdivision development on the natural water cycle by reducing the export of pollutants, sediments and nutrients from the site released into the natural watercourse. To treat the stormwater runoff from the Site, various treatment devices can be used throughout the development area, and these concepts can be integrated into the overall design of the road layouts, road cross sections, stormwater layouts and water supply reticulation systems.

There can be several individual devices that can be placed together to form an overall 'stormwater treatment train'. By using a series of devices, the sediment, pollutants and nutrients in the stormwater run-off can be treated so that the final discharge from the site will meet environmental guidelines.

4.2.1 Bioretention Areas

Opportunity exists at stormwater drainage outlet points of the proposed development to provide bioretention. Modelling of the proposed bioretention basins was carried out over a range of sizes based on the proposed development layout. The location of the bioretention basins can be seen in Figure 4.1 and Appendix A. When sizing bioretention basins in the MUSIC model, the surface area allocated for each of the bioretention basins was calculated from the filter area, batter slopes and extended detention areas to ensure an appropriate value was assigned.

The overall treatment of pollutants within the music model indicated that the use of Gross Pollutant Traps is not required as part of the stormwater quality treatment train. In order to control course sediment and gross pollutants entering the bioretention system, a pre-treatment course sediment forebay will be installed at the inlet of the bioretention basins. Course sediment forebays will be sized to a 3-month recurrence interval storm and with a clean out frequency of no less than one year. Detailed design of course sediment forebays will be undertaken during the detailed design phase. Figure 4.3 below details the typical cross section for bioretention basins.

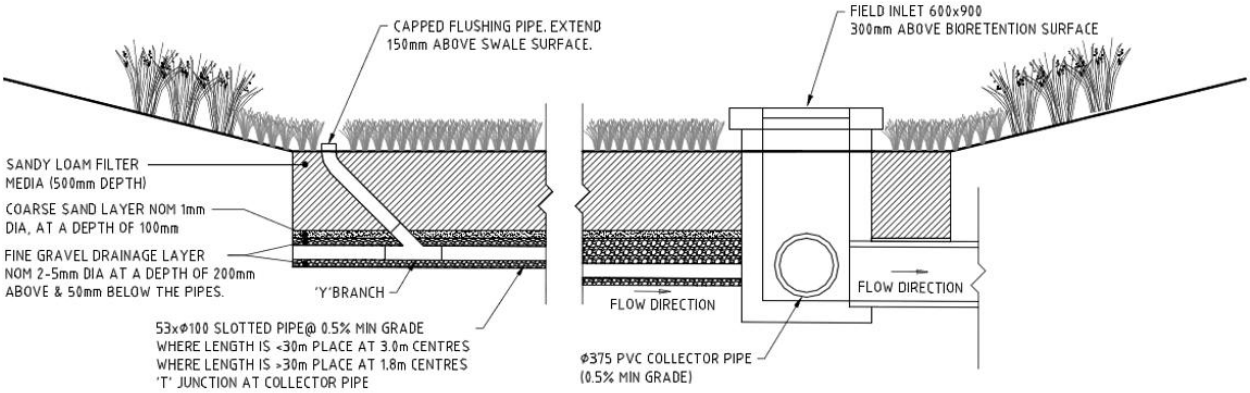


Figure 4.3: Typical Bioretention Basin Section

In order to model conditions expected during the lifespan of the bioretention basin, filter media parameters within the MUSIC model have been selected based on conformance test reports provided by local suppliers. Table 4.3 below details the proposed parameters of the bioretention basins used within the MUSIC model. Concept design of the basins is provided in Appendix B.

TABLE 4.3: BIORETENTION BASIN MODELLING PARAMETERS

Parameter	Basin A2	Basin A3	Basin B2	Basin C2	Basin C3
Catchment IDs	QA31/QAX1/QA2	QA3	QB2	QC41/QC2	QCX3/QC3
Filter Area (m2)	1050	580	640	750	450
Surface Area (m2)	1050	580	640	750	450
Unlined filter media perimeter (m)	0.01	0.01	0.01	0.01	0.01
Extended Detention Depth (m)	0.3	0.3	0.3	0.3	0.3
Filter Depth (m)	0.5	0.5	0.5	0.5	0.5
Filter Media Hydraulic Conductivity (mm/hr)	200	200	200	200	200
Equivalent Overflow Weir Width (m)	105	58	64	75	45
Course Sediment Management	Sediment Forebay	Sediment Forebay	Sediment Forebay	Sediment Forebay	Sediment Forebay

4.2.2 Coarse Sediment Management

Coarse sediment forebays are to be installed at the pipe outlet for each basin in accordance with the Healthy Land and Water Bioretention Technical Design Guidelines 2014. Course sediment forebays shall be appropriately sized for the upstream catchments. Coarse Sediment forebays shall have the following design characteristics:

- Removal Efficiency: 80%
- Sediment Loading Rate: 0.6 m^3/Ha/yr
- Design Flow: Q_{3Month}
- Turbulence Factor: 0.5
- Minimum Cleanout: Annual
- Minimum Forebay Depth: 200 mm.

Preliminary sizing of the basins is shown in Table 4.4 below:

TABLE 4.4: PRELIMINARY SEDIMENT FOREBAY SIZING

Basin	A2	A3	B2	C2	C3
Area (m2)	50	25	25	25	15

4.2.3 MUSIC Analysis and Results

A MUSIC analysis was carried out on the proposed development site based on the 'treatment train' shown in Table 4.5. The results of the annual pollutant load reductions based on the above design calculations are shown in Table 4.5.

TABLE 4.5: SUMMARY OF POLLUTANT TARGETS FOR TREATMENT TRAIN

Indicator	WQO's Target	WQO's Achieved	Objectives Met
TSS (Total Suspended Solids)	80%	80%	YES
TP (Total Phosphorus)	60%	73.7%	YES
TN (Total Nitrogen)	45%	50.5%	YES
GP (Gross Pollutants)	90%	95.8%	YES

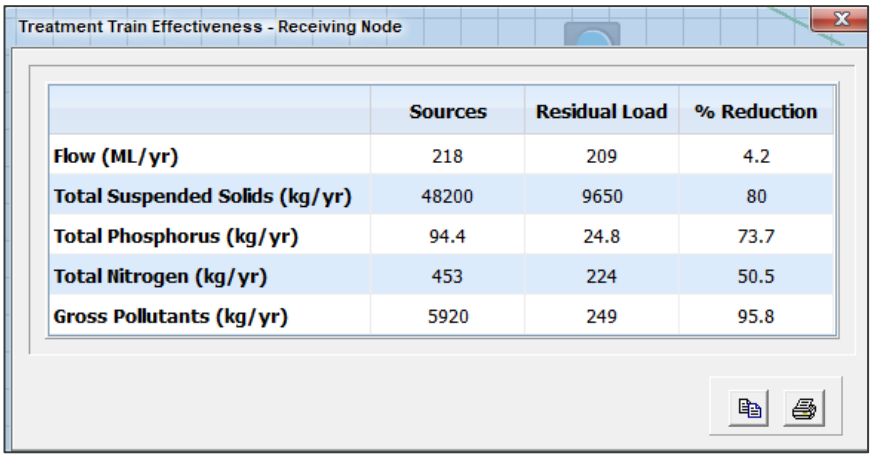


Figure 4.4: Treatment Train Effectiveness

4.3 Construction of Bioretention Basins

4.3.1 Bioretention Basin Layers

The layers of the bioretention basin have been selected based on the recommendations within the Bioretention Technical Design Guidelines Version 1.1 and are as follows:

- Filter Layer
  - 500 mm thick Sandy Loam Layer in accordance with the FAWB Guidelines.
- Transition Layer
  - 100 mm thick layer of well graded sands containing less than 2% fines.
- Drainage Layer

- 300 mm thick layer of fine gravel (2-5mm) with less than 2% fines and minimum saturated hydraulic conductivity of 4000 mm/hr

- Underdrainage System
  - An underdrain system of slotted drainage pipes (100mm diameter)
    - 1% longitudinal grade;
    - 2.5 m centres; and
    - maximum run length of 25m.
  - Slotted pipes are to flow to larger PVC collector pipes with 1% longitudinal grades and the following maximum collection areas:
    - DN 100 78m2
    - DN 150 229m2
    - DN 225 343 m2
    - DN 300 1455 m2
  - The underdrainage layout for the basins can be seen within Appendix B.

The bioretention basin has been modelled within MUSIC with an exfiltration rate of 0 mm/hr. Geofabric or any other liner is not to be used between the layers within the bioretention system due to elevated risks associated with clogging.

The following parameters must all be satisfied with the selection of the transition and drainage layers:

- D15 (Transition Layer) ≤ 5 x D85 (Filter Media)
- D15 (Drainage Layer) ≤ 5 x D85 (Transition Layer)

4.3.2 Bioretention Filter Media

The filter media used within the bioretention basin is to be in accordance with the Facility for Advancing Water Biofiltration (FAWB) "Guideline Specifications for Soil Media in Bioretention Systems" – 2009 Version.

4.3.3 Construction Methodology

On completion of civil works, the bioretention shall be excavated to the base with the underdrainage system, drainage media, transition layer, and filter media installed. Landscape works are to be installed along the batters of the bioretention basin in accordance with the Water by Design / Healthy Land and Water - Guidelines for the construction and establishment of bioretention systems and wetlands v2 2022.

The top of the filter media is to have geofabric installed and overlain by topsoil and turf. At such time that the upstream catchment of the bioretention basin reaches 80% buildout, the topsoil, turf and geofabric are to be removed and the bioretention basin is to be planted out in accordance with the Water by Design / Healthy Land and Water - Guidelines for the construction and establishment of bioretention systems and wetlands v2 2022. Reference is made to the landscape plans which detail final planting of the bioretention basin batters and surface area.

4.4 Construction Phase Erosion and Sediment Control

4.4.1 Construction Management Plan

As previously specified, the major stormwater pollutant during the construction phase will be that of suspended solids. To ensure adverse impacts to downstream waterways are mitigated during the construction phase, best practice erosion and sediment control measures are required.

It should be noted that an erosion and sediment control strategy has been prepared as part of this conceptual management plan. It shall be the responsibility of the developer, through their principal contractor, to ensure that temporary sediment and erosion controls are installed and maintained correctly.

4.4.2 Water Quality Management Plan

Internal catchments where surface disturbance and earthworks are occurring are to incorporate temporary sediment basin/s for construction phase erosion and sediment control in accordance with IECA best practices for erosion and sediment control (IECA Australasia, Nov 2008).

Sediment control should be able to be achieved by applying the following best practice sediment and erosion control management measures during the construction phase:

(1) Establish a single stabilised entry/ exit point for the site works.

(2) Construct a shake-down grid at the entrance to facilitate the removal of sediment from vehicles leaving the site. The access road extending from the end of existing road or kerb to the grid should comprise a 150-200mm deep pad of 40mm crushed rock.

(3) Install sediment fences along the lower boundary of the development works.

(4) Install bins and/ or wind-proof litter areas on-site to minimise the dispersion of gross pollutants.

(5) Maintain on site spare materials necessary for the emergency repair of all erosion control devices. This includes silt fences, clean crushed rock for reapplication to the entrance road and for replacement of rock within temporary drainage channels.

(6) Following each days' construction works, ensure that any material on road surfaces is swept from the road, and not permitted to be washed down the gutters and piped drainage systems.

(7) Quality of pooled water within sediment basins are to be monitored prior to dewatering, sufficient time should be given to allow sediment to settle (possibly with the assistance of a suitable flocculent if necessary) and/ or filtering during pumping operations.

(8) Final establishment of basins at outlets should not occur until full stabilisation of upstream catchments has occurred; preferably these should be temporarily turfed during the maintenance period while dwelling construction is occurring.

While the above provides general guidance on the management of stormwater during the construction phase, detailed Erosion and Sediment Control Management Plans will be required during the operation works application stage for each precinct/stage in accordance with International Erosion Control Association Australia (IECA) Guidelines.

5. WORKS SCHEDULE

The Contractor will be responsible for the maintenance of stormwater quality control devices from the possession of the Site until the Site are accepted 'Off Maintenance' by Redland City Council or until stabilisation has occurred to the satisfaction of the site superintendent. A defined sequence of actions in relation to construction of the Site has been established and the contractor is responsible for ensuring adherence to a sequence of actions for development of the Site.

TABLE 5.1: WORKS SCHEDULE OF KEY CONSTRUCTION EVENTS FOR THE SITE

Construction Phase	Required Action
Site Possession	• Installation of construction exit. • Construct temporary erosion and sediment control measures such as silt fencing and perimeter banks. • Construct temporary works to sediment basin to dimensions nominated by superintendent.
Construction	• Topsoil to be stripped and stockpiled in locations agreed with the superintendent. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile. • Sediment control devices require removal to allow construction access and will be reinstated at the completion of each workday. • Bulk earthworks complete. • Drainage structures in place. • Movement of construction equipment shall be limited to the area of work and existing roads. • Disturbed areas are to be stabilised following final trimming. Areas are to be restored progressively. • Surface stabilisation treatment complete. • Planting to be undertaken in accordance with the vegetation management plan. • Kerb sediment traps are to be provided at each drainage pit adjacent disturbed areas.
Maintenance	• Regularly check capacity of erosion control devices. • Disturbed areas are to have 80% coverage within 30 days of trimming. • Ensure permanent erosion control structures are stable.

In addition to the above table, the "*Guidelines for the construction and establishment of bioretention systems and wetlands v2 2022*" from Water by Design / Healthy Land and Water will be used as a guide during the construction and establishment phase of the works.

6. CONCLUSION

The stormwater management plan for the Early Release stages (the Site) of the proposed Southern Thornlands Priority Development Area has been prepared to support the Development Application and provide recommendations to the management of stormwater quality and quantity. The various methods recommended as part of this stormwater management plan are considered best practices for developments of this type. The proposed stormwater strategy is also consistent with the Redland City Council City Plan.

The combined bioretention/detention basins proposed for installation at strategic locations within the subject site are predicted to result in:

(1) Stormwater detention to ensure post development peak flows do not exceed the pre-development peak flows discharged from the Site for the modelled storm events.

(2) Appropriate stormwater quality treatment in accordance with the State Planning Policy (SPP).

(3) No interaction of development extents and infrastructure within the Eprapah Creek flood extent, nor impacts to Eprapah Creek flood behaviour as a result of discharge from the Site.

A summary of the proposed stormwater bioretention basins for the Site is provided in Table 6.1, and the detention basins in Table 6.2.

TABLE 6.1: BIORETENTION BASIN SUMMARY

Parameter	Basin A2	Basin A3	Basin B2	Basin C2	Basin C3
Catchment ID	QA31/QAX1/QA2	QA3	QB2	QC41/QC2	QCX3/QC3
Filter Area (m^2)	1050	580	640	750	450

A summary of the proposed stormwater bioretention basins for the Site is provided in Table 6.2.

TABLE 6.2: DETENTION BASIN SUMMARY

Parameter	Basin A1	Basin B1	Basin C1
Catchment ID	PA1	PB1	PAX1, PCX1, PC1, PCX2
Detention Basin Volume (m^3)	9,200	2,200	9,800

7. QUALIFICATIONS

(a) In preparing this document, including all relevant calculation and modelling, Engeny Australia Pty Ltd (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

(b) Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

(c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

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  (ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

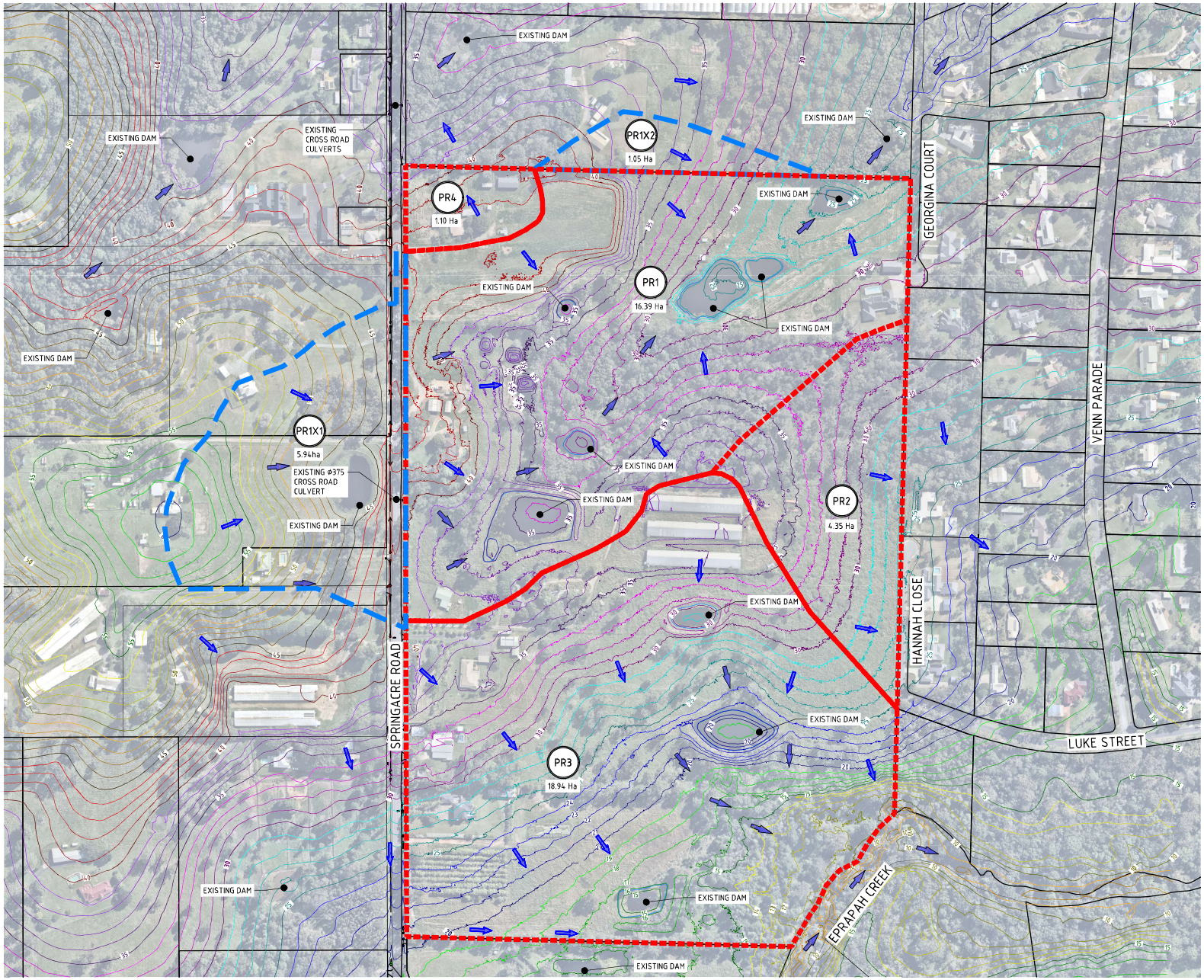
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(g) This Report does not provide legal advice.

APPENDIX A: SITE LAYOUT AND CATCHMENTS



CATCHMENT TABLE

INTERNAL		EXTERNAL	
CATCHMENT No.	AREA (Ha)	CATCHMENT NO.	AREA (Ha)
PR1	16.39 Ha	PR1X1	5.94 Ha
PR2	4.35 Ha	PR1X2	1.05 Ha
PR3	18.94 Ha		
PR4	1.10 Ha		

LEGEND

- EXISTING CONTOURS
- LOT BOUNDARY
- INTERNAL STORMWATER CATCHMENT
- EXTERNAL STORMWATER CATCHMENT
- PR1 — CATCHMENT NUMBER
- STORMWATER OVERLAND FLOW
- CONCENTRATED STORMWATER FLOW

0 40 80 120 160 200m
40 30 20 10

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DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

REVISION IN PROGRESS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUE FOR DISCUSSION	ES	PDW	PI	PI	16/10/25

ENGINEERING CERTIFICATION
Registered Engineer
Date
Registered Accreditation

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EMPOWER

Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1
Title: PRE DEVELOPMENT CATCHMENT PLAN

Datum: AHD
PSM 79006
RL 67.474
(RCC) COORD

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Project No.	Drawing No.	Rev
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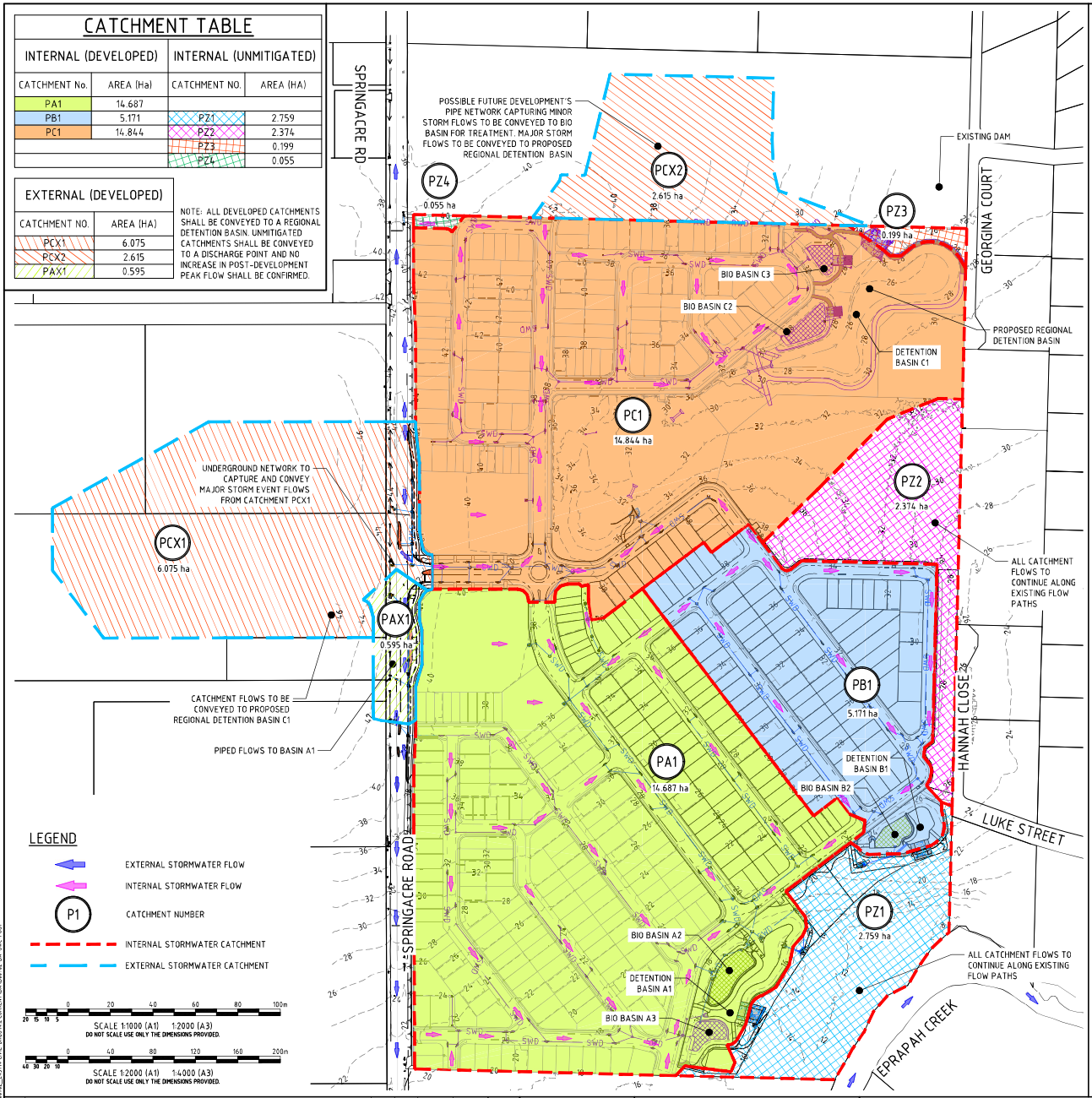
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CATCHMENT TABLE

INTERNAL (DEVELOPED)		INTERNAL (UNMITIGATED)	
CATCHMENT No.	AREA (Ha)	CATCHMENT NO.	AREA (HA)
PA1	14.687		
PB1	5.171	PZ1	2.759
PC1	14.844	PZ2	2.374
		PZ3	0.199
		PZ4	0.055

EXTERNAL (DEVELOPED)	
CATCHMENT NO.	AREA (HA)
PCX1	6.075
PCX2	2.615
PAX1	0.595

NOTE: ALL DEVELOPED CATCHMENTS SHALL BE CONVEYED TO A REGIONAL DETENTION BASIN. UNMITIGATED CATCHMENTS SHALL BE CONVEYED TO A DISCHARGE POINT AND NO INCREASE IN POST-DEVELOPMENT PEAK FLOW SHALL BE CONFIRMED.

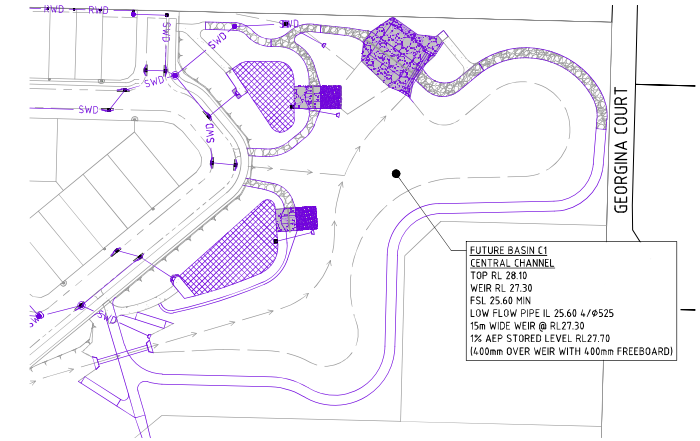


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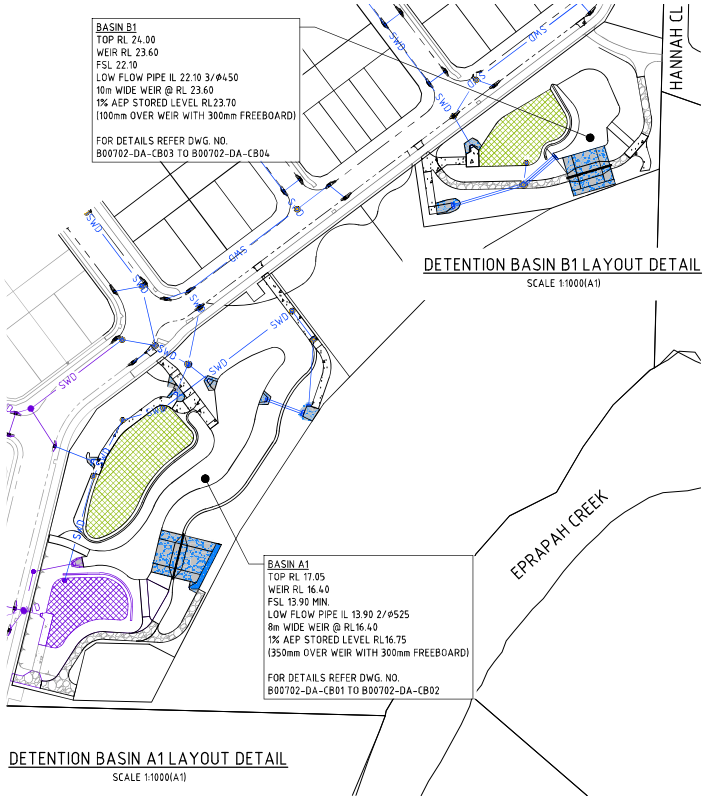
- EXTERNAL STORMWATER FLOW
- INTERNAL STORMWATER FLOW
- P1 — CATCHMENT NUMBER
- INTERNAL STORMWATER CATCHMENT
- EXTERNAL STORMWATER CATCHMENT

SCALE 1:1000 (A1) 1:2000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

SCALE 1:2000 (A1) 1:4000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.



DETENTION BASIN C1 LAYOUT DETAIL
SCALE 1:1000(A1)



DETENTION BASIN B1 LAYOUT DETAIL
SCALE 1:1000(A1)

DETENTION BASIN A1 LAYOUT DETAIL
SCALE 1:1000(A1)

REVISION IN PROGRESS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUE FOR DISCUSSION	ES	PDW	PI	PI	16/10/25

ENGINEERING CERTIFICATION
Registered Engineer
Date
Registered Accreditation

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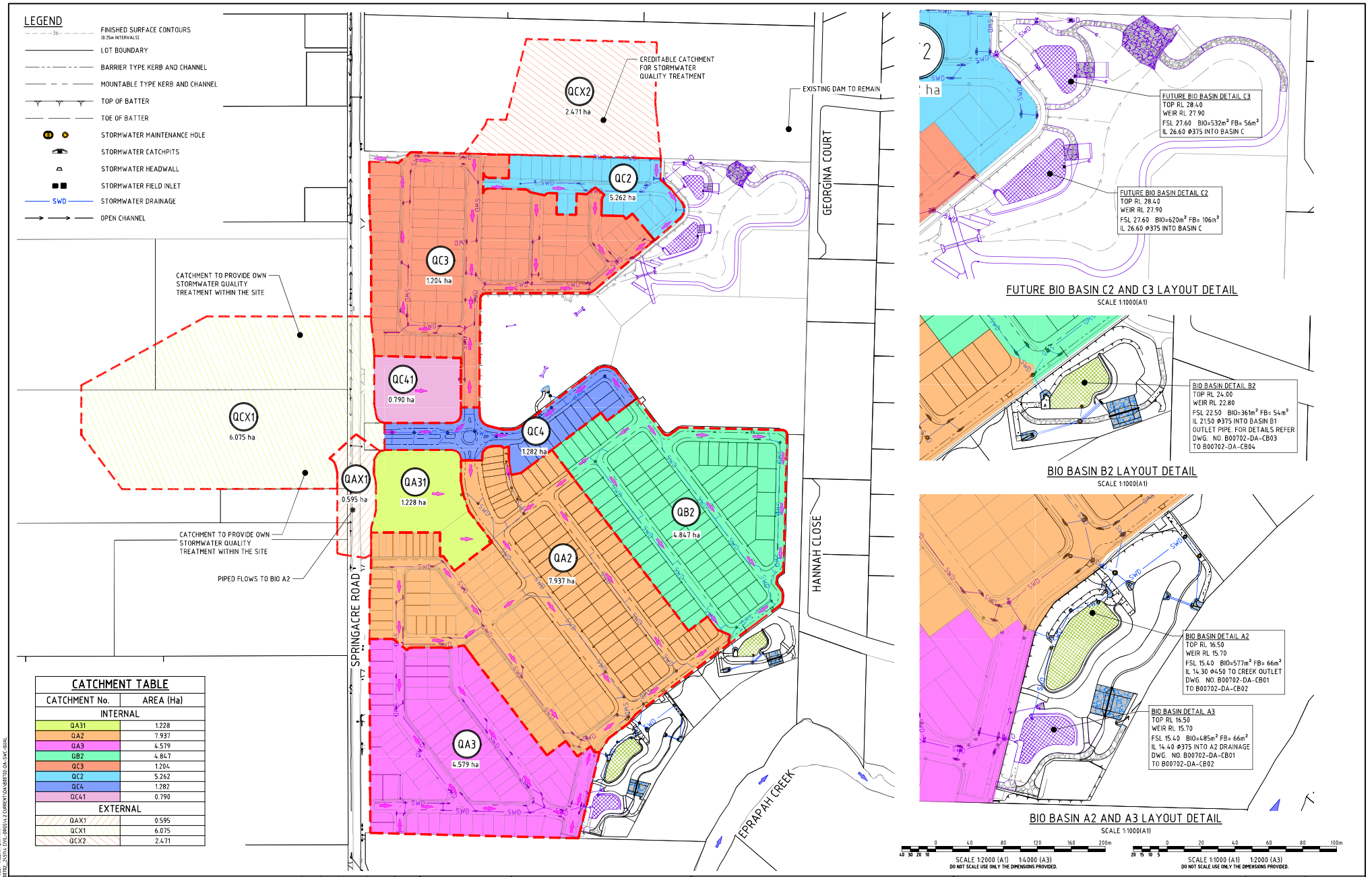
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Project: SOUTHERN THORNLANDS PRECINCT 1
Title: POST DEVELOPMENT CATCHMENT PLAN

Datum: AHD
PSM 79006
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Project No.	Drawing No.	Rev
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CATCHMENT TABLE

CATCHMENT No.	AREA (Ha)
INTERNAL	
QA31	1.228
QA2	7.937
QA3	4.579
QB2	4.847
QC3	1.204
QC2	5.262
QC4	1.282
QC41	0.790
EXTERNAL	
QAX1	0.595
QCX1	6.075
QCX2	2.471

REVISION IN PROGRESS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUE FOR DISCUSSION	ES	PDW	PI	PI	16/10/25

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Date
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Project: SOUTHERN THORNLANDS PRECINCT 1
Title: STORMWATER QUALITY CATCHMENT PLAN

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RL 67.474
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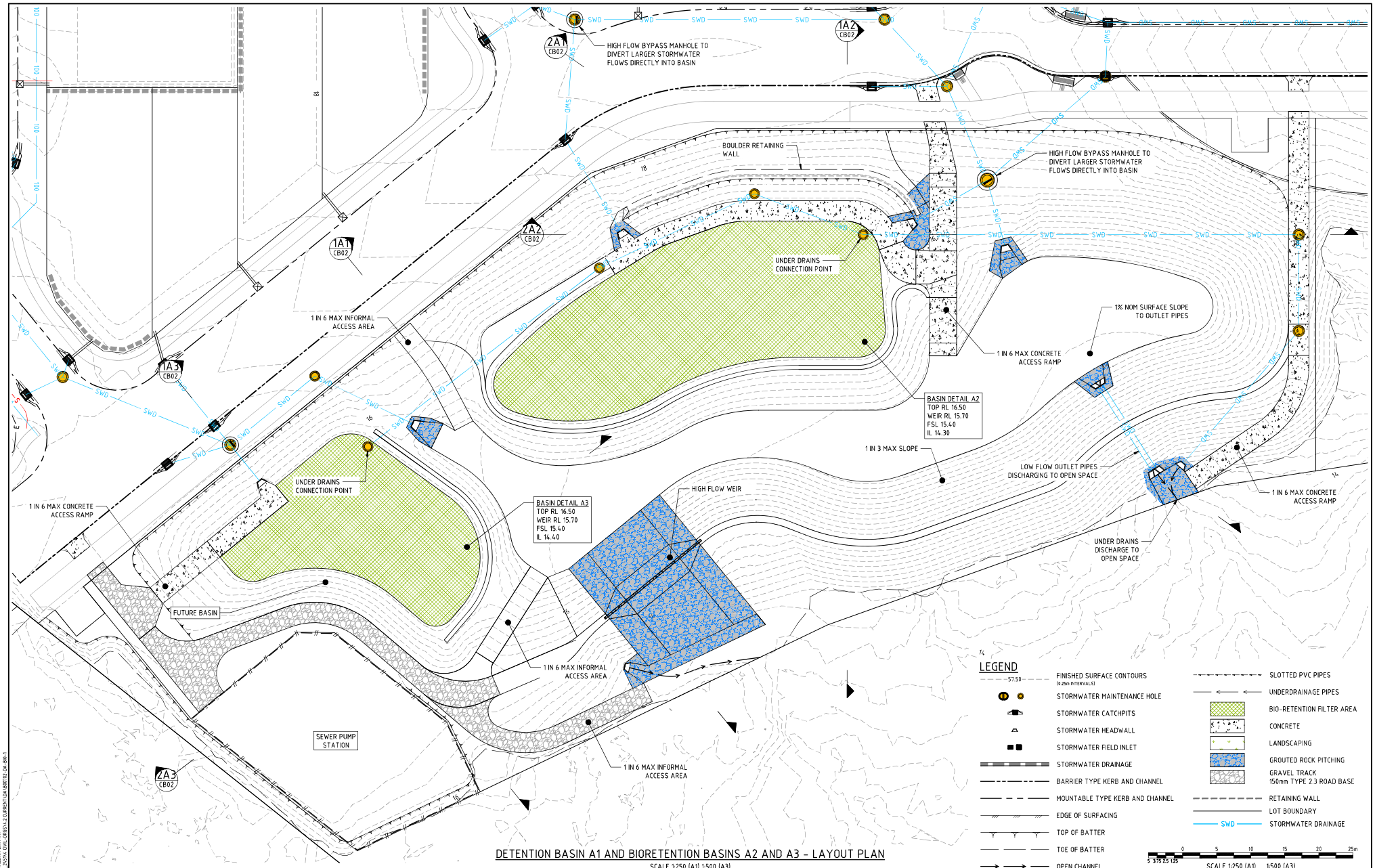
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APPENDIX B: CONCEPT ENGINEERING PLANS



DETENTION BASIN A1 AND BIORETENTION BASINS A2 AND A3 - LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

REVISION IN PROGRESS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUE FOR DISCUSSION	ES	PDW	PI	PI	16/10/25

ENGINEERING CERTIFICATION

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Date

Registered Accreditation

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URBEX

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Client: URBEX PTY LTD

Project: SOUTHERN THORNLANDS PRECINCT 1

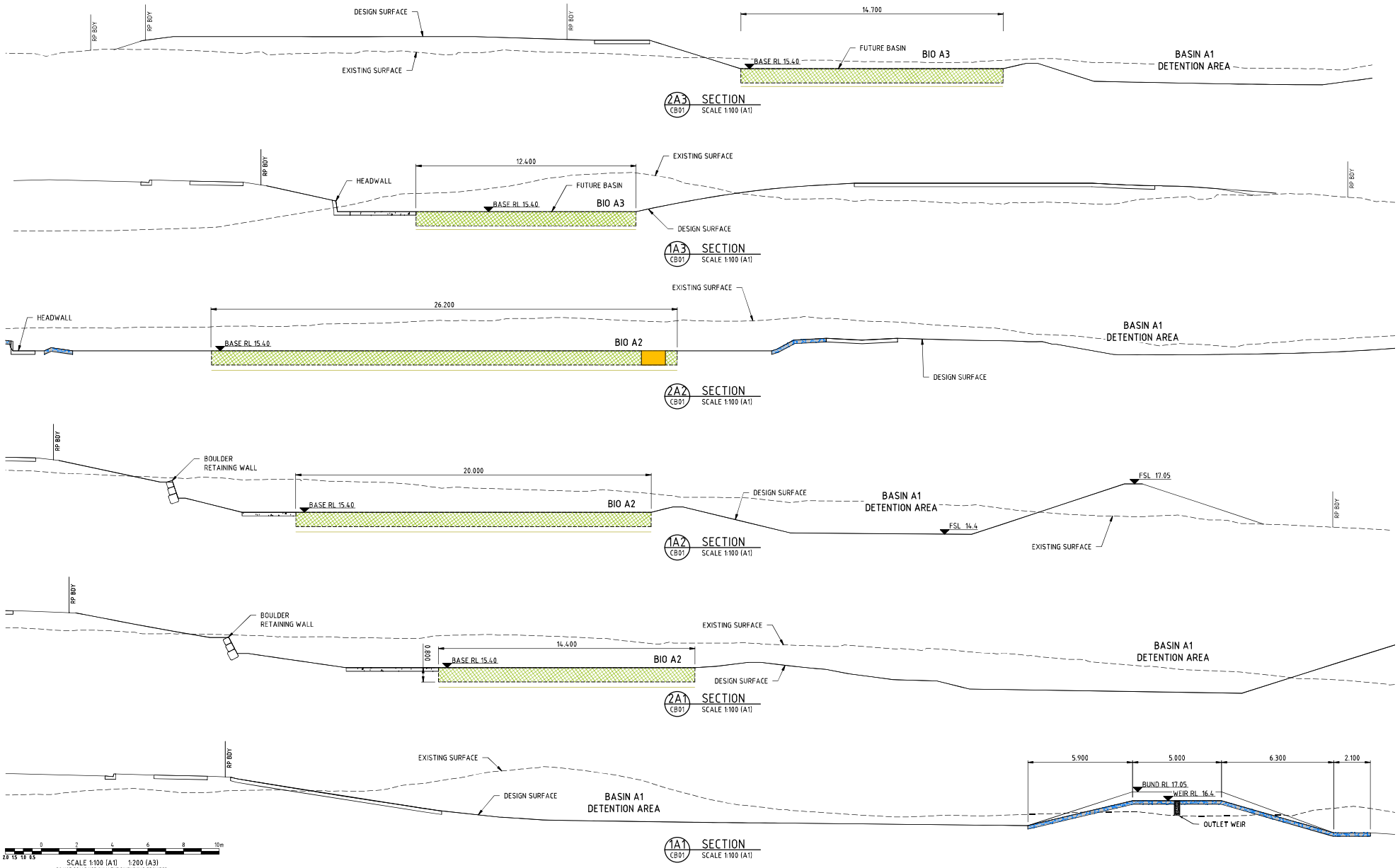
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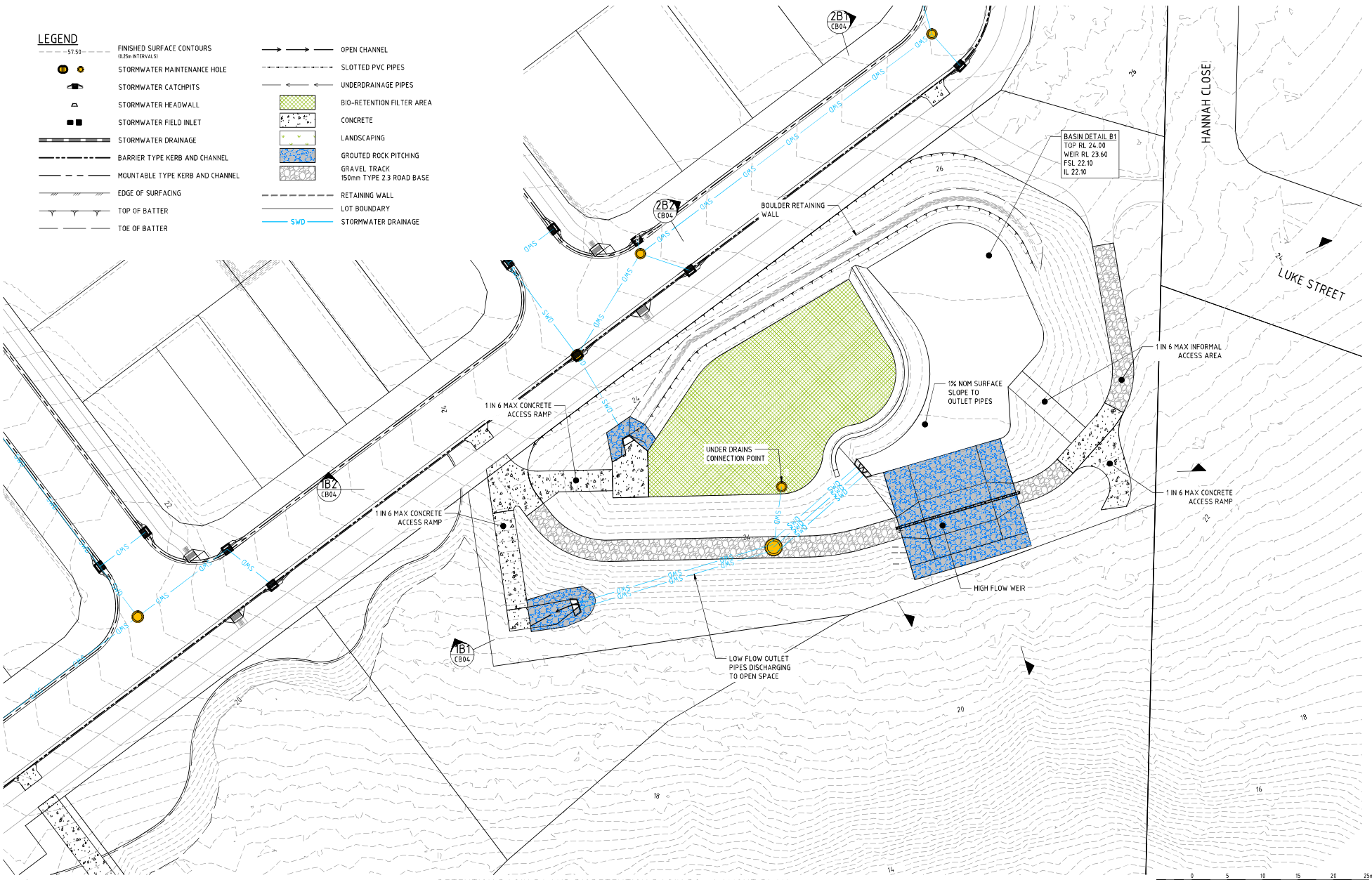
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Project: SOUTHERN THORNLANDS PRECINCT 1
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DETENTION BASIN B1 AND BIORETENTION BASIN B2 - LAYOUT PLAN

SCALE 1:250 (A1) 1:500 (A3)

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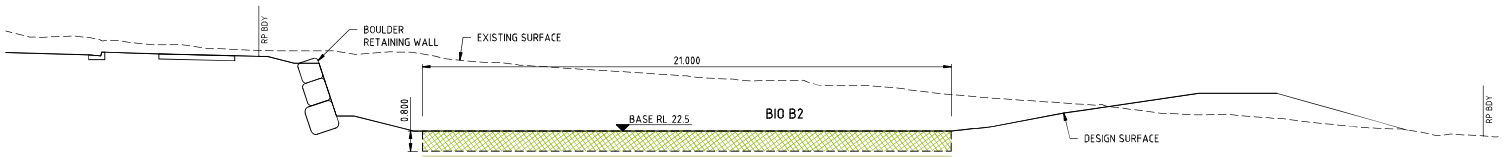
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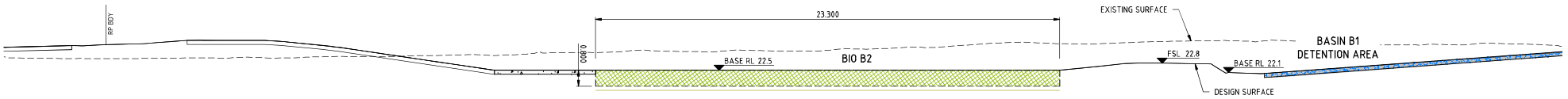
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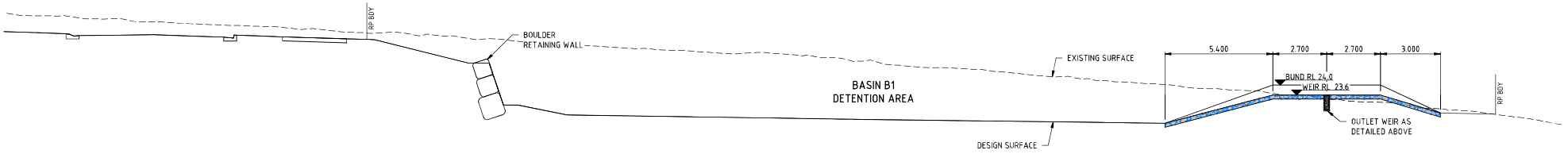
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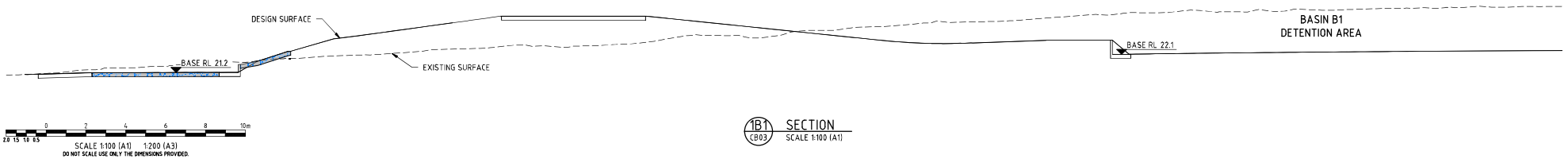
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1B2 CB03 SECTION
SCALE 1:100 (A1)



2B1 CB03 SECTION
SCALE 1:100 (A1)



1B1 CB03 SECTION
SCALE 1:100 (A1)

SCALE 1:100 (A1) 1:200 (A3)
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URBEX

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Client: URBEX PTY LTD
Project: SOUTHERN THORNLANDS PRECINCT 1
Title: BIORETENTION BASIN B2
CROSS SECTIONS

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Amended Sewer Network Capacity Assessment Required

Appendix E. Sewer Network Capacity Assessment

AMENDED IN RED

By: Nicole Tobias

Date: 19 April 2026

Queensland Government

EMPOWER

www.bmdgroup.global

Precinct 1 Southern Thornlands PDA

Sewer Network Capacity Assessment

FINAL Report V1 - 9 December, 2025



H2One Pty Ltd

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Reviewed by RPEQ	Reg. No.	Signed	Date
Joshua May	18064		9 December, 2025

Version	Date	Author	Reviewer
DRAFT - V1	14 November, 2025	J Meesamphan	J May
FINAL - V1	9 December, 2025	J Meesamphan	J May

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1 INTRODUCTION

1.1 Background

Stages 1 and 2 of Precinct 1 of the Southern Thornlands Priority Development Area (PDA) is currently in the planning phase of the development approval process. The relevant lots are located at 76–94 Springacre Road, 96–108 Springacre Road, 110–118 Springacre Road and 124–138 Springacre Road, Thornlands QLD 4164, comprising of Lot 13 on RP53653, Lot 14 on RP53653, Lot 2 on RP128089 and Lot 16 on RP53653.

The development will comprise of a total of 11 x duplex lots and 165 x residential freehold lots, delivered over two separate stages, as per the following breakdown. Refer to Appendix 1 for the development layout plan and relevant staging.

Stage 1

- 5 × lots with duplex unit
- 88 × residential freehold lots

Stage 2

- 6 × lots with duplex unit
- 77 × residential freehold lots

Empower Engineers and Project Managers Pty Ltd developed a temporary service strategy for the sewer network of Stages 1 and 2. This strategy involves the construction of the proposed regional Sewer Pump Station (SPS), and utilising a temporary pump set and rising main that will extend east and discharges to the Victoria Point Sewage Treatment Plant (STP) catchment. Refer to Appendix 1 for an overview of the proposed strategy.

As part of the infrastructure planning process, a capacity assessment was undertaken on Redland City Council's (RCC) downstream sewer network, to determine if the additional sewage loading from the regional SPS will adversely impact system performance and trigger the need for infrastructure upgrades.

H2One Pty Ltd was engaged to undertake the hydraulic modelling assessment, in accordance with RCC's Design Standards; "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025). The results of the study are presented in this report.

1.2 Objectives

The objectives of the project were as follows.

1. Assess the capacity of downstream gravity mains, pressure mains, pumps and wet wells for the relevant sewer catchment; Victoria Point STP pump station (PS).
2. Determine infrastructure upgrades necessary to achieve RCC's minimum Design Standards, where system performance failures have occurred due to the additional loadings of Precinct 1, within the Southern Thornlands PDA.
3. Prepare a network capacity assessment report.

Note: This assessment did not consider the capacity of the sewage treatment plant (STP) or associated treatment processes. The scope of work was limited to assessment of upstream trunk sewer infrastructure only.

1.3 Sewer Service Strategy

A temporary sewer service arrangement has been proposed to facilitate the initial development of Precinct 1 (Stages 1 and 2), within the Southern Thornlands PDA. The strategy includes the construction of a regional SPS at the southern boundary of Precinct 1, which will ultimately service the wider PDA at full development.

During the interim period, the SPS is planned to operate under a temporary configuration utilising a smaller pump set and rising main that discharges to the existing DN300 gravity main along Intrepid Drive, Victoria Point. From this connection point, flows will be conveyed east through a DN300 to DN600 trunk gravity system to the Victoria Point lift station located on-site of the treatment plant.

This temporary system is expected to remain in operation for approximately five to seven years, providing service until future stages of the Southern Thornlands PDA are developed and the ultimate trunk infrastructure is constructed. Under the ultimate arrangement, the regional SPS will discharge to the Cleveland STP catchment, via planned trunk network extensions.

Based on Redland City Council's (RCC) 2022 Netserv model, the Victoria Point STP PS currently services a catchment population of 34,760 EP, increasing to approximately 39,140 EP by the 2036 planning horizon. An overview of the proposed servicing configuration is provided in Appendices 1 and 2.

1.4 Sewage Generation

A sewage generation assessment was undertaken on the proposed development, to determine the approximate loading attributed to the land-use type and density. This was calculated using RCC's Equivalent Persons (EP) unit rates and average "per capita" sewage generation (200 L/EP/day). For completeness, the ultimate demand of Precinct 1 was adopted for the assessment.

Refer to Table 1 below for a summary of the relevant EP estimates.

Table 1. Estimated sewage generation for Precinct 1 (Ultimate) of the Southern Thornlands PDA

Site Land-use and Density	Demand Rate	EP	ADWF (L/s)	PWWF (L/s)
418 x res. freehold lots	2.7	1,128.6	2.6	13.1
47 x duplex units	2.51 EP/Apt.	197.7	0.5	2.3
140 x 1 bedroom apt.	1.31 EP/Apt.	183.4	0.4	2.1
40 x 2 bedroom apt.	1.76 EP/Apt.	70.4	0.2	0.8
70 x 3 bedroom apt.	2.51 EP/Apt.	175.7	0.4	2.0
3,400 m^2 GFA com.	1.68 EP/100 m^2 GFA	57.1	0.1	0.7
	TOTAL	1,812.9	4.2	21.0

Note: As per the SEQ Code, PWWF flow rates were based on 5 x ADWF @ 200 L/EP/day.

2 METHODOLOGY

2.1 Desired Standards of Service

The design standards adopted for the hydraulic assessment were based on the "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025), with exception to the maximum depth of gravity pipe flow at 1.0 m freeboard. This requirement is merely a standard industry practice adopted by water authorities in South-east Queensland, and is not a specific design standard from either the SEQ Code or Water Service Association of Australia (WSAA) Sewerage Code.

A summary of the relevant design provisions utilised for the project is as follows.

Table 2. Design provisions adopted for the hydraulic assessment

	Provision	Specification
Sewerage	ET to EP conversion factor	2.7
	Average Dry Weather Flow (ADWF)	200 L/EP/day
	Peak Wet Weather Flow (PWWF)	5 x ADWF
	Single pump capacity	C1 x ADWF (L/s) where; C1 = 3.5 to 5.0 $C1 = 15 \times (EP)^{-0.1587}$
	Pump station operational storage (m^3)	0.9 x Q / N where; Q = Single pump capacity (L/s) N = Number of pump starts per hour, where N = 12 for duty pump motor < 100 kW N = 8 for duty pump motor 100 – 200 kW N = 5 for duty pump motor > 200 kW
	Pump station emergency storage (m^3)	4 hours ADWF
	Total pump station capacity (L/s)	PWWF
	Maximum depth of gravity flow (proposed system)	75% pipe diameter
	Maximum depth of gravity flow (existing system)	1.0 m below manhole level
	Maximum pressure main flow velocity	3.0 m/s

2.2 Network Modelling Assessment

The methodology adopted for the hydraulic analysis of the sewer network is as follows.

1. RCC's latest LGIP MIKE+ sewer network model ("*VP206P_211022_(Netserv_Model_v3)*") was adopted for the hydraulic analysis. This model incorporates the 2022 Netserv planning demands and approved infrastructure upgrades.

   The modelling assessment considered the 2021 and 2036 planning horizons only, as the study relates to a temporary servicing arrangement that will not be relevant to long-term infrastructure planning. For the post-development scenarios, the total sewage loading generated by Precinct 1 was applied to the proposed discharge manhole (Node 114619).

2. The pump capacity of the Victoria Point STP PS was assessed by running the model at PWWF and determining if wet well levels operated within the stand-by pump start/stop settings. This approach was adopted as the STP pump station receives inflows from multiple upstream

pump stations, and therefore represents the most appropriate method for assessing the combined pumping capacity of the system.

If the pump station/s could not maintain acceptable levels and surcharging occurred, pump and/or rising main capacity upgrades were investigated until design standards were achieved.

3. The operational storage of the Victoria Point STP PS wet wells was subsequently evaluated by comparing the required storage capacity, post-development, against wet well volumes between the duty pump start/stop levels.

   If the wet well's operational storage volume was above the minimum requirement, compliance was achieved. If it was below the minimum requirement, upgrades were investigated until design standards were achieved.

4. The flow depth of gravity mains was assessed from the proposed connection point to Victoria Point STP PS, pre- and post-development. To avoid surcharging from potential deficiencies downstream, the relevant pump station was deactivated and the gravity mains discharged directly to an outlet.

   If flow depths could not be maintained within RCC's specifications, pipe augmentations were investigated until Design Standards were achieved.

5. An emergency storage assessment was not undertaken as the proposed regional SPS will be designed to cater for this requirement.

6. Modelling results were verified and findings reported.

3 RESULTS

3.1 Pumps and Rising Mains

A pump capacity assessment was undertaken on the Victoria Point STP PS, as per the methodology described in Section 2.2 of this report. The analysis identified that the existing pump set has sufficient capacity to service the temporary service strategy, up to the 2036 planning horizon. No pump capacity upgrades are therefore required to temporarily service Precinct 1 of the PDA.

Refer to Appendix 3 for detailed modelling results.

3.2 Wet Wells

An assessment on the operational storage capacity of the Victoria Point STP PS wet well was undertaken with the inclusion of the additional EP loading from Precinct 1. Table 3 below shows a summary of results and Appendix 4 provides detailed calculations.

Table 3. Operational storage capacity results (post-development)

Planning Horizon	Storage Available (kL)	Storage Required (kL)	Difference (kL)
2021	30.1	23.3	+6.8
2036	30.1	26.2	+4.0

Note 1: The Precinct 1 sewage loading contributed approximately 1.4 kL towards the operational storage requirement.

Note 2: The duty pump power rating (< 100 kW) was estimated based on model flow and discharge pressure results presented in the model.

The results in the above table demonstrate that there is sufficient operational storage capacity to incorporate the additional sewage loading, up to the 2036 planning horizon. No wet well capacity upgrades are therefore required to temporarily service Precinct 1.

3.3 Gravity Mains

As outlined in Section 2.2, gravity main flow depths were assessed against RCC's minimum design requirements, from the discharge point to the Victoria Point STP PS. The analysis confirmed that the existing gravity main system has sufficient capacity to accommodate the proposed site loading up to the 2036 planning horizon. Accordingly, no gravity main upgrades are required to accommodate the temporary service strategy.

At the 2036 planning scenario, a single overflow event was observed at the manhole located immediately downstream of the proposed discharge point (MH ID: *1_3021C*). However, this was determined to be a likely model anomaly, as no ground cover was present at the manhole, and RCC's online mapping indicated no physical manhole at the reported location. A subsequent sensitivity check was completed, assuming 600 mm of cover, which confirmed that the system operates satisfactorily under these conditions.

The gravity system was also assessed under a 4 × ADWF peaking factor (16.8 L/s) for Precinct 1. The results showed that all gravity mains operated with a Hydraulic Grade Line (HGL) contained within pipe. As the development area will be of new construction, the short-term PWWF is expected to be closer to 4 × ADWF, rather than 5 × ADWF, consistent with the SEQ Code provisions for "NuSewer" systems.

Refer to Appendix 5 for detailed modelling results and gravity main profiles.

4 CONCLUSION

Stages 1 and 2 of Precinct 1 of the Southern Thornlands Priority Development Area (PDA) is currently in the planning phase of the development approval process. The relevant lots are located at 76–94 Springacre Road, 96–108 Springacre Road, 110–118 Springacre Road and 124–138 Springacre Road, Thornlands QLD 4164, comprising of Lot 13 on RP53653, Lot 14 on RP53653, Lot 2 on RP128089 and Lot 16 on RP53653.

The development will comprise of a total of 11 x duplex lots and 165 x residential freehold lots, delivered over two separate stages, as per the following breakdown. Refer to Appendix 1 for the development layout plan and relevant staging.

Stage 1

- 5 × lots with duplex unit
- 88 × residential freehold lots

Stage 2

- 6 × lots with duplex unit
- 77 × residential freehold lots

Empower Engineers and Project Managers Pty Ltd developed a temporary service strategy for the sewer network of Precinct 1 (Stages 1 and 2). This strategy involves the construction of the proposed regional Sewer Pump Station (SPS), and utilising a temporary pump set and rising main that will extend east and discharges to the Victoria Point Sewage Treatment Plant (STP) catchment.

As part of the infrastructure planning process, a capacity assessment was undertaken on Redland City Council's (RCC) downstream sewer network, to determine if the additional sewage loading from the regional SPS will adversely impact system performance and trigger the need for infrastructure upgrades. For completeness, it was assumed that the ultimate demand of Precinct 1 would be utilised for the assessment (1,813 EP). H2One Pty Ltd was engaged to undertake the hydraulic modelling assessment, in accordance with RCC's Design Standards; "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025).

The hydraulic analysis determined that there was sufficient capacity in the downstream sewer network to incorporate the additional loading of Precinct 1, up to the 2036 planning horizon. The gravity main assessment did identify an over flow event at a manhole downstream of the proposed connection point, however further investigation identified that this was likely to be a model error, as no ground cover was present at the manhole, and RCC's online mapping indicated no physical manhole at the reported location. A subsequent sensitivity check was completed, assuming 600 mm of cover, which confirmed that the system operates satisfactorily under these conditions. In addition, the adoption of 4 x ADWF for a "NuSewer" system determined that all gravity main pipes operated with flow depths below pipe obvert. No sewer infrastructure upgrades are therefore required to service the proposed temporary pumping strategy, up to the 2036 planning horizon.

It is recommended that RCC reviews the findings presented in this report and approves the proposed temporary service strategy for Precinct 1 of the Southern Thornlands PDA. Detailed modelling results and system plans can be observed in Appendices 1 through 5.

5 REFERENCE LIST

RCC. (2025). *SEQ Water Supply and Sewerage Design and Construction Code*. Cleveland, QLD

RCC. (2018). *Redland City Plan 2018, Version 12*. Cleveland, QLD

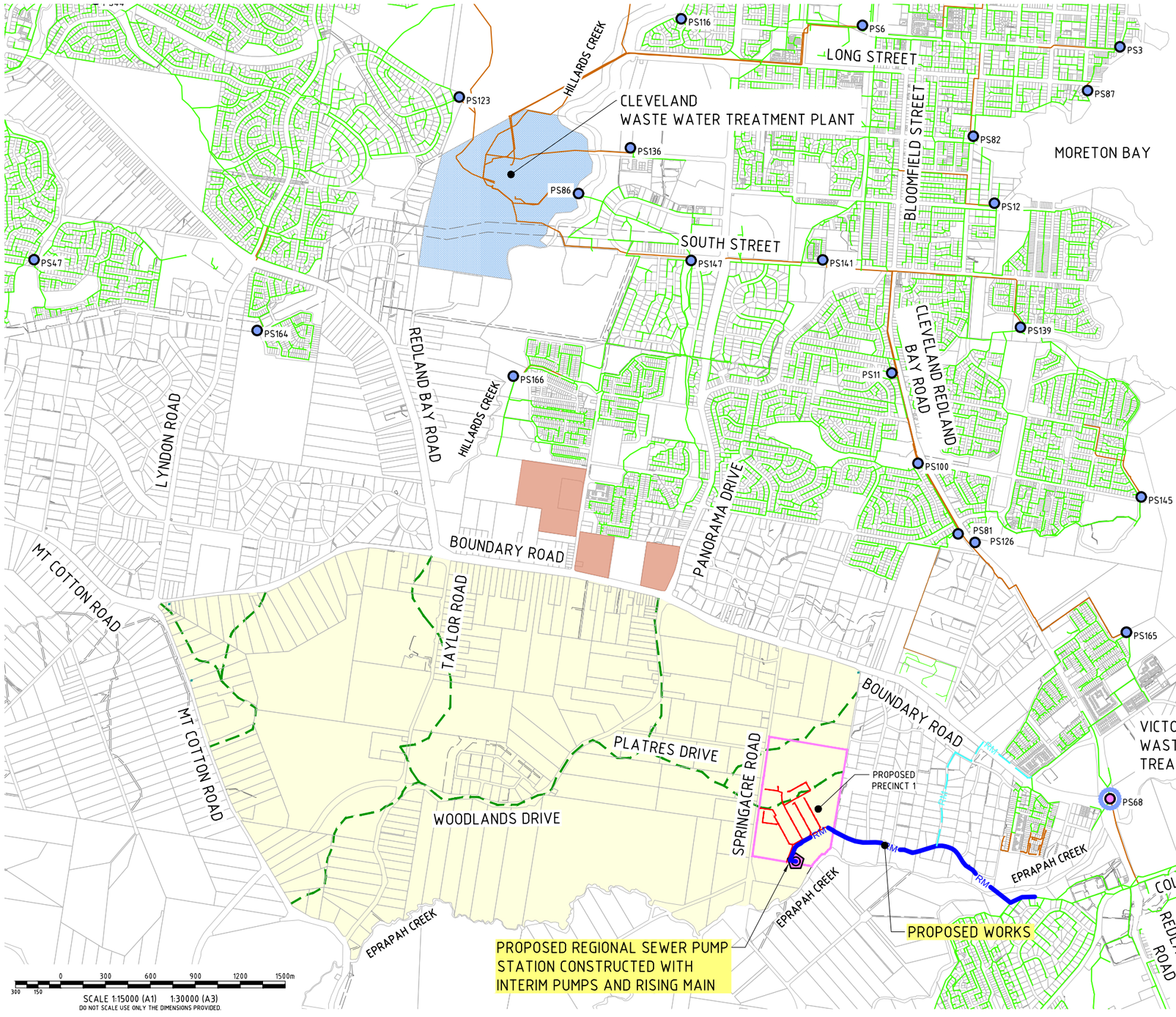
6 APPENDICES

Appendix 1. Proposed temporary service strategy for sewer infrastructure

SOUTHERN THORNLANDS SEWER STRATEGY

PRECINCT 1 SEWER STAGING OPTIONS

PHASE □ □SEWER RISING MAIN



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300 150

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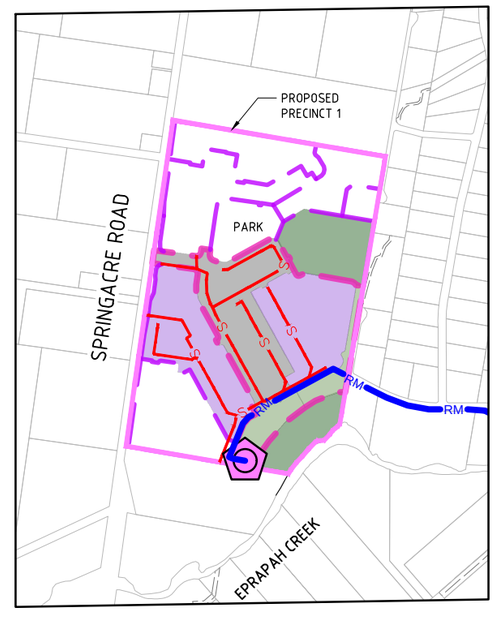
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LEGEND

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- PRIORITY DEVELOPMENT AREA (PDA)
- CLEVELAND WASTE WATER TREATMENT PLANTS
- PS135 EXISTING SEWER PUMP STATIONS TO CLEVELAND WWTP
- VICTORIA POINT WASTE WATER TREATMENT PLANTS
- PS135 EXISTING SEWER PUMP STATIONS TO CLEVELAND WWTP
- INTERNAL SEWER CATCHMENTS
- S EXISTING PRESSURED SEWER RETICULATION
- S EXISTING SEWER RETICULATION
- S PROPOSED SEWER GRAVITY MAIN
- KNOWN DEVELOPMENT APPLICATIONS WITH SEWER ACCESS
- PROPOSED SEWER RISING PUMP STATION
- RM PROPOSED SEWER RISING MAIN
- RM PROPOSED SEWER RISING MAIN (ALTERNATE ALIGNMENT)
- PROPOSED PRECINCT 1 SITE AREA

BASED ON HOUSE/BUILDING LIKLEY OCCUPIED - (APPROX people moving andusing)

Stage - Status	# Lots / Dwellings	Civil Completion	Build Commence	House / MD Build timeframe (months)	*House / MD first occupied date*	EP / dwelling	EP	EP (cummulative)	Months to requirement	Refer below for phased lot extents
Stage 1	79	01-Dec-26	01-Dec-26	6	*01-Jul-27*	2.7	213.3	213	23	
Stage 2	75	01-May-27	01-May-27	6	*01-Dec-27*	2.7	202.5	416	28	
Stage 3	83	01-Oct-27	01-Oct-27	6	*01-May-28*	2.7	224.1	640	33	
MD (Lot North)	1	01-Dec-26	01-Dec-26	18	*01-Jul-28*		573	1,213	35	
Stage 4	63	01-Mar-28	01-Mar-28	6	*01-Oct-28*	2.7	170.1	1,383	38	
Stage 5	55	01-Aug-28	01-Aug-28	6	*01-Mar-29*	2.7	148.5	1,532	43	
MD (Lot South 1)	1	01-Dec-26	01-Jul-28	12	*01-Aug-29*		242	1,774	48	
Stage 6	39	01-Jan-29	01-Jan-29	6	*01-Aug-29*	2.7	105.3	1,879	48	
Stage 7	62	01-Jun-29	01-Jun-29	6	*01-Jan-30*	2.7	167.4	2,046	53	



CONCEPT ONLY SUBJECT TO DETAIL INVESTIGATION AND DESIGN

REVISION IN PROGRESS

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
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ENGINEERING CERTIFICATION

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Date

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Client

Project SOUTHERN THORNLANDS SEWER STRATEGY

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PHASE 2 - SEWER RISING MAIN

Datum AHD
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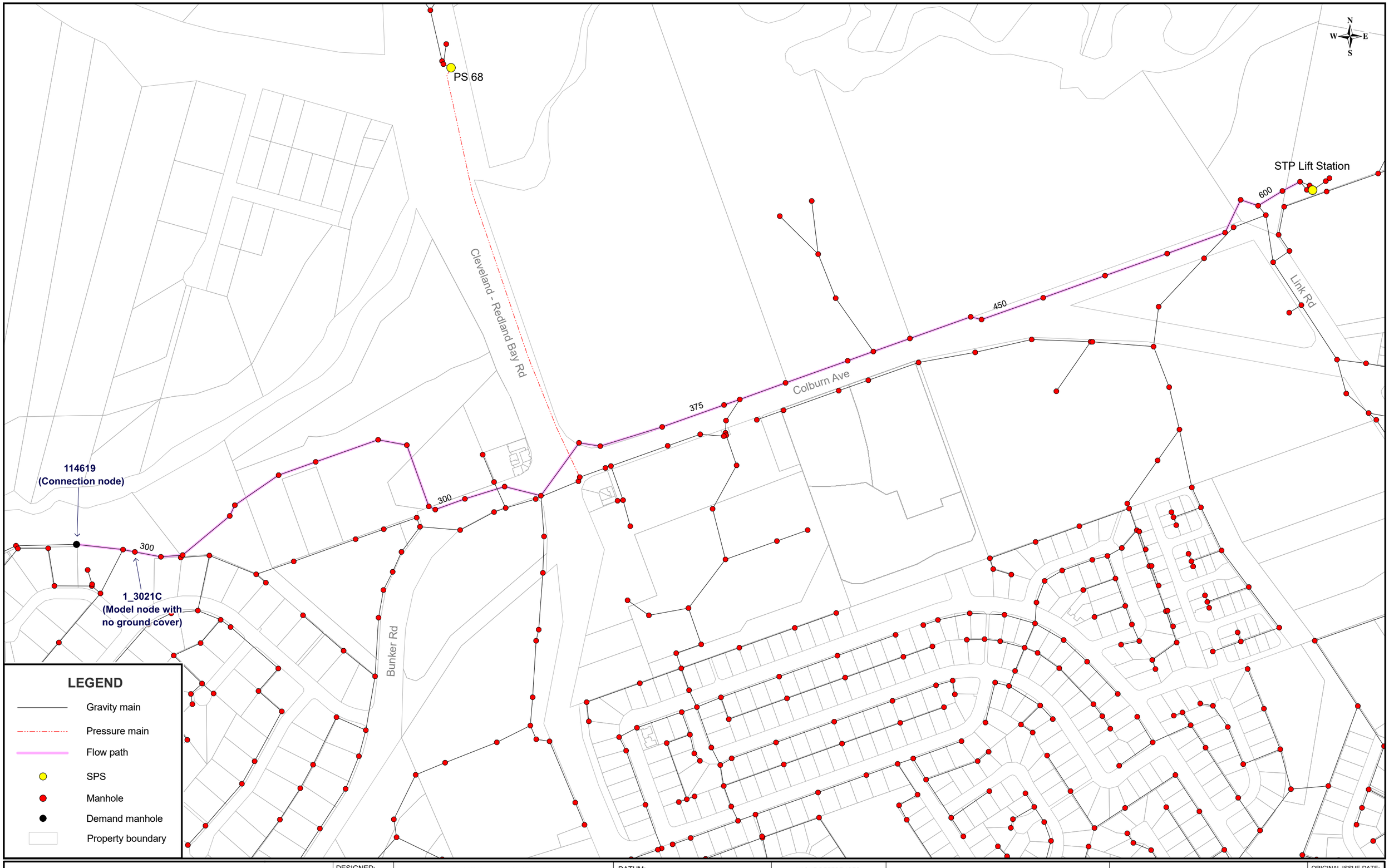
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Appendix 2. Sewer network model layout plan



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Important Notice!
This map is not a precise survey document. Accurate locations can only be determined by a survey on the ground.

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DESIGNED:	J Meesamphan
DRAWN:	J Meesamphan
CHECKED:	J May
APPROVED:	J May
CLIENT PM:	
H2ONE PM:	J May

NOTE: DESIGN NOT TO BE AMENDED WITHOUT H2ONE ACCEPTANCE

No.	REVISION	APPROVED
A	ORIGINAL ISSUE - 14 NOV, 2025	

DATUM:
HORIZ: MGA94 (ZONE 56)
HEIGHT: AHD

SCALE:

0 100 200
Metres

SURVEYED BY / DATE:

SURVEY CHECKED:

H2ONE REFERENCES

PROJECT NO:
2307576

FILE REFERENCE:

CAD FILE:

Redland CITY COUNCIL

Redland City Council
PO Box 21
Cleveland QLD 4163

Precinct 1, Southern Thornlands PDA Sewer Network Capacity Assessment

Appendix 2. Sewer network model layout plan

ORIGINAL ISSUE DATE: NOV, 2025

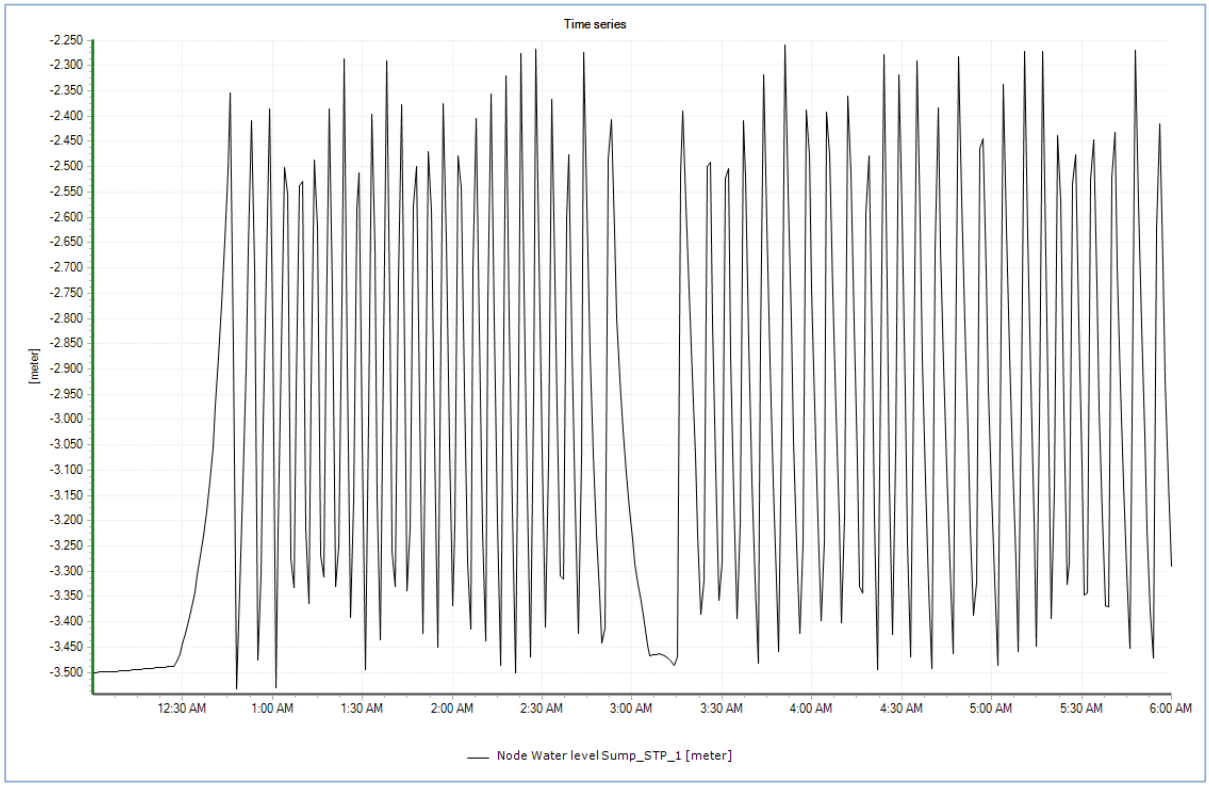
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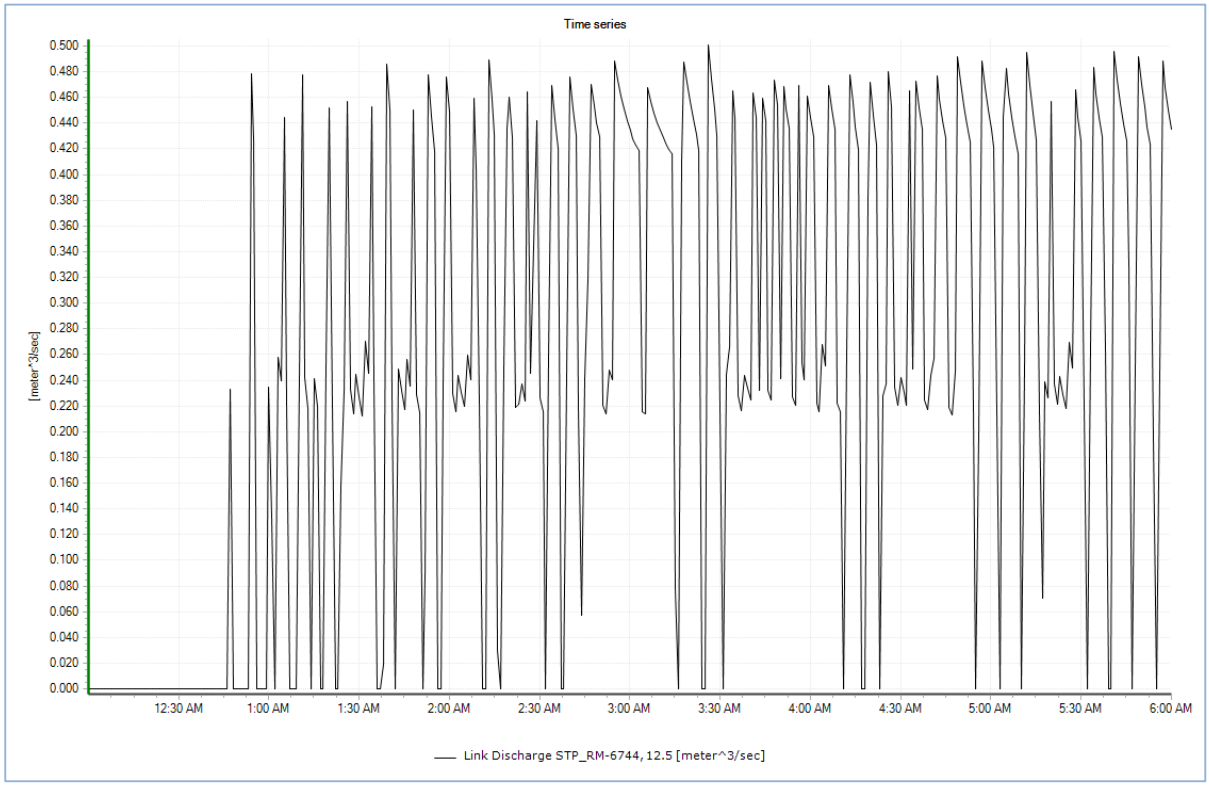
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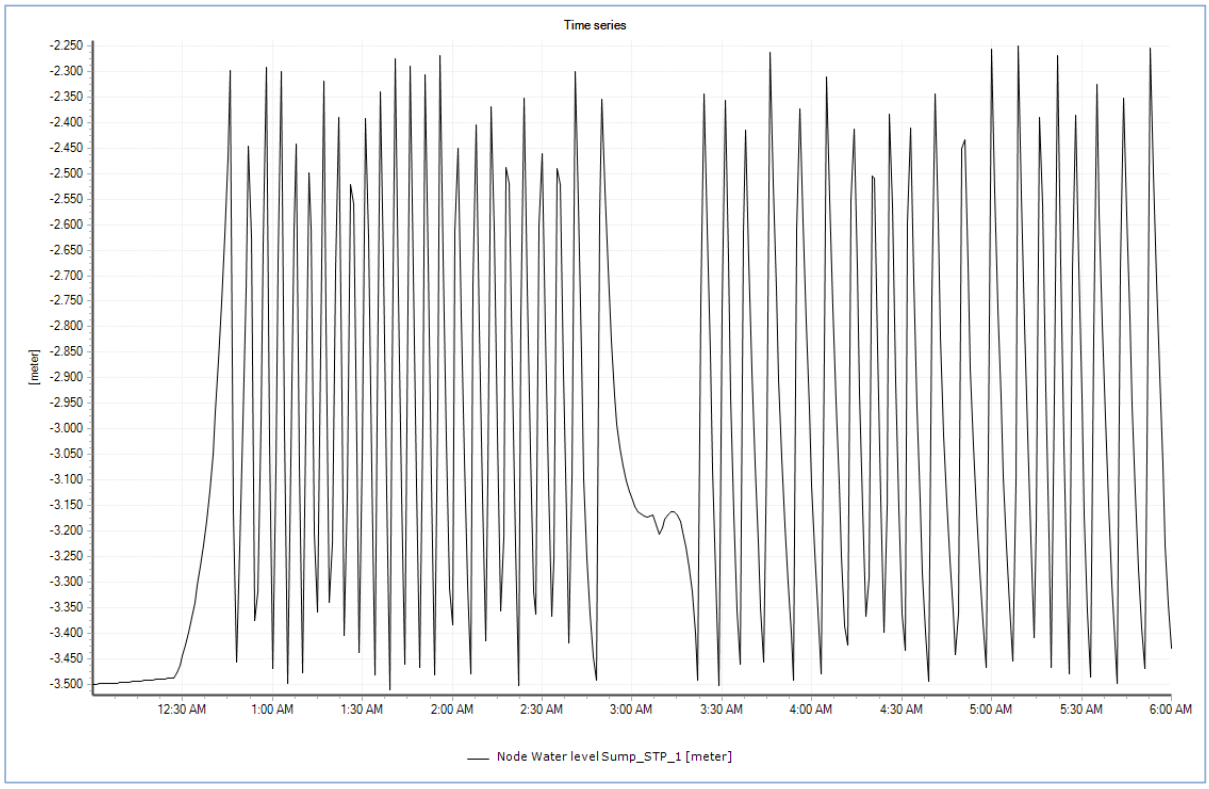
Appendix 3. Pump capacity assessment results

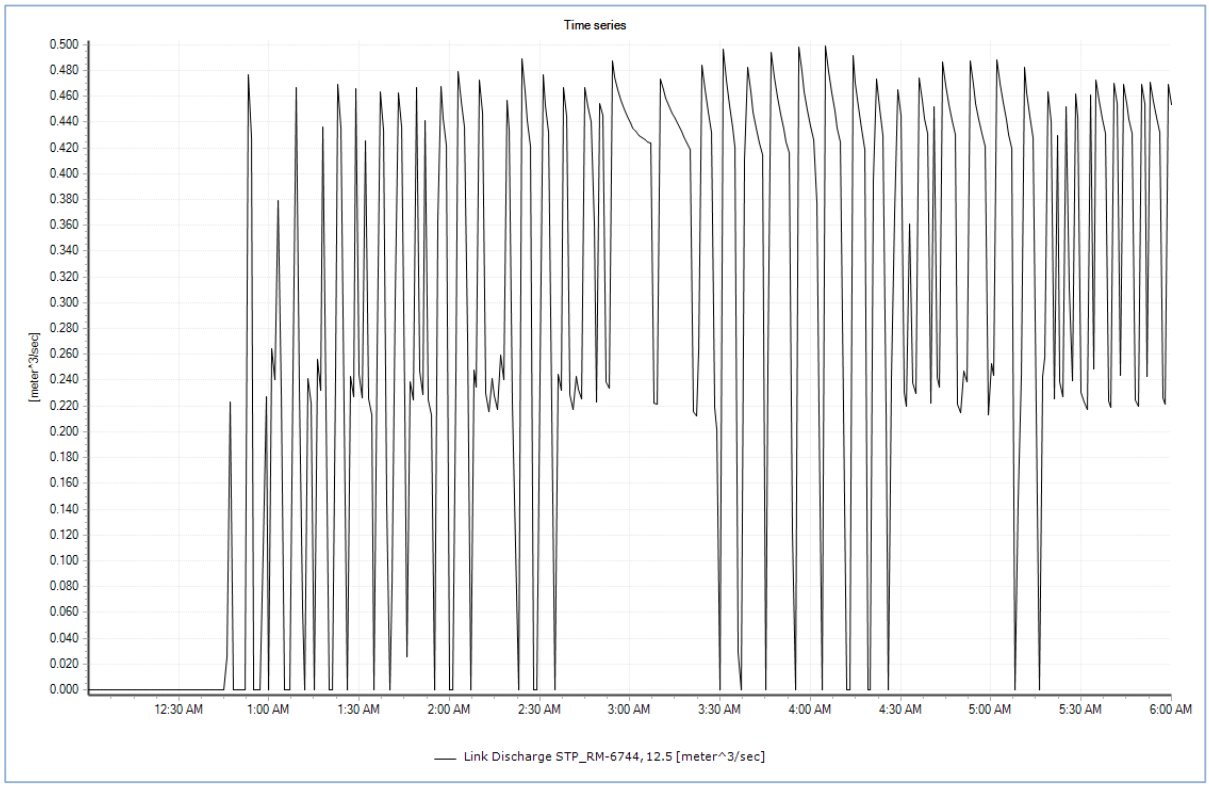
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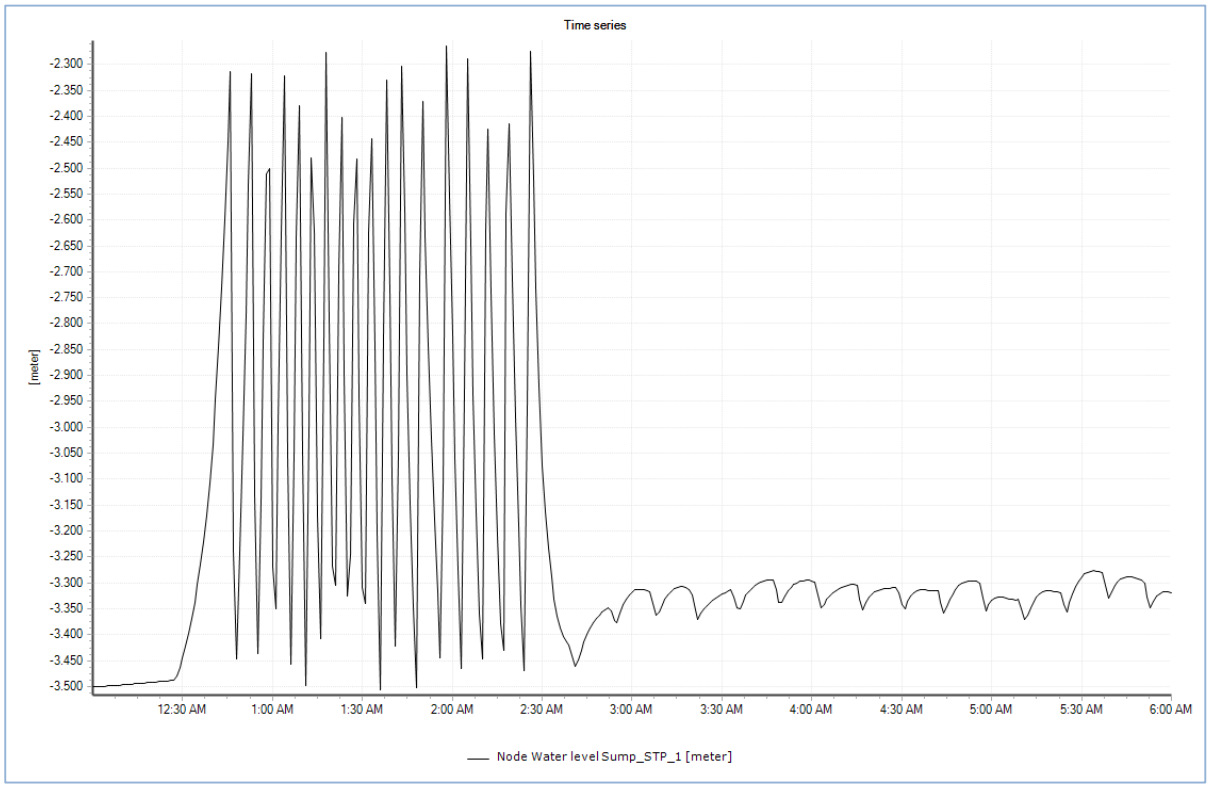


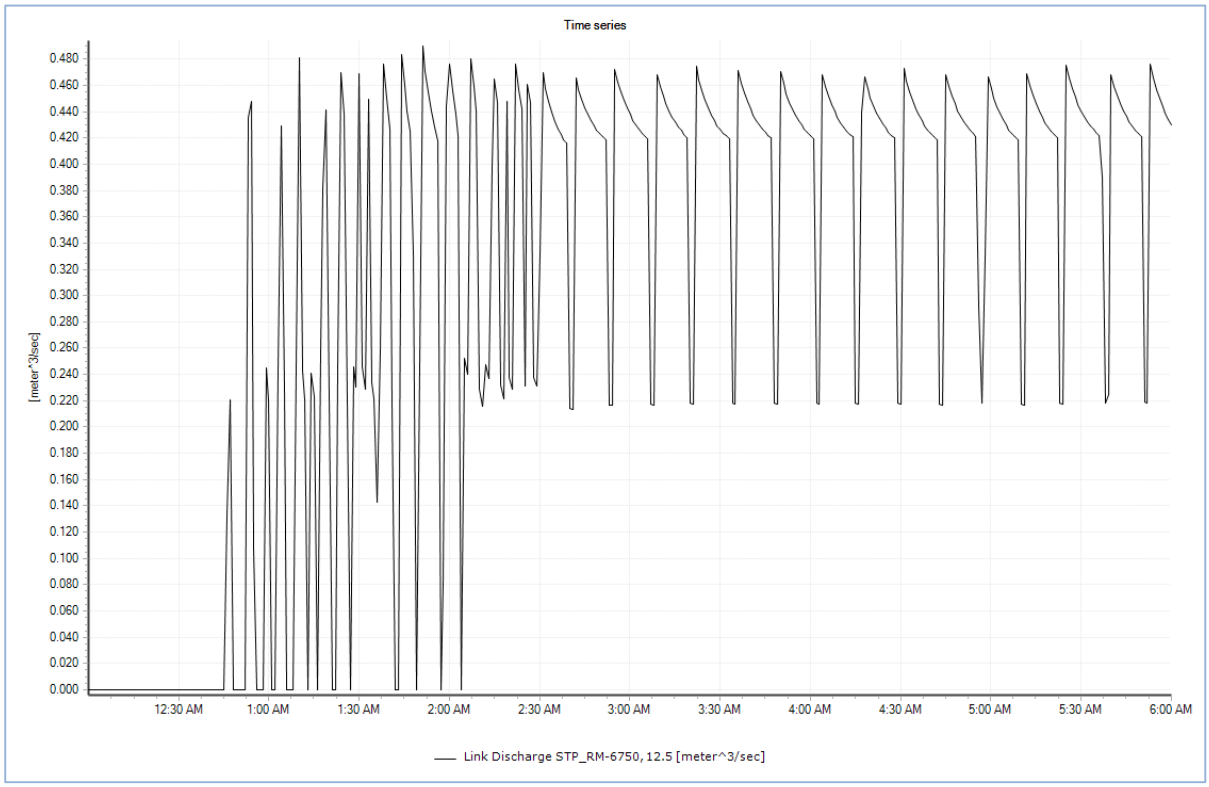
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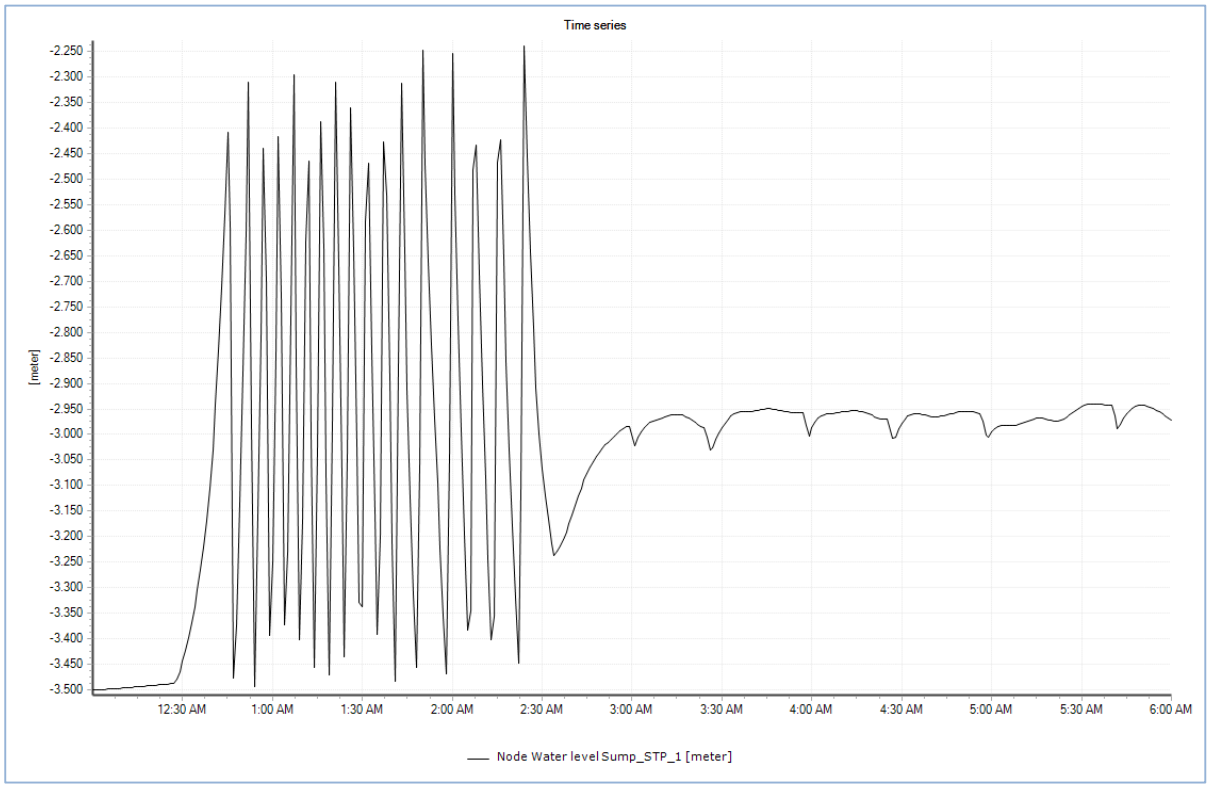


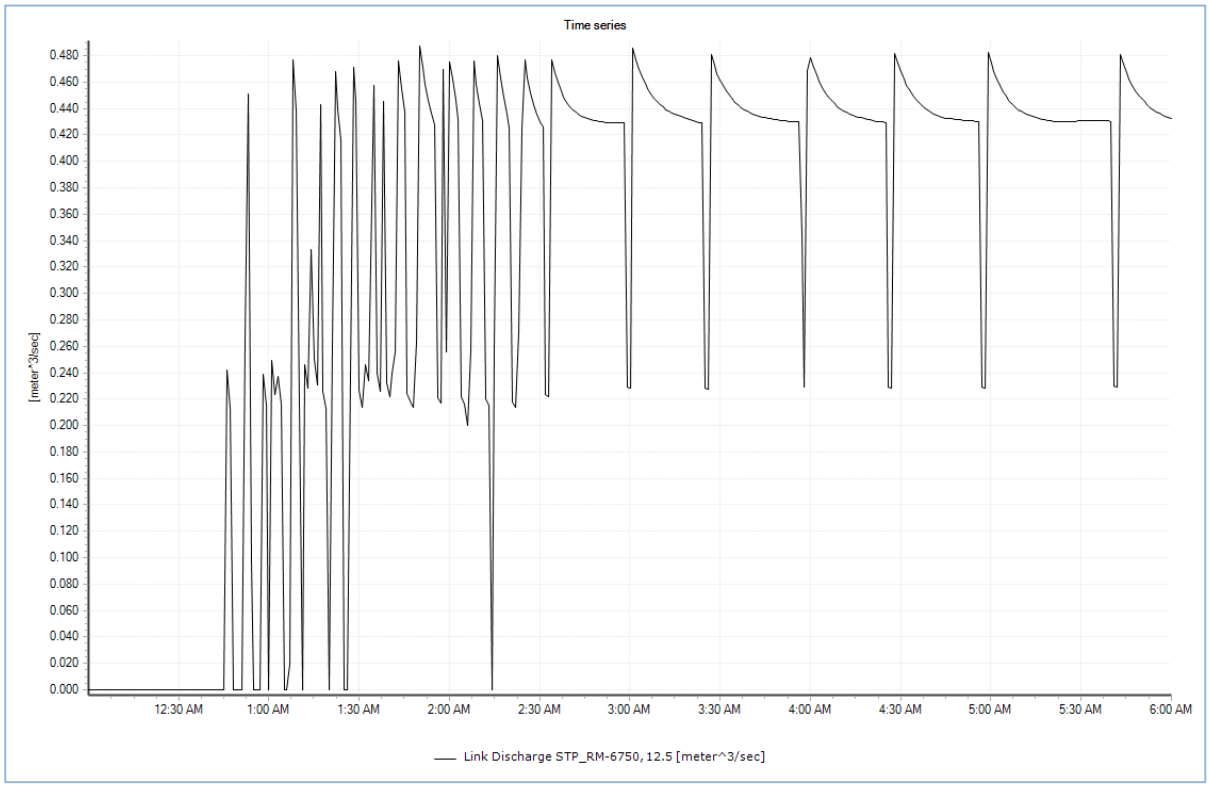
Victoria Point STP PS @ 2036 Pre-develop. (5 x ADWF)



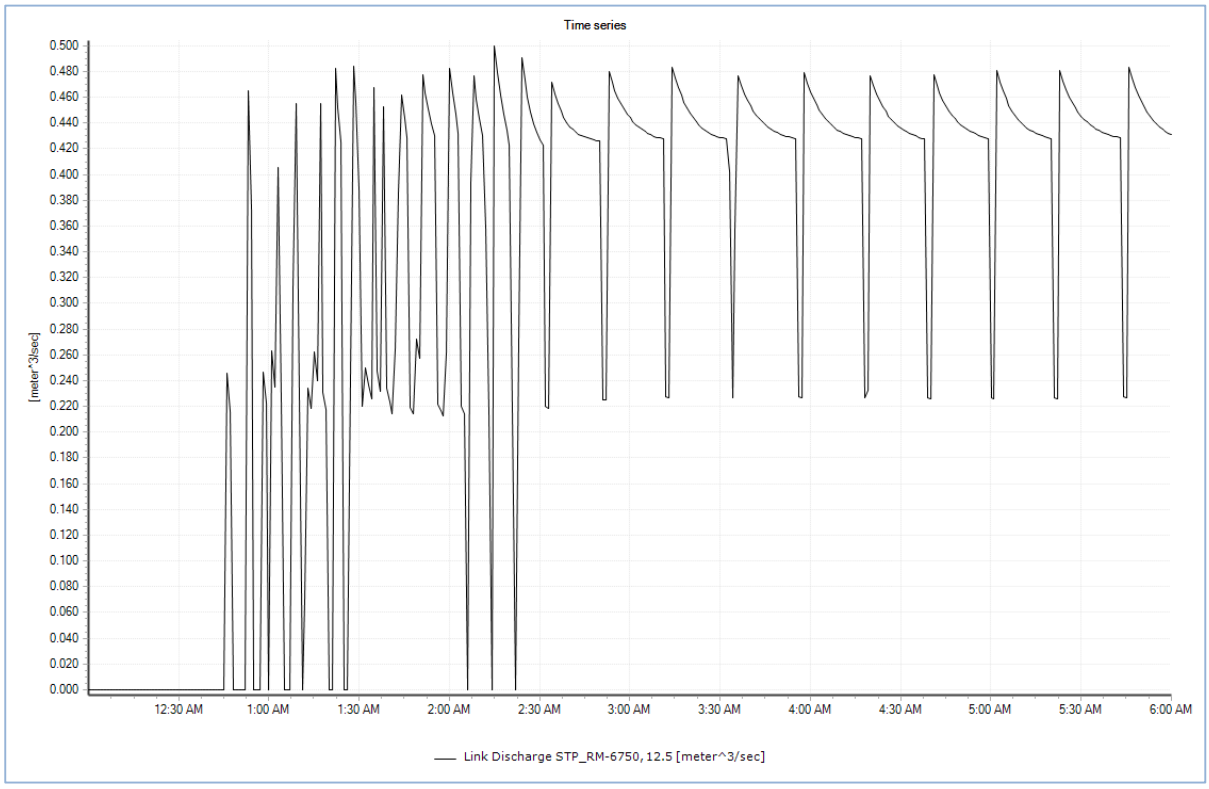


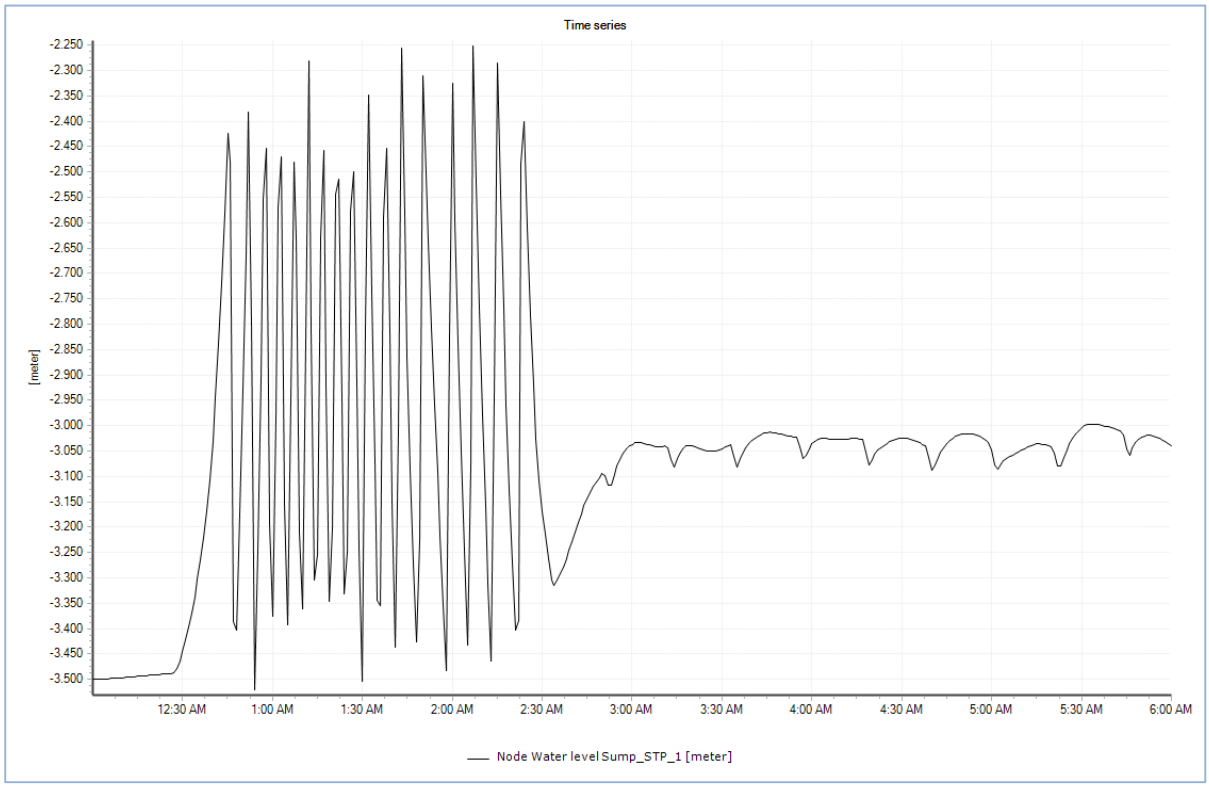
Victoria Point STP PS @ 2036 Post-develop. (5 x ADWF)



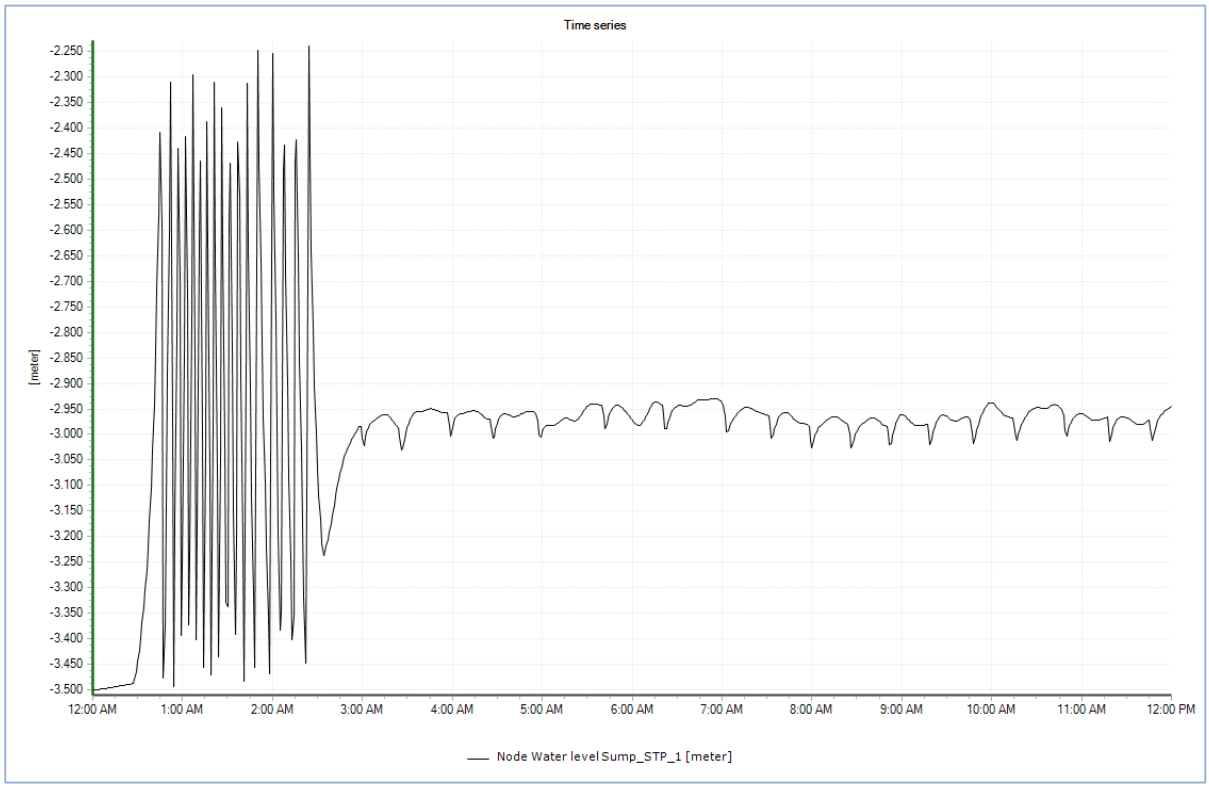


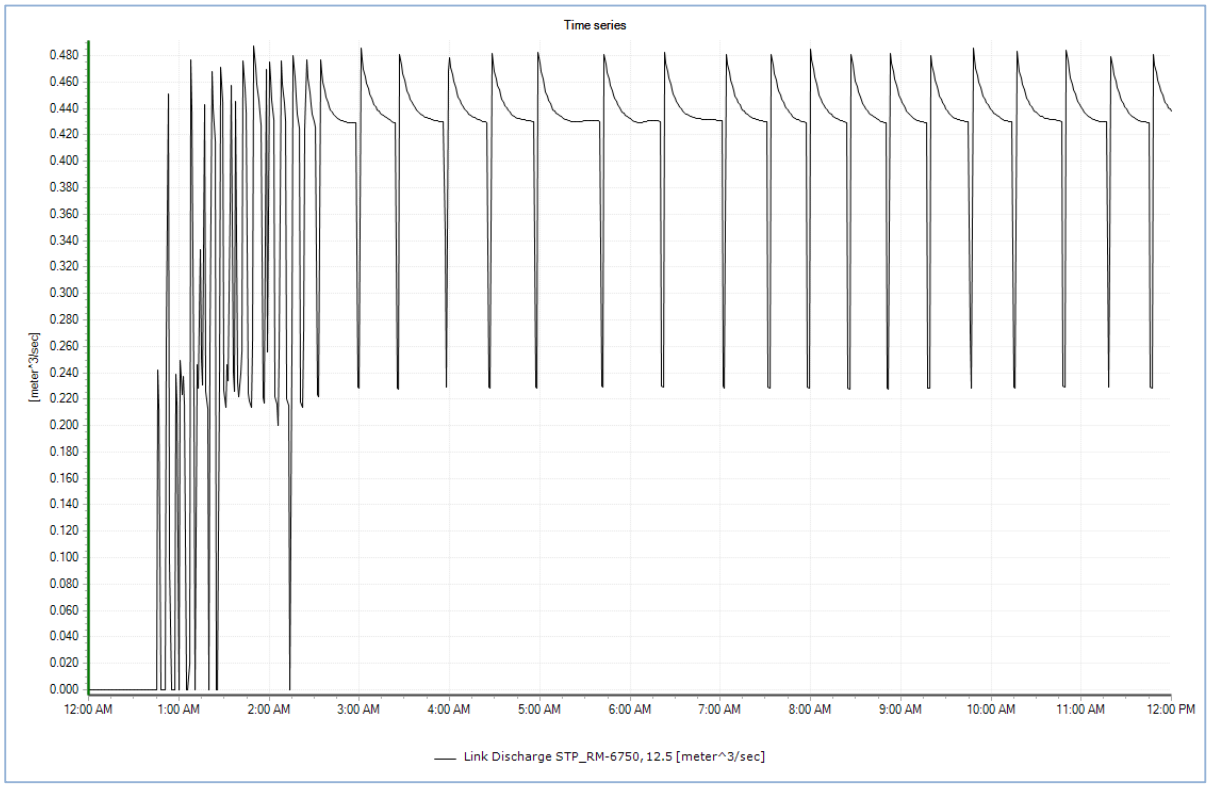
Victoria Point STP PS @ 2036 Post-develop. (4 x ADWF)





Victoria Point STP PS @ 2036 Post-develop. – With Corrected Manhole (Extended 12Hr Model Run Duration)





Appendix 4. Operational storage capacity assessment results

		2021	2036
Single Pump Capacity Required	C1	3.50	3.50
	ADWF (L/s)	88.90	99.78
	Q (L/s)	311.14	349.22
Storage Capacity Required	Pump Setup	Duty-assist	Duty-assist
	Duty Head (m)	NA	NA
	Pump Efficiency (%)	NA	NA
	Duty Power (kW)	<100.00	<100.00
	No. pump starts (n)	12.00	12.00
	Volume (kL)	23.34	26.19
Storage Capacity Available	Duty Start (RL m)	-2.30	-2.30
	Duty Stop (RL m)	-3.50	-3.50
	Duty Height (m)	1.20	1.20
	WW Diam. (m)	4.00	4.00
	Volume (kL)	30.14	30.14
OUTCOME	**Difference (kL)**	**+6.84**	**+3.95**
	Pass / Fail	**Pass**	**Pass**

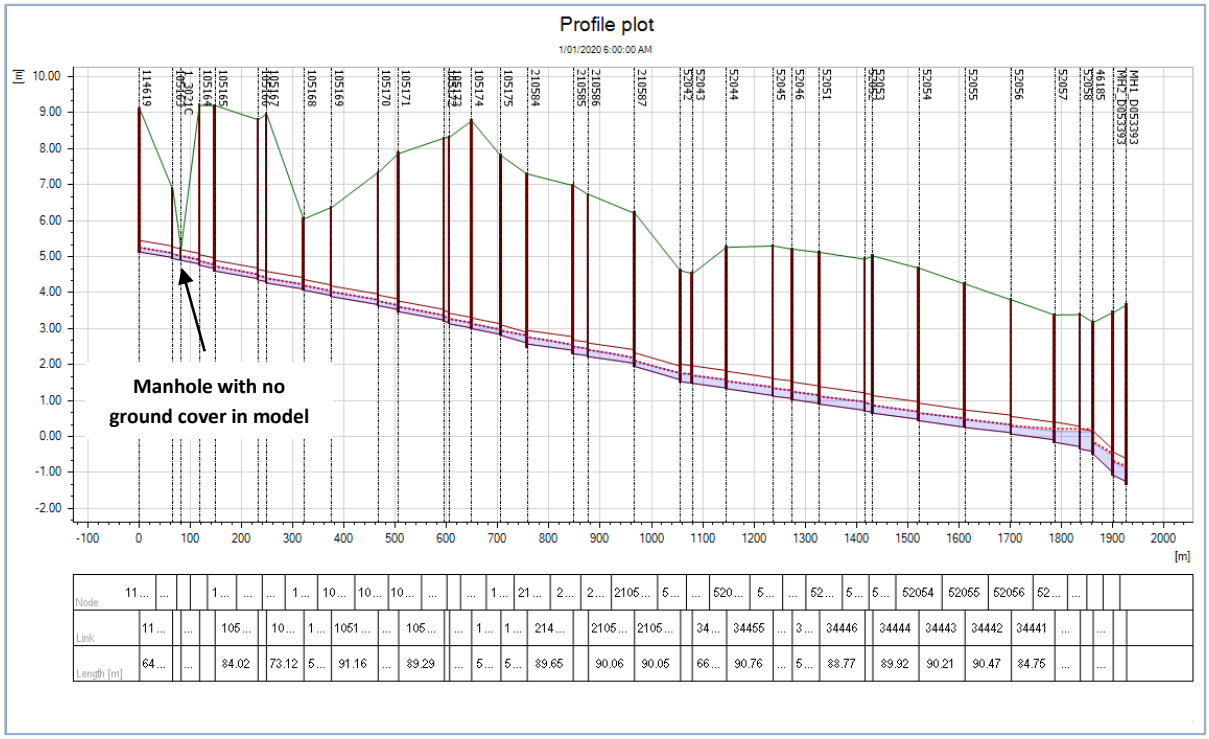
Note 1: Wet well and pump details were sourced from RCC's hydraulic model.

Note 2: The above table shows results at post-development.

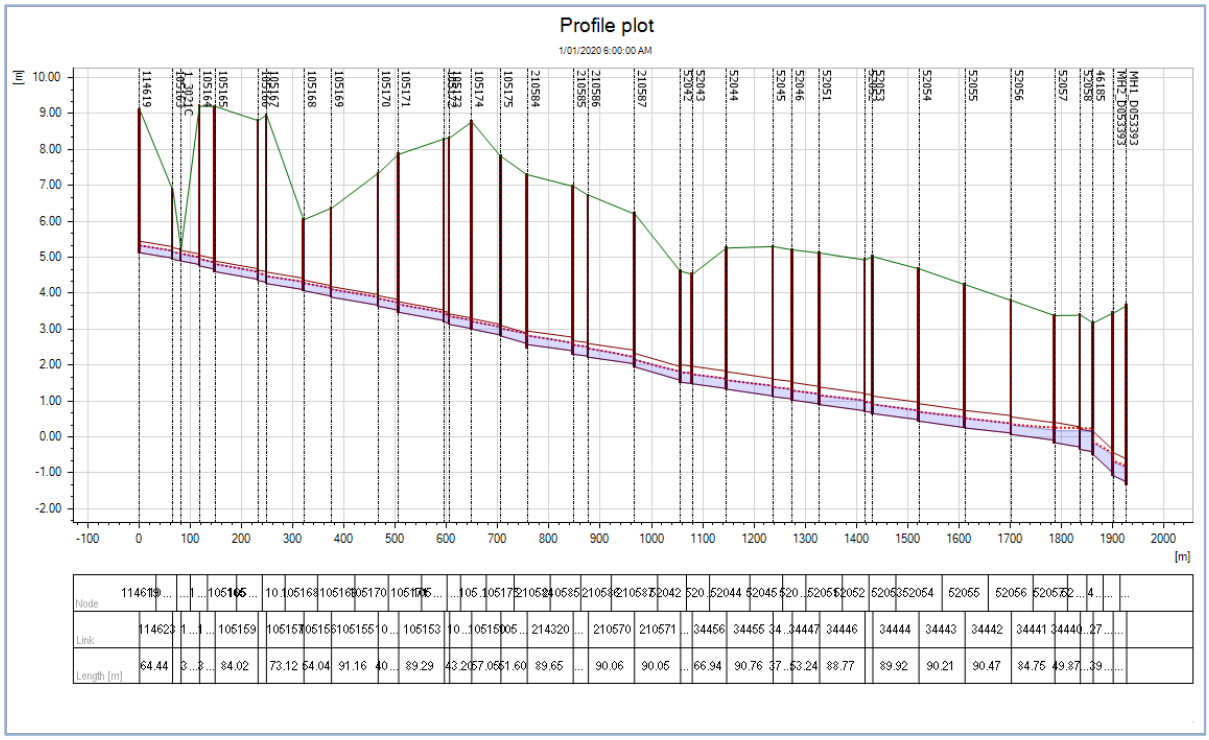
Note 3: The duty pump power rating (< 100 kW) was estimated based on model flow and discharge pressure results presented in the model.

Appendix 5. Gravity main capacity assessment results

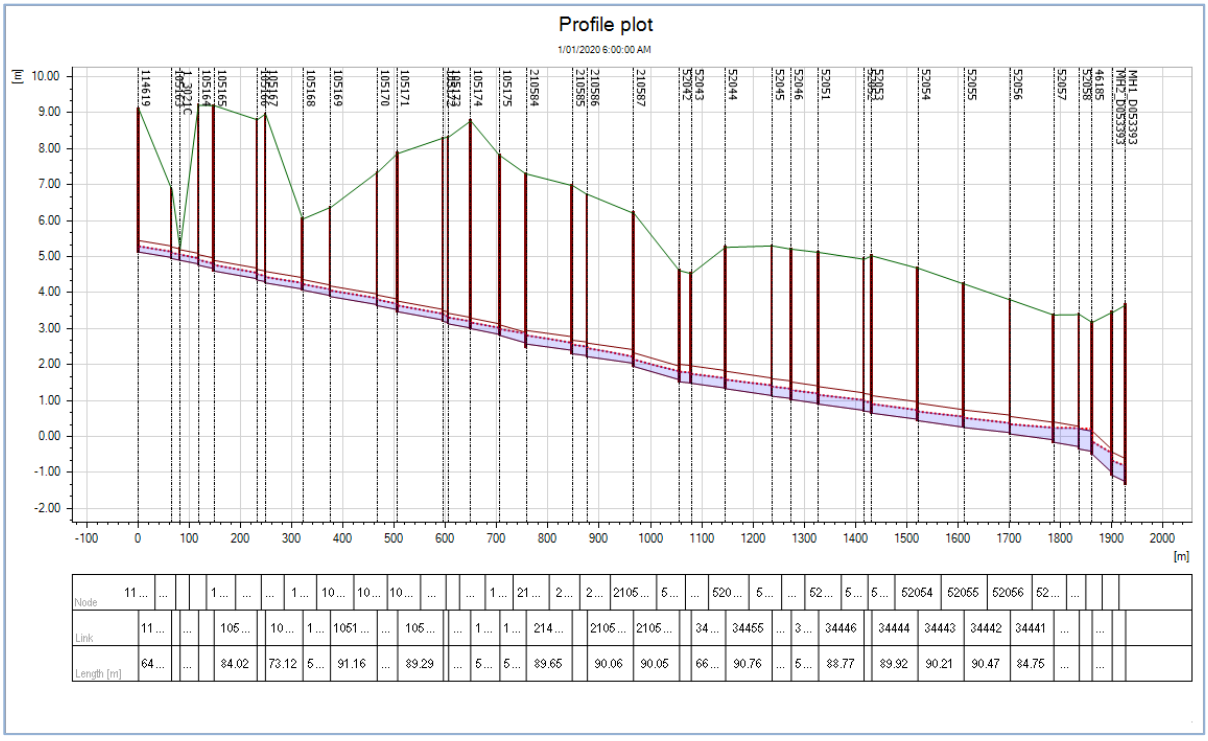
Victoria Point STP PS @ 2021, Pre-development (5 x ADWF)



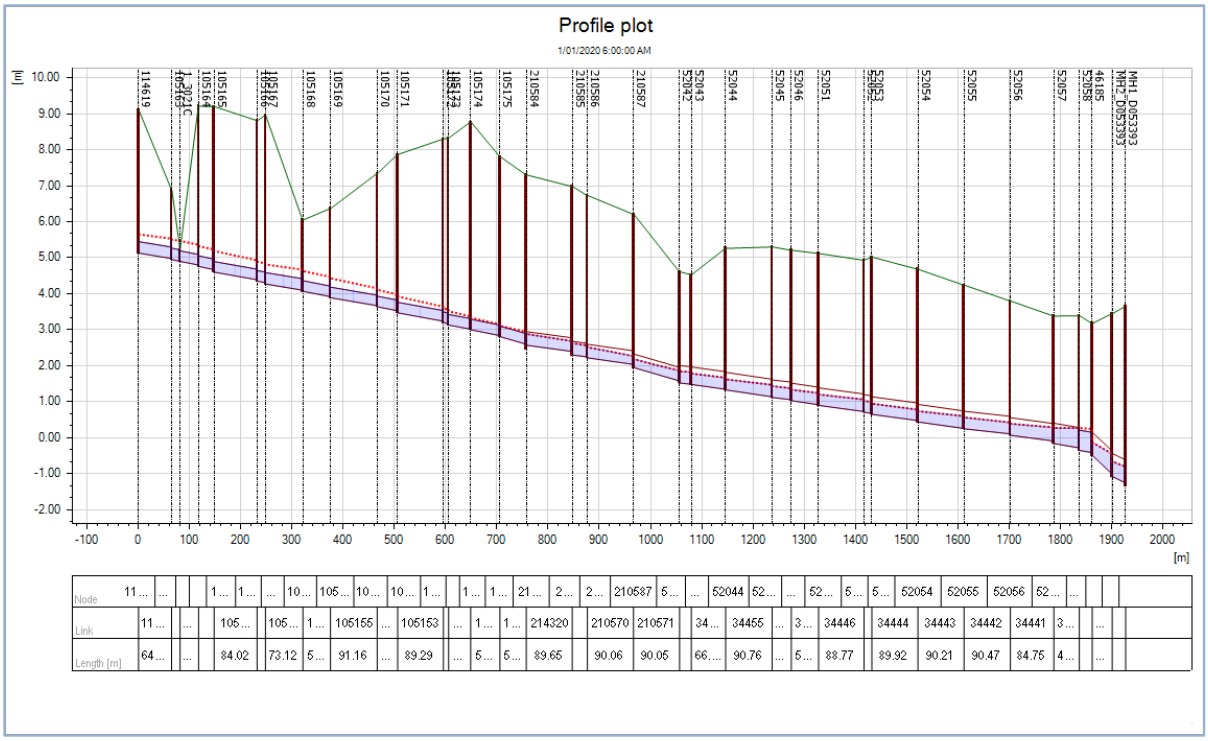
Victoria Point STP PS @ 2021, Post-development (5 x ADWF)



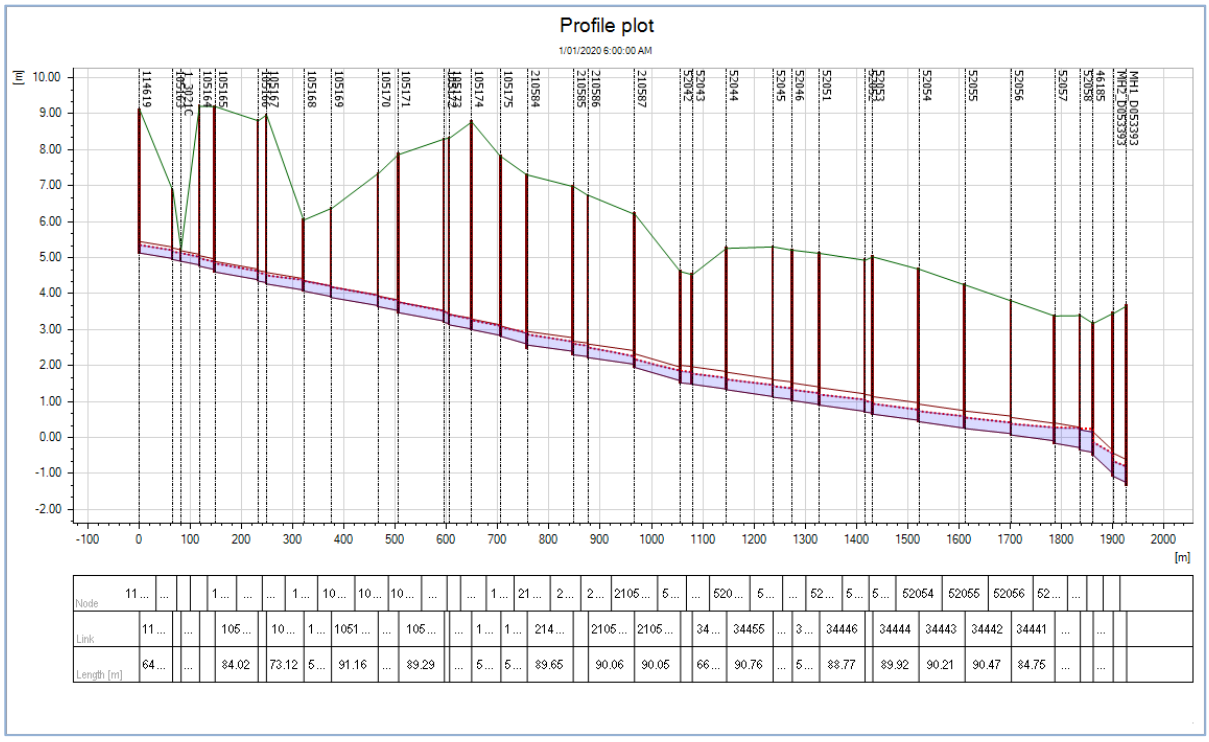
Victoria Point STP PS @ 2036, Pre-development (5 x ADWF)



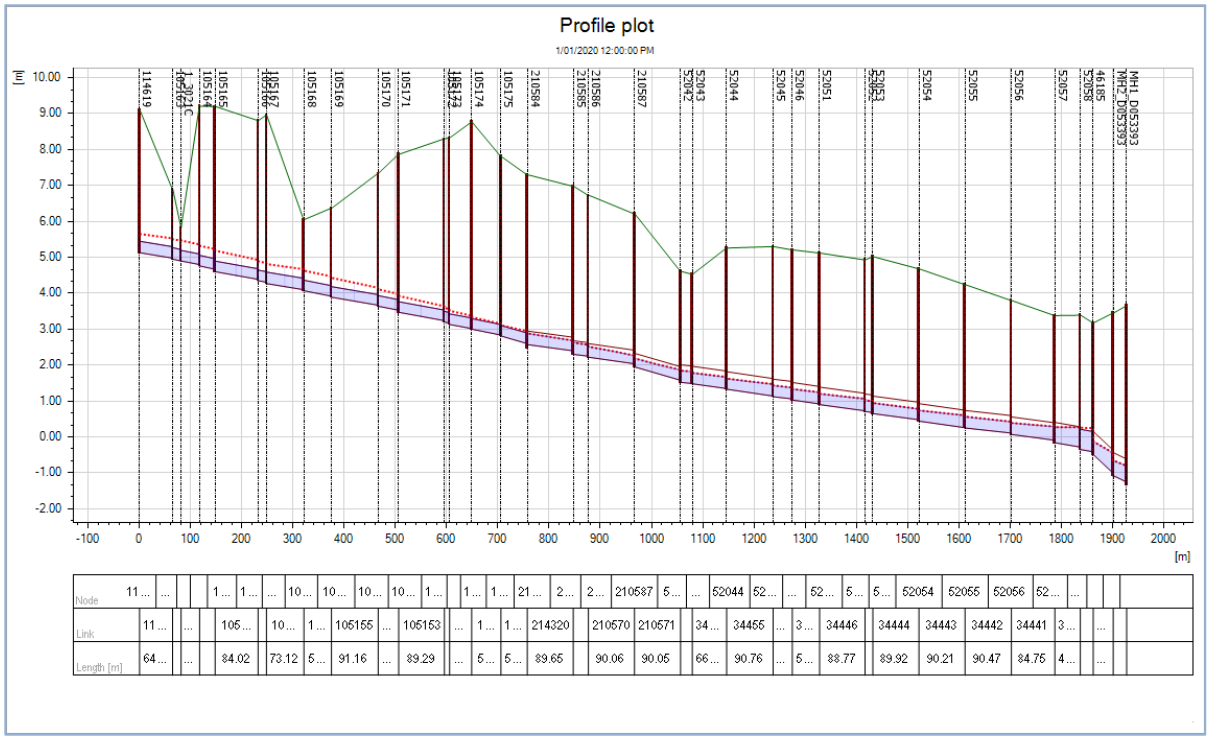
Victoria Point STP PS @ 2036, Post-development (5 x ADWF)



Victoria Point STP PS @ 2036, Post-development (4 x ADWF)



Victoria Point STP PS @ 2036, Post-development - Corrected Manhole with 600 mm Cover (5 x ADWF)



Appendix F. Water Supply Service Assessment

EMPOWER

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Precinct 1 Southern Thornlands PDA

Water Supply Service Assessment

FINAL Report V1 - 9 December, 2025



H2One Pty Ltd

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Reviewed by RPEQ	Reg. No.	Signed	Date
Joshua May	18064		9 December, 2025

Version	Date	Author	Reviewer
DRAFT - V1	16 September, 2025	J Meesamphan	J May
FINAL - V1	9 December, 2025	J Meesamphan	J May

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1 INTRODUCTION

1.1 Background

A residential subdivision at 76–94 Springacre Road, 96–108 Springacre Road, 110–118 Springacre Road and 124–138 Springacre Road, Thornlands QLD 4164 is currently in the planning phase of the development approval process. The site is legally described as Lot 13 on RP53653, Lot 14 on RP53653, Lot 2 on RP128089 and Lot 16 on RP53653, and forms part of the initial stages for the Southern Thornlands Priority Development Area (PDA).

The development will comprise of a total of 11 x duplex lots and 165 x residential freehold lots, delivered over two separate stages, as per the following breakdown. Refer to Appendix 1 for the development layout plan and relevant staging.

Stage 1

- 5 × lots with duplex unit
- 88 × residential freehold lots

Stage 2

- 6 × lots with duplex unit
- 77 × residential freehold lots

As part of the infrastructure planning process, a water supply modelling assessment was undertaken to confirm the proposed service strategy for the development site. This consisted of the following.

- A capacity assessment on Redland City Council's (RCC) external water supply network, to determine if the site's additional demand will impact the existing system and trigger the need for infrastructure upgrades.
- A hydraulic modelling assessment of the development's internal pipe reticulation, to ensure adequate service will be provided to each allotment.

Empower Engineers and Project Managers Pty Ltd developed a concept water supply pipe layout, with a connection to the existing nominal diameter (DN) 150 mm asbestos cement (AC) reticulation main along Springacre Drive, adjacent to the western property boundary. Refer to Appendix 2 for further details.

Using this concept plan, H2One Pty Ltd was engaged to undertake the hydraulic modelling assessment to confirm the proposed service strategy, in accordance with RCC's Design Standards; "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025). The results of this study are presented in this report.

1.2 Objectives

The main objectives of the project were as follows.

1. Introduce the development's pipe layout to RCC's latest planning model and complete a standard flow and fire flow hydraulic analysis to determine if the proposed internal pipe network performs within the minimum Design Standards.
2. Assess standard flow and fire flow capacity of RCC's external water supply network, and where required, determine infrastructure upgrades necessary to achieve the minimum design standards, where system performance failures have occurred due to the additional loading of the new development.

3. Issue an RPEQ certified hydraulic assessment report, with concept layout plans.

1.3 Water Supply Service Strategy

The development site is located within District Metered Area (DMA) 208, serviced by the Mount Cotton Water Supply Tanks (6.8 ML @ RL 106 m surface level), located approximately 8.7 km's to the south along Tallow Rood Court, Mount Cotton. From this water supply tank, a DN450 and DN375 trunk pipe system delivers bulk water to the local reticulation network.

Two connect points are proposed for Stage 1 of the development site, located on the existing DN150 reticulation main along Springacre Drive, at an approximate ground level of RL 40 m. The development's internal reticulation network will consist of DN100 and DN150 PVCU pipes.

The Southern Thornlands ultimate water supply trunk infrastructure master plan has yet to be finalised, however the preferred strategy will likely consist of a DN525 trunk main traversing the property frontage of the development, providing supply from the Heinemann Road tanks. For the purpose of this study, it was assumed that the Mount Cotton tanks will service the development site, via the DN150 along Woodlands Drive, prior to the trunk upgrades being implemented within the next 5 to 10 years. The modelling assessment was therefore undertaken at the 2031 planning horizon only, as ample network capacity should be available to service the site after the installation of the DN525 trunk main.

Refer to Appendices 2 and 3 for an overview of the proposed service strategy.

1.4 Demand Assessment

A demand assessment was undertaken to estimate the water consumption attributed to the development's proposed land-use type and density, based on the demand rates in RCC's Design Standards. Table 1 shows a summary of that estimation.

Table 1. Demand estimate for the proposed development.

Site Land Use and Density	Demand Rate	EP	Peak Flow (L/s)
165 x res. freehold lot	2.7 EP/Lot	445.5	4.51
22 x duplex units	1.84 EP/unit	40.5	0.41
	TOTAL	**486.0**	**4.92**

Note 1: Based on the demand rate from RCC's hydraulic model, i.e. 215 L/EP/day revenue water and 15 L/EP/day of non-revenue water, with an Average Day (AD) to Peak Hour (PH) factor of 4.0.

Note 2: Demand rates were sourced from the *SEQ Water Supply and Sewerage Design and Construction Code* (2013).

As per RCC's latest Netserv Plan, the development lots had a planning demand allocation of 34.8 EP, at the 2031 planning horizon. These demands were removed from the hydraulic model for the post-development scenarios.

2 METHODOLOGY

2.1 Design Standards

The design standards adopted for the hydraulic assessment were based on the "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025). A summary of the relevant provisions are as follows.

Table 2. SEQ Code provisions relevant to the hydraulic analysis

	Provision	Specification
Water Supply	ET to EP conversion factor	2.7
	Average Day (AD) Demand	230 L/EP/day (including non-revenue water)
	Maximum pipe velocity (m/s)	2.5 m/s
	Standard flow minimum service pressure and background demand	22m at the property boundary at PH demand
	Standard flow maximum service pressure	55 m
	Residential fire flow minimum network pressure and background demand	12m at 2/3 PH demand Positive pressure at PH demand Reservoir at Minimum Operating Level (15%)
	Commercial fire flow minimum network pressure and background demand	12m at PH demand
	Fire flows	Residential (<= 3 storey) - 15 L/s Residential (> 3 storey) - 30 L/s Commercial/industrial - 30 L/s

2.2 Hydraulic Modelling Assessment

2.2.1 Internal Pipe Network

The methodology adopted for the hydraulic assessment of the development's internal water supply network is as follows.

1. The concept pipe layout was converted to shape file and introduced to RCC's latest Netserv planning model ("*RCC WD LGIP Model_2021 FINAL v5*") as a background layer. Pipe and node elements were then manually drawn and details added, e.g. node surface levels, pipe diameters, pipe lengths etc.
2. DN100 and DN150 pipe sizes were allocated a Hazen Williams Roughness co-efficient of 100 and 110, respectively.
3. Planning demands (EP) were evenly distributed to each model node and a residential diurnal pattern ("RES_SEQ") allocated.
4. A standard flow and fire flow hydraulic analysis was undertaken on the internal reticulation network, where pipe sizes were systematically increased and/or connections adjusted to achieve RCC's minimum Design Standards.
5. Modelling results were verified and deliverables prepared.

2.2.2 External Pipe Network

The methodology adopted for the hydraulic assessment of RCC's external water supply network is as follows.

1. For the 2031 planning horizon, a 1 x Peak Day (PD) demand standard flow hydraulic analysis was undertaken on the property connection point/s and local pipe network, at both pre- and post-development. Any deficiencies in the network were investigated and appropriate solutions determined.

   Note: An assessment on the capacity of the Mt Cotton supply tank was not undertaken, as the development's additional loading was considered negligible for the existing storage capacity.

2. Residential (15 L/s) and commercial (30 L/s) fire flow rates were applied to the surrounding network as per the native allocations in RCC's hydraulic model. Hydrants directly servicing the subject site were allocated 15 L/s fire flow @ 2/3 PH demand.
3. For the 2031 planning horizon, a fire flow hydraulic analysis was undertaken on all hydrants servicing the local network, at pre- and post-development. Any deficiencies in the network were investigated and appropriate solutions determined.
4. Modelling results were verified and findings reported.

3 RESULTS

3.1 Internal Pipe Network

As per the methodology described in Section 2.2 of this report, a standard flow and fire flow hydraulic analysis was undertaken on the development's proposed internal water supply network, at the 2031 planning horizon. The analysis identified that the infrastructure presented in Table 3 and Appendix 3 achieved RCC's minimum Design Standards, across both development stages. Key outcomes are as follows.

- The proposed reticulation layout presented a standard flow minimum pressure of 51.5 m, at node Junction_114, across all development stages. This is in compliance with RCC's minimum pressure standard of 22.0 m.
- The proposed reticulation layout presented a 2/3 peak hour and peak hour fire flow minimum pressure of 25.0 m and 17.7 m, respectively. This occurred at node Junction_156 and is in compliance with RCC's minimum design standard of 12.0 m and positive pressure, respectively.
- The maximum service pressure was 91.3 m at node Junction_124, based on a ground level of RL 19.25 m, across all development stages. This is not in compliance with RCC's maximum service pressure standard of 55.0 m and may trigger the need for pressure management.
- The proposed reticulation layout presented a peak hour maximum pipe velocity of 0.2 m/s on pipe "Pipe_279", which is well below RCC's maximum velocity requirement of 2.5 m/s.

Table 3. Summary of recommended infrastructure for the development's internal water supply network

Description	Location	Diameter (DN)	Length (m)
Reticulation pipe	Within the development site	100	1,440.0
Reticulation pipe		150	1,150.0

Refer to Appendix 4 for the raw network modelling results.

3.2 External Pipe Network

As per the methodology described in Section 2.2 of this report, a standard flow and fire flow hydraulic analysis was undertaken on RCC's external water supply network, at the 2041 planning horizon. A summary of results is presented in Tables 4 and 5 below.

Table 4. Standard flow network modelling results for RCC's external network

Provision	Planning Scenario	
	2031 Network Pre-develop.	2031 Network Post-develop.
Connection point 1 (*Junction_58*) min. pressure (m)	54.5	49.8
Connection point 2 (*J7699)* min. pressure (m)	55.7	50.9
Network min. pressure (m)	26.3	25.5
Network min. pressure node ID	Junction_14	Junction_14
Network no. min. pressure failures	0	0
Max. pipe velocity (m/s)	2.4	2.4
Network max. velocity ID	9754	9754
Network no. max. velocity failures	0	0

Table 5. Fire flow network modelling results for RCC's external network

Scenario		Planning Scenarios	
		2031 Network Pre-develop.	2031 Network Post-develop.
2/3 Peak Hour	Site hydrant 1 (*Junction_58*) min. pressure (m)	35.8	27.3
	Site hydrant 1 (*J7699)* min. pressure (m)	35.1	27.6
	Network hydrants min. pressure (m)	21.9	21.4
	Network hydrant min. pressure node ID	J4604	J4604
	Network hydrants no. failures	0	0
Peak Hour	Network hydrants min. pressure (m)	16.8	16.1
	Network hydrant min. pressure node ID	wNode_247	wNode_247
	Network hydrants no. failures	0	0

Note: At peak hour, the same nodes failed with a minimum pressure around -8.0 m. All remaining nodes had positive pressure with the next lowest being 8.5 m.

The results in Tables 4 and 5 demonstrate that the external network performed within RCC's Design Standards, across all scenarios. No water supply infrastructure upgrades are therefore required to service the proposed development.

4 CONCLUSION

A residential subdivision at 76–94 Springacre Road, 96–108 Springacre Road, 110–118 Springacre Road and 124–138 Springacre Road, Thornlands QLD 4164 is currently in the planning phase of the development approval process. The site is legally described as Lot 13 on RP53653, Lot 14 on RP53653, Lot 2 on RP128089 and Lot 16 on RP53653, and forms part of the initial stages for the Southern Thornlands Priority Development Area (PDA).

The development will comprise of a total of 11 x duplex lots and 165 x residential freehold lots, delivered over two separate stages, as per the following breakdown.

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- A hydraulic modelling assessment of the development's internal pipe reticulation, to ensure adequate service will be provided to each allotment.

H2One Pty Ltd was engaged to undertake the hydraulic modelling assessment to confirm the proposed service strategy, in accordance with RCC's Design Standards; "*South East Queensland Water Supply and Sewerage Design and Construction Code*" (2025). The hydraulic analysis identified that the external water supply network and the development's proposed internal pipe layout achieved RCC's minimum design standards. Water supply infrastructure upgrades are not required to service the proposed development.

It is recommended that RCC independently confirms the modelling outcomes presented in this report, and approves the proposed water supply service strategy for the development at 76 - 94 Springacre Road, 96 - 108 Springacre Road, 110 - 118 Springacre Road and 124 - 138 Springacre Road, Thornlands QLD, with consideration to the overall trunk infrastructure master plan for the Thornlands PDA.

Detailed modelling results and system plans can be observed in Appendices 1 through 4.

5 REFERENCE LIST

RCC. (2025). *SEQ Water Supply and Sewerage Design and Construction Code*. Cleveland, QLD

RCC. (2013). *SEQ Water Supply and Sewerage Design and Construction Code*. Cleveland, QLD

6 APPENDICES

Appendix 1. Development layout plan

URBEX

SPRINGACRE ROAD

STAGE 01

STAGE 02

Future Development

BALANCE LOT 906 7.21ha

BALANCE LOT 907 7.31ha

BALANCE LOT 909 11.55ha

BALANCE LOT 909

National easement for infrastructure purposes

Approved Lot awaiting registration

Hannah Close

New Road 32.0m wide

New Road 18.0m wide

New Road 16.0m wide

New Road 13.0m wide

New Road 22.0m wide

New Road 8.0m wide

New Road 19.0m wide

900 3964m²

901 4872m²

902 1251m²

903 3044m²

904 7721m²

905 672m²

LAND USE BUDGET

LAND USE	LOTS	AREA
RESIDENTIAL	170	6.29 ha
INFRASTRUCTURE	1	0.07 ha
BIO RETENTION BASIN	2	1.45 ha
OPEN SPACE	2	0.83 ha
NEW ROAD	-	4.95 ha
BALANCE LOTS	3	26.58 ha
TOTAL	178	40.17 ha

LOT YIELD BY LOT TYPE

LOT TYPE	No.	No.%	DW	AREA	AREA%	AVERAGE
T	12	7.10%	12	6708m²	10.67%	559m²
CY	32	18.93%	32	12714m²	20.23%	397m²
PV	71	42.01%	71	26250m²	41.76%	370m²
V	30	17.75%	30	8921m²	14.19%	297m²
MR	9	5.33%	29	4769m²	7.59%	530m²
TFL	6	3.55%	6	1382m²	2.20%	230m²
TRL	9	5.33%	9	2113m²	3.36%	235m²
TOTALS	169	100%	189	62858m²	100%	372m²

LOCALITY PLAN



LEGEND

- Application Boundary
- Stage Boundary
- Open Space
- Bioretention Basin
- Infrastructure
- Road

0 30 60 90 120 150m

Scale 1:3,000 at A3

North

Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO STP01-RaL1 (Sht 1 of 3)

DATE 04.12.2025

FILE REF STP01

Prepared by Place Plan for Urbex Pty Ltd
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Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO	STP01-RaL1 (Sht 2 of 3)
DATE	04.12.2025
FILE REF	STP01

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0 10 20 30 40 50m

Scale 1:1,000 at A3

North

STAGE 02

New Road 22.0m wide

New Road 16.0m wide

New Road 16.0m wide

New Road 16.0m wide

New Road 18.0m wide

Hannah Close

BALANCE LOT

909

11.55ha

LEGEND

- Application Boundary
- Stage Boundary
- Open Space
- Bioretention Basin
- Infrastructure
- Road

URBEX

Southern Thornlands Precinct 1
Reconfiguration of a Lot - Application 1

DRAWING NO	STP01-RaL1 (Sht 3 of 3)
DATE	04.12.2025
FILE REF	STP01

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0 10 20 30 40 50m

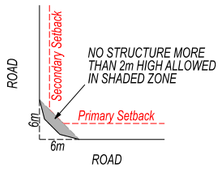
Scale 1:1,000 at A3

North

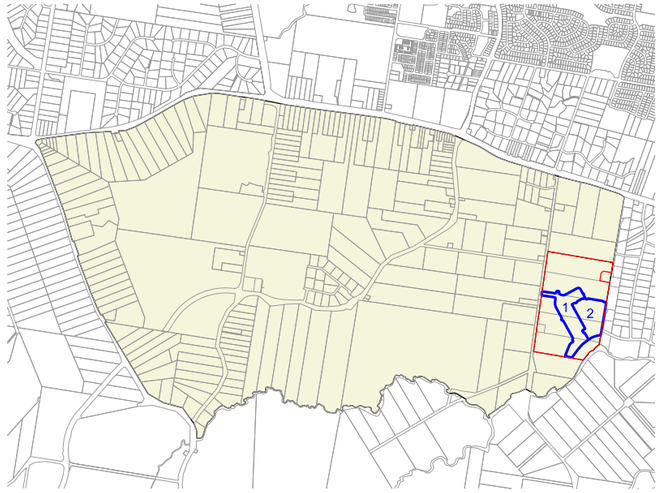
LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
- Mandatory Build to Boundary
- Indicative Driveway Location
- (3) Indicates maximum number of dwellings on multi-residential lots
- (S) Single Storey Dwellings only permitted
- (S*) Single Storey Dwellings only permitted within 10m of eastern rear boundary
- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

CORNER ALLOTMENTS

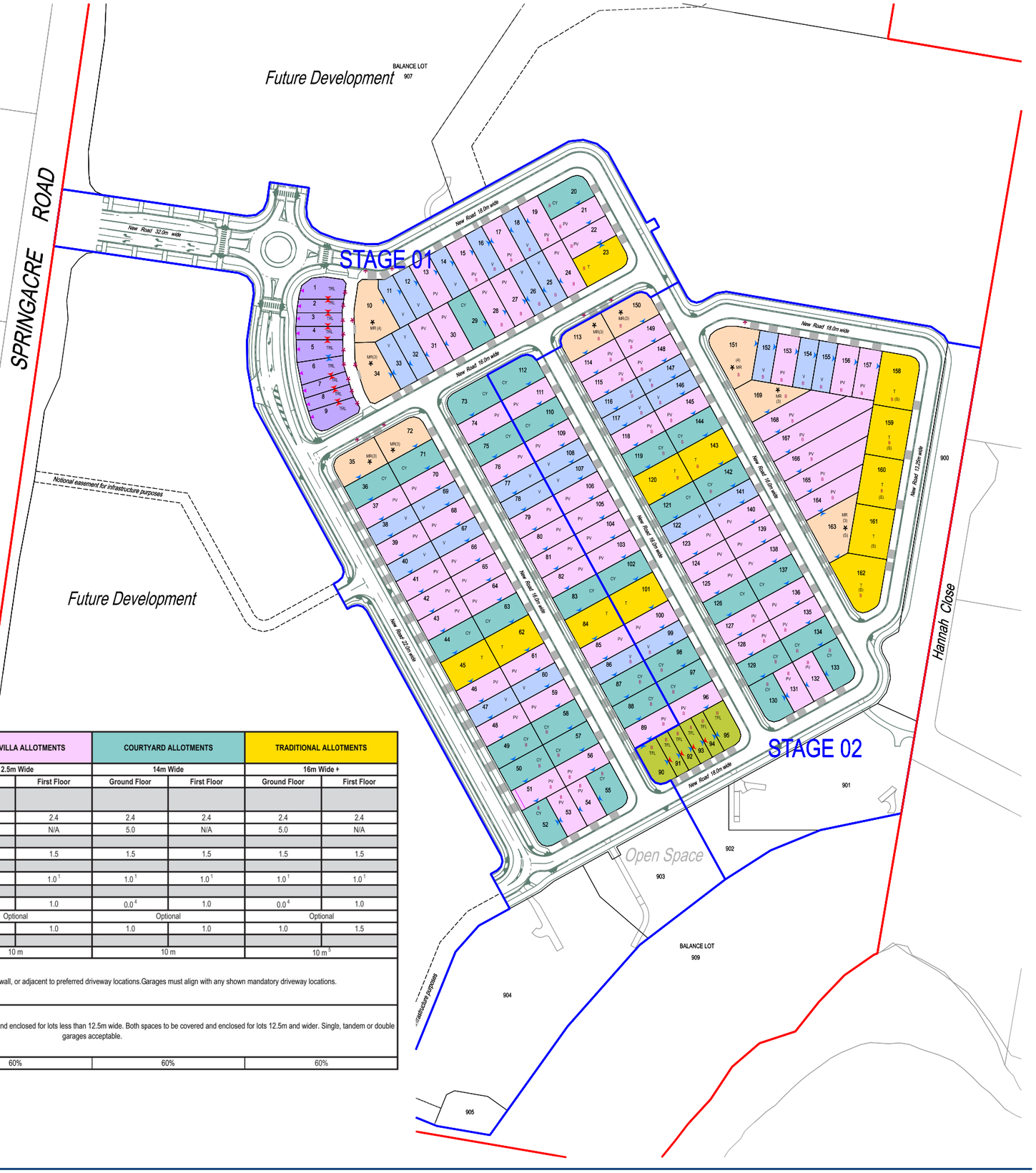


LOCALITY PLAN



PDA EXTENTS | PRECINCT 1 | APPLICATION 1 | STAGES

NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5



Plan of Development Table	FRONT-LOADED TERRACE ALLOTMENTS		REAR LOADED TERRACE ALLOTMENTS		MULTIPLE RESIDENTIAL		VILLA ALLOTMENTS		PREMIUM VILLA ALLOTMENTS		COURTYARD ALLOTMENTS		TRADITIONAL ALLOTMENTS	
	7.5m - 9m		7.5m - 9m Wide		VARIES		10.5m Wide		12.5m Wide		14m Wide		16m Wide +	
	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor
Primary Frontage Setback (metres)														
Front Wall	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Garage	5.0	N/A	N/A	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A
Corner Allotments (metres)														
Secondary Frontage (Road)	1.2	1.2	1.2	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Rear Setback (metres)														
Rear Setback	1.0[3]	1.0[3]	0.0	0.0	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]
Side - General Lots (metres)														
Build to Boundary	0.0	0.0	0.0	0.0	0.0[4]	1.0	0.0[4]	0.9	0.0[4]	1.0	0.0[4]	1.0	0.0[4]	1.0
	Mandatory[2]		Mandatory[2]		Optional		Optional		Optional		Optional		Optional	
Non Build to Boundary	0.9	0.9	0.9	0.9	1.5	1.5	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.5
Other Requirements														
Build to Boundary Length	80% of lot length		80% of lot length		10 m		10 m		10 m		10 m		10 m[5]	
Garage Location	Garages are to be located along one of the BTB walls, preferably on the low side.				Garages are to be located along the BTB wall where it is available. Additional garaging should align to preferred driveway locations.		Garages are preferred to be located along the BTB wall, or adjacent to preferred driveway locations.Garages must align with any shown mandatory driveway locations.							
On Site Parking Requirements (minimum)	1 space to be covered and enclosed. Single or tandem garages acceptable. Double garages are permitted on two storey dwellings only.		2 spaces, 1 space to be covered and enclosed. Garage to be located to laneway frontage unless noted on plar.		1 covered space per dwelling plus 0.5 addonal spaces per dwelling		Minimum of two (2) car parking spaces on-site. 1 space to be covered and enclosed for lots less than 12.5m wide. Both spaces to be covered and enclosed for lots 12.5m and wider. Single, tandem or double garages acceptable.							
Site Cover (maximum)	75%		75%		75%		60%		60%		60%		60%	

1. Where adjoining a retaining wall >1.5m, the setback is 1.2m.
2. Except for ends of Terrace pack.
3. Where the rear of the lot adjoins a road or a park, the rear setback will be 1.5m.
4. Build to boundary length limited to 10m. Build to boundary length can be increased to 50% of the depth of the lot if such lengthening does not cause adverse impacts for winter solar access for adjacent lots.
5. Traditional lots with a primary frontage over 18m cannot Build to the Boundary.

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO STP01-POD1 (Sht 1 of 5)
DATE 04.12.2025
FILE REF STP01

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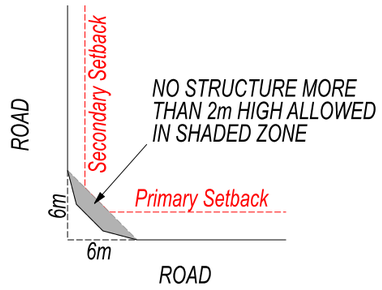
0 25 50 75 100 125 m
Scale 1:2,500 at A3

North

NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5

STAGE 01

CORNER ALLOTMENTS



LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
- Mandatory Build to Boundary
- Indicative Driveway Location
- (3) Indicates maximum number of dwellings on multi-residential lots
- (S) Single Storey Dwellings only permitted
- (S*) Single Storey Dwellings only permitted within 10m of eastern rear boundary
- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

PRODUCT TYPE
16m Wide + (T)
14m Wide (CY)
12.5m Wide (PV)
10.5m Wide (V)
Multiple Residential (MR)
Front-loaded Terrace (TFL)
Rear-loaded Terrace (TRL)

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO	STP01-POD1 (Sht 2 of 5)
DATE	04.12.2025
FILE REF	STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

PRODUCT TYPE
16m Wide + (T)
14m Wide (CY)
12.5m Wide (PV)
10.5m Wide (V)
Multiple Residential (MR)
Front-loaded Terrace (TFL)
Rear-loaded Terrace (TRL)

LEGEND

- Application Boundary
- Stage Boundary
- Optional Build to Boundary
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- Indicative Driveway Location
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- Mandatory Primary Frontage
- * Multiple Residential lot
- B Refer to Bushfire plan for Building Requirements
- * Indicative Bin Pad location (to be confirmed at detail design)

Hannah Close

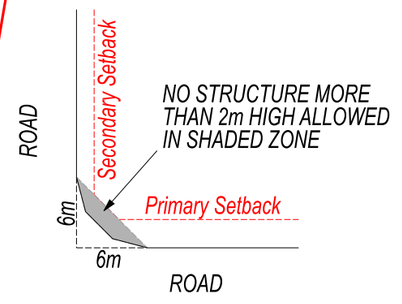
STAGE 02

901

902

903

CORNER ALLOTMENTS



NOTE: This plan should be read in conjunction with Development Controls on Sheets 4 and 5

URBEX

Southern Thornlands Precinct 1
Plan of Development - Application 1

DRAWING NO	STP01-POD1 (Sht 3 of 5)
DATE	04.12.2025
FILE REF	STP01

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0 10 20 30 40 50m

Scale 1:1,000 at A3

North

1. General

1.1 All development is tc be undertaken in accordance with the Development Approval, and Queensland Development Code (QDC), except as varied below.

1.2 The maximum height of buildings shall not exceed three (3) storeys or 10.5m above Natural Ground Level, except where noted on the POD. Lots marked with an (S) have a maximum building height of 1 storey or 6.0 m above natural grond level. Lots marked with an (S*) are required to limit any portion of the dwelling within 10 metres of their eastern rear boundary to single storey construction up to 6.0 m above natural ground level.

1.3 Maximum building location envelopes are subject to future proposed easements and/or other underground services.

1.4 Buildings shall be constructed in accordance with Bushfire AS3959. Refer to the BAL Rating advice relevant to the lot.

1.5 Secondary dwellings are not permitted on lots less than 400m².

1.6 Approved uses are Dwelling House, dual occupancy, display home, multiple dwelling, home-based business.

1.7 Advertising Devices, where associated with a display home/village and temporary in nature, are Exempt Development.

1.8 Where Mandatory Primary Frontage is required the dwelling must address the nominated frontage by incorporating an entry, portico / verandah, front door, windows, letter box, appropriate fencing and pedestrian entry facing this frontage.

2. Setbacks

2.1 Setbacks are as per the Plan of Development Table unless otherwise dimensioned. If a lot is not developed for a Multiple Residential (MR) site, then the equivalent size detached lot setbacks will apply.

2.2 The location of the built to boundary walls are indicated on the Plan of Development. Where built to boundary walls are not adopted, side setbacks shall be in accordance with the Plan of Development Table.

2.3.1 Boundary setbacks are measured to the Outermost Projection (OMP) of the structure.

2.3.2 Front verandah and covered areas to the front door are permitted to extend into the front setback on the condition that the roofed area is not enclosed. For front setbacks, this roofed area can extend to 1.0m from the front property line.

2.3.3 Eaves and window shades are permitted to extend into side and rear setbacks provided they do not encroach closer than 450mm to the lot boundary (other than where buildings are built to boundary).

2.4 Excluding Terrace product, the maximum length of a wall built on the BTB line shall not exceed 10 metres, unless it can be shown that a greater length will not adversely impact overshadowing of adjoining lots. Excluding Terraces, the maximum height of a wall built on the BTB line shall not exceed 4.0 m.

2.5 Where a retaining wall on the rear boundary is either terraced or a single face wall over 2.0m high, a 2.5m rear setback is required.

2.6 A corner lot, for the purposes of determining setbacks, is a lot that adjoins the intersection of two streets. For lots that abut a shared access driveway, laneway or a pedestrian link / landscape buffer, a secondary frontage setback does not apply. Buildings on corner lots are to be sited in accordance with the 'Special Siting Requirements for Corner Allotments'.

2.7 Setbacks on corner lots are determined by the frontage that the primary facade addresses. The primary facade is the frontage where the front door and letterbox are located, and requires Primary Frontage setbacks. Secondary frontage setbacks are required on the alternative frontage.

3. Private Open Space

3.1 Private open space must measure a minimum of 12m² with a minimum dimension in any direction of 2.4 metres. Private Open Space cannot include driveways and must have a minimum grade of less than 5%.

3.2 Private open space must be directly accessible from a living space.

4. On-site car parking and driveways

4.1 On-site car parking is to be provided in accordance the requirements setout in the Plan of Development table.

4.2 Driveways are to accord with Redland City Council's (RCC) standards. Prior to construction, approval from RCC for Vehicular Access to Residential Premises is required. Driveways within the verge must be built at the grade of the verge.

4.3 The maximum width of a driveway within the verge shall be 4.8 metres for a lot with a double car width garage and 3.0 metres for a lot with a single car width garage.

4.4 Double garages are permitted on terraces where they are accessed from the laneway.

4.5 Garages and carports accessed from a Laneway must be built setback 0.9 metres from the boundary unless otherwise dimensioned on the Plan of Development. Ingress/egress must be achieved for a B99 Vehicle.

4.6 Maximum of one driveway per dwelling.

4.7 Minimum distance of a driveway from an intersection of one street with another street is 6.0 metres. The Driveway must be laid at the grade of the adjacent verge area. No grade changes to the verge for the driveway will be allowed.

4.8 Where there is a footpath within the verge, the driveway prevails and should be cut at the nearest joint and the footpath reinstated to either side of the driveway without compromising the structural integrity of the footpath.

4.9 Driveways must be completed prior to occupation of the dwelling.

4.10 Driveways must be atleast 300mm from side property boundaries.

5. Onsite Parking lots 10 to 12.49m wide

5.1 Garages for any single storey dwelling on a Lot between 10.0m and 12.49m in width must adhere to the following design criteria:
a. The front facing building wall, which includes the garage door, must not exceed an external width of 5.7m
b. The garage door must have a sectional tilt or roller door and:
i. must not exceed 4.8m wide,
ii. must have a minimum 450mm eave above it, and
iii. must be setback a minimum of 240mm behind the pillar of the garage door
c. The front façade of the dwelling must be forward of the alignment of the garage wall, and must include a front entry door with glass inserts, sidelights, other street facing windows or a habitable room with a window. Additionally a front veranda, portico or porch must be located over the front entry and extend 1.6m forward of the front wall/door and include front piers with distinct materials and/or colours.
d. Driveways cannot exceed 3.0m across the verge on Lots between 10.0m and 12.49m wide.

5.2 Double car garages are permitted on any double storey dwelling built on a Lot between 10.0m and 12.49m.

6. Fencing

6.1 Fencing erected by developer must not be altered, modified or removed without their prior written approval.

6.2 Fencing on all park or street frontages has a maximum height of 1.2 metres where solid or have a maximum height of 1.8 metres where containing openings that make the fence more than 50% transparent.

6.3 Fencing on lanes can be screen fencing at 1.8m high where along private open space, carparking and service areas.

6.4 Fencing on corner lots is to be designed as front fences addressing both streets (rather than a front and a side fence).

6.5 Where fencing is not proposed in front of the house, all side fencing must return to the house a minimum of 1.0 metre behind the front building, unless a side fence is required sfaety above a retaining wall.

6.6 If elevated construction is to be used, under floor services must be located or screened from adjoining properties and public spaces.

7. Retaining Walls

7.1 For retaining walls **not** constructed by the developer:
a. Retaining walls must not exceed more than 1.0m where fronted to a public street or park. Retaining walls to side and rear boundaries (which are not visible from a public street or park) can be up to 2.0m. Retaining in excess of 2.5m in height must be terraced.
b. Where retaining walls are terraced, the lower face is to be a maximum of 1.0m from the property boundary.

7.2 No timber retaining walls over 1.0m high or where visible from any public street or park.

7.3 Retaining walls 1.0m or higher require RPEQ certification.

8. Building Articulation

8.1 All buildings with a width of more than 10 metres that are visible from a street or park are to include articulation to reduce the mass of the building by one or more of the following:
- Balconies, porches or verandahs;
- Articulation of roof lines and walls

8.2 Where adjoining an area of open space, housing design must facilitate passive surveillance of the open space, through the incorporation of at least one (1) habitable room orientated towards the open space.

8.3 Carports and garages are to be compatible with the main building design in terms of height, roof form, detailing, materials and colours.

8.4 Air-conditioners, gas bottles, hot water systems, clothes lines, sheds, satellite dishes, water tanks and other household services must be screened and/or located to minimise visual impact to public streets or parks (solar panels and hot water system panels (not tanks) can be sited to optimise orientation).

8.5 Homes must include a clearly identifiable and addressed front door and undercover point of entry.

8.6 Screened drying areas and rubbish bins area must be behind the main face of the dwelling.

9. Slope and Building Footings

9.1 Buildings on sloping sites built to the boundary on the low side of the lot must project the footing deep enough to be below the adjoining property building pad level. If the pad level is not nominated the pad level is assumed to be the average of the four corners of the adjoining property using as constructed levels.

9.2 Building footings are to be designed in accordance with the appropriate Australian Standard. Building footings are to be designed to ensure that there are no adverse impacts (functional, financial or construction limitations) on adjoining allotments, particularly in relation to retaining walls.

10. Electric Vehicle Readiness

10.1 All dwellings are to have a dedicated electrical circuit from the circuit board to the garage for at least one Basic (slow) EVSE charger per home, in accordance with the Australian Wiring Rules AS/NZS 3000: 2018.
The circuit is to be fitted with a minimum 20 Amp GPO outlet which can be replaced by a dedicated 7kW EVSE of the occupant's choice. Where not used for Electric Vehicle Supply Equipment, the circuit is to be terminated at an isolator.

11. Additional Criteria for Multiple Residential Allotments

11.1 Buildings must address all street frontages with driveways, pedestrian entries or both.

11.2 All dwellings must have a clearly identifiable front door, which is undercover.

11.3 Drying and rubbish bin areas must be located behind the main face of the dwelling or suitably screened from public streets and park frontages.

11.4 Maximum number of dwellings on each multiple residential lot is annotated on the Plan of Development.

12. Additional Criteria for Secondary Dwellings

12.1 Floor area must be between a minimum of 40m² and 75m².

12.2 Materials, detailing, colours and roof form are consistent with those of the primary house.

12.3 Outdoor living space must measure a minimum of 9m² with a minimum dimension in any direction of 3 metres.

12.4 Outdoor living space must be directly accessible from the main living space and can be combined with the primary dwelling outdoor space.

12.5 Outdoor living space on a corner allotment must be suitably screened if located within the secondary street boundary setback.

12.6 A minimum of one (5m x 3m) car parking space must be provided for the secondary dwelling, in addition to parking for the primary dwelling.

12.7 The driveway must be shared with the primary house, however on corner allotments a separate driveway may be provided with a minimum width of 3 metres and a maximum width of 5 metres.

12.8 Corner allotments must provide dedicated pedestrian entry and a visible door from and addressing the secondary street to the secondary dwelling.

12.9 Corner allotments must provide a minimum of one habitable room, with large windows or balconies, fronting the secondary street.

13. Definitions

13.1 Laneway Allotment - Allotments serviced by a laneway, typically rear loaded Terrace Allotments.

13.2 Site Cover - Site cover, of development, means the portion of the site, expressed as a percentage, that will be covered by a building or structure, measured to its outermost projection, after the development is carried out, other than a building or structure, or part of a building or structure, that is -
a. in a landscaped or open space area, including, for example, a gazebo or shade structure; or
b. a basement completely below ground level and used for car parking; or
c. the eaves of a building; or a sun shade.

URBEX

Southern Thornlands Precinct 1
Development Controls - Application 1

DRAWING NO	STP01-POD1 (Sht 4 of 5)
DATE	04.12.2025
FILE REF	STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

Plan of Development Table	FRONT-LOADED TERRACE ALLOTMENTS		REAR LOADED TERRACE ALLOTMENTS		MULTIPLE RESIDENTIAL		VILLA ALLOTMENTS		PREMIUM VILLA ALLOTMENTS		COURTYARD ALLOTMENTS		TRADITIONAL ALLOTMENTS	
	7.5m - 9m		7.5m - 9m Wide		VARIES		10.5m Wide		12.5m Wide		14m Wide		16m Wide +	
	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor	Ground Floor	First Floor
Primary Frontage Setback (metres)														
Front Wall	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Garage	5.0	N/A	N/A	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A	5.0	N/A
Corner Allotments (metres)														
Secondary Frontage (Road)	1.2	1.2	1.2	1.2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Rear Setback (metres)														
Rear Setback	1.0[3]	1.0[3]	0.0	0.0	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]	1.0[1]
Side - General Lots (metres)														
Build to Boundary	0.0	0.0	0.0	0.0	0.0[4]	1.0	0.0[4]	0.9	0.0[4]	1.0	0.0[4]	1.0	0.0[4]	1.0
	Mandatory[2]		Mandatory[2]		Optional		Optional		Optional		Optional		Optional	
Non Build to Boundary	0.9	0.9	0.9	0.9	1.5	1.5	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.5
Other Requirements														
Build to Boundary Length	80% of lot length		80% of lot length		10 m		10 m		10 m		10 m		10 m[5]	
Garage Location	Garages are to be located along one of the BTB walls, preferably on the low side.				Garages are to be located along the BTB wall where it is available. Additional garaging should align to preferred driveway locations.		Garages are preferred to be located along the BTB wall, or adjacent to preferred driveway locations.Garages must align with any shown mandatory driveway locations.							
On Site Parking Requirements (minimum)	1 space to be covered and enclosed. Single or tandem garages acceptable. Double garages are permitted on two storey dwellings only.		2 spaces, 1 space to be covered and enclosed. Garage to be located to laneway frontage unless noted on plan.		1 covered space per dwelling plus 0.5 addional spaces per dwelling		Minimum of two (2) car parking spaces on-site. 1 space to be covered and enclosed for lots less than 12.5m wide. Both spaces to be covered and enclosed for lots 12.5m and wider. Single, tandem or double garages acceptable.							
Site Cover (maximum)	75%		75%		75%		60%		60%		60%		60%	

1. Where adjoining a retaining wall >1.5m, the setback is 1.2m.
2. Except for ends of Terrace pack.
3. Where the rear of the lot adjoins a road or a park, the rear setback will be 1.5m.
4. Build to boundary length limited to 10m. Build to boundary length can be increased to 50% of the depth of the lot if such lengthening does not cause adverse impacts for winter solar access for adjacent lots.
5. Traditional lots with a primary frontage over 18m cannot Build to the Boundary.

URBEX

Southern Thornlands Precinct 1
Development Controls - Application 1

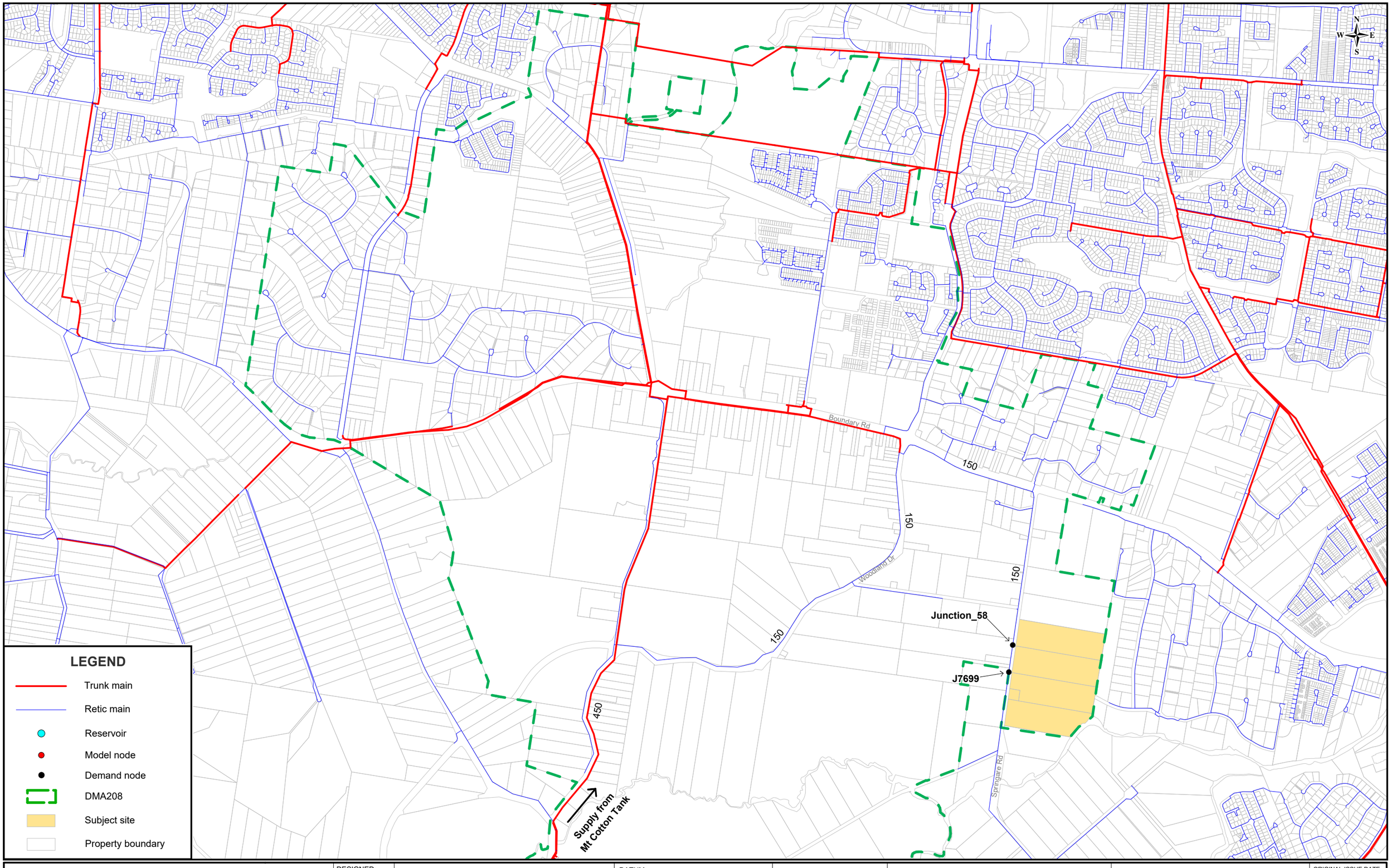
DRAWING NO STP01-POD1 (Sht 5 of 5)
DATE 04.12.2025
FILE REF STP01

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0 10 20 30 40 50m
Scale 1:1,000 at A3

North

Appendix 2. Local water supply network servicing the development site (DMA208)



H2ONE

H2One Pty Ltd
PO Box 23
KALBAR QLD 4309

P: (07) 5463 9538
E: Info@H2One.com.au
W: h2one.com.au

Important Notice!
This map is not a precise survey document. Accurate locations can only be determined by a survey on the ground.

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DESIGNED: J Meesamphan	NOTE: DESIGN NOT TO BE AMENDED WITHOUT H2ONE PTY LTD ACCEPTANCE		
DRAWN: J Meesamphan			
CHECKED: J May			
APPROVED: J May			
CLIENT PM:			
	A	ORIGINAL ISSUE - 16 SEP, 2025	
H2ONE PM: J May	No.	REVISION	APPROVED

DATUM:
HORIZ: MGA94 (ZONE 56)
HEIGHT: AHD

SCALE:
0 425 850
Metres

SURVEYED BY / DATE:

SURVEY CHECKED:

H2ONE REFERENCES

PROJECT NO: 2307576

FILE REFERENCE:

CAD FILE:

Redland CITY COUNCIL

Redland City Council
PO Box 21
Cleveland QLD 4163

Precinct 1, Sth Thornlands PDA
Thornlands QLD 4164
Water Supply Service Assessment

Appendix 2. Local water supply network servicing the development site (DMA208)

ORIGINAL ISSUE DATE: SEP, 2025

DATE SCANNED:

DRG No:

REV:

Appendix 3. Water supply pipe layout for the development



LEGEND

- Proposed DN100 pipe
- Proposed DN150 pipe
- Model node
- Property boundary

H2ONE

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DESIGNED:	J Meesamphan
DRAWN:	J Meesamphan
CHECKED:	J May
APPROVED:	J May
CLIENT PM:	
H2ONE PM:	J May

NOTE: DESIGN NOT TO BE AMENDED WITHOUT H2ONE PTY LTD ACCEPTANCE

No.	REVISION	APPROVED
A	ORIGINAL ISSUE - 16 SEP, 2025	

DATUM:
HORIZ: MGA94 (ZONE 56)
HEIGHT: AHD

SCALE:

0 30 60

Metres

SURVEYED BY / DATE:

SURVEY CHECKED:

H2ONE REFERENCES

PROJECT NO: 2307576

FILE REFERENCE:

CAD FILE:

Redland CITY COUNCIL

REDLAND CITY COUNCIL
PO BOX 21, CLEVELAND QLD 4163

Precinct 1, Sth Thornlands PDA
Thornlands QLD 4164
Water Supply Service Assessment

Appendix 3. Water supply pipe layout for the development

ORIGINAL ISSUE DATE: SEP, 2025

DATE SCANNED:

DRG No:

REV:

Appendix 4. Raw modelling results for the development's internal pipe reticulation

Pipes

Stage	ID	Diameter (DN)	HW Co-efficient	Length (m)	SF PH Flow Rate (L/s)	SF PH Velocity (m/s)	SF PH Head Loss (m/km)
Stage 1	Pipe_175	150	110	122.2	1.7	0.10	0.14
	Pipe_277	150	110	45.2	1.7	0.10	0.14
	Pipe_278	150	110	92.1	1.5	0.08	0.11
	Pipe_279	150	110	56.9	1.6	0.09	0.12
	Pipe_280	100	100	187.4	0.2	0.03	0.02
	Pipe_281	150	110	21.5	1.2	0.07	0.07
	Pipe_282	150	110	42.5	0.6	0.04	0.02
	Pipe_283	100	100	103.5	0.4	0.05	0.07
	Pipe_284	150	110	82.1	0.1	0.02	0.01
	Pipe_285	150	110	24.0	0.1	0.06	0.05
	Pipe_286	100	100	184.0	0.5	0.06	0.10
	Pipe_295	150	110	50.6	0.2	0.01	0.00
	Pipe_319	150	110	28.1	0.4	0.02	0.01
	Pipe_320	100	100	74.0	0.2	0.03	0.02
	Pipe_328	100	100	158.6	0.2	0.02	0.02
	Pipe_330	150	110	28.6	0.1	0.00	0.00
	Pipe_332	100	100	86.2	0.1	0.00	0.00
	Pipe_336	150	110	43.7	1.0	0.06	0.05
	Pipe_337	150	110	122.0	1.0	0.06	0.05
	Pipe_338	150	110	3.0	1.0	0.06	0.05
	Pipe_339	150	110	29.7	1.0	0.06	0.05
	Pipe_357	150	110	25.3	0.1	0.06	0.05
Stage 1 & 2	Pipe_175	150	110	122.2	3.1	0.17	0.40
	Pipe_277	150	110	45.2	3.1	0.17	0.40
	Pipe_278	150	110	92.1	2.8	0.16	0.34
	Pipe_279	150	110	56.9	3.5	0.20	0.51
	Pipe_280	100	100	187.4	0.6	0.08	0.17
	Pipe_281	150	110	21.5	2.7	0.15	0.31
	Pipe_282	150	110	42.5	2.0	0.11	0.18
	Pipe_283	100	100	103.5	0.5	0.06	0.12
	Pipe_284	150	110	82.1	0.1	0.05	0.04
	Pipe_285	150	110	24.0	0.1	0.11	0.17
	Pipe_286	100	100	184.0	0.8	0.11	0.31
	Pipe_295	150	110	50.6	0.6	0.04	0.02
	Pipe_319	150	110	28.1	1.8	0.10	0.15
	Pipe_320	100	100	74.0	0.8	0.10	0.26
	Pipe_321	100	100	31.8	0.9	0.12	0.38
	Pipe_322	100	100	26.6	0.6	0.07	0.15
	Pipe_323	100	100	172.1	0.1	0.00	0.00
	Pipe_324	100	100	160.1	0.2	0.02	0.02
	Pipe_325	100	100	149.5	0.1	0.02	0.02
	Pipe_326	100	100	59.1	0.1	0.07	0.15
	Pipe_327	100	100	44.7	0.1	0.12	0.38
	Pipe_328	100	100	158.6	0.3	0.04	0.04
	Pipe_329	150	110	75.3	0.1	0.03	0.01
	Pipe_330	150	110	28.6	0.1	0.02	0.01
	Pipe_331	150	110	257.6	0.1	0.05	0.03
	Pipe_332	100	100	86.2	0.1	0.05	0.07
	Pipe_336	150	110	43.7	1.9	0.11	0.17
	Pipe_337	150	110	122.0	1.9	0.11	0.17
	Pipe_338	150	110	3.0	1.9	0.11	0.17
	Pipe_339	150	110	29.7	1.9	0.11	0.17
	Pipe_357	150	110	25.3	0.1	0.11	0.17

Note: "SF" is "standard flow", "PH" is "peak hour" and "HW" is "Hazen-Williams"

Nodes

Stage	ID	Demand (EP)	RL AHD (m)	SF PH Demand (L/s)	SF PH Pressure (m)	Fire Flow (L/s)	FF 2/3 PH Pressure (m)
Stage 1	Junction_114	0.0	40.00	0.00	54.1	15.0	30.7
	Junction_116	19.7	36.00	0.21	58.1	15.0	34.3
	Junction_117	19.7	36.50	0.21	57.6	15.0	33.3
	Junction_118	19.7	36.75	0.21	57.4	15.0	32.9
	Junction_119	19.7	36.75	0.21	57.4	15.0	32.7
	Junction_120	19.7	31.25	0.21	62.9	15.0	35.4
	Junction_121	19.7	31.25	0.21	62.9	15.0	38.8
	Junction_122	0.0	33.00	0.00	61.1	15.0	37.0
	Junction_123	19.7	20.00	0.21	74.1	15.0	45.7
	Junction_124	19.7	19.25	0.21	74.9	15.0	44.7
	Junction_126	19.7	38.00	0.21	56.1	15.0	30.4
	Junction_127	19.7	37.25	0.21	56.9	15.0	27.2
	Junction_129	0.0	32.00	0.00	62.1	15.0	36.1
	Junction_130	0.0	32.00	0.00	62.1	15.0	36.1
	Junction_133	0.0	38.00	0.00	56.1	15.0	30.1
	Junction_134	0.0	39.00	0.00	55.1	15.0	29.1
	Junction_149	19.7	22.00	0.21	72.1	15.0	41.7
	Junction_155	19.7	37.25	0.21	56.9	15.0	32.0
	Junction_156	19.7	37.50	0.21	56.6	15.0	29.7
Stage 1 & 2	Junction_114	0.0	40.00	0.00	51.5	15.0	28.4
	Junction_116	19.7	36.00	0.21	55.5	15.0	32.0
	Junction_117	19.7	36.50	0.21	54.9	15.0	31.1
	Junction_118	19.7	36.75	0.21	54.7	15.0	30.7
	Junction_119	19.7	36.75	0.21	54.7	15.0	30.5
	Junction_120	19.7	31.25	0.21	60.2	15.0	33.8
	Junction_121	19.7	31.25	0.21	60.2	15.0	36.7
	Junction_122	0.0	33.00	0.00	58.5	15.0	35.0
	Junction_123	19.7	20.00	0.21	71.4	15.0	46.7
	Junction_124	19.7	19.25	0.21	72.2	15.0	47.3
	Junction_126	19.7	38.00	0.21	53.5	15.0	28.2
	Junction_127	19.7	37.25	0.21	54.2	15.0	25.3
	Junction_129	0.0	32.00	0.00	59.5	15.0	33.9
	Junction_130	0.0	32.00	0.00	59.5	15.0	33.9
	Junction_133	0.0	38.00	0.00	53.5	15.0	28.0
	Junction_134	0.0	39.00	0.00	52.5	15.0	27.1
	Junction_149	19.7	22.00	0.21	69.4	15.0	42.7
	Junction_150	38.3	25.50	0.37	65.9	15.0	39.2
	Junction_151	38.3	27.00	0.37	64.4	15.0	36.3
	Junction_152	38.3	28.00	0.37	63.4	15.0	34.6
	Junction_153	38.3	36.00	0.37	55.4	15.0	26.7
	Junction_154	38.3	36.75	0.37	54.6	15.0	26.3
	Junction_155	19.7	37.25	0.21	54.2	15.0	26.6
	Junction_156	19.7	37.50	0.21	53.9	15.0	25.0
	Junction_171	38.3	30.00	0.37	61.4	15.0	28.9

Appendix G. Springacre Road Design and Checks

EMPOWER

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URBEX PTY LTD
SPRINGACRE ROAD, THORNLANDS, QLD, 4164
CIVIL WORKS

DRAWING INDEX

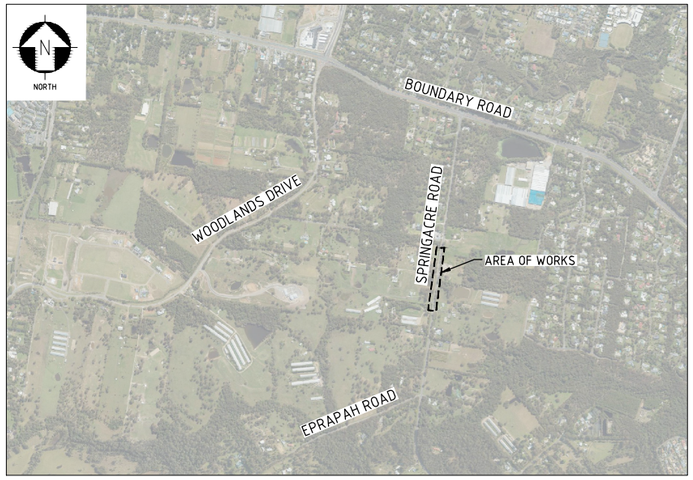
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COVER SHEET AND DRAWING INDEX		
B00703-DD-DI01	A	COVER SHEET AND DRAXING INDEX
B00703-DD-DI01	A	GENERAL NOTES
TYPICAL SECTION		
B00703-DD-TC01	A	TYPICAL SECTIONS - SHEET 1 OF 3
B00703-DD-TC02	A	TYPICAL SECTIONS - SHEET 2 OF 3
B00703-DD-TC03	A	TYPICAL SECTIONS - SHEET 3 OF 3
ROADWORKS		
B00703-DD-GA01	A	GENERAL ARRANGEMENT & DRAWING KEY PLAN
B00703-DD-GA02	A	ROADWORKS - PLAN & PROFILE - SHEET 1 OF 6
B00703-DD-GA03	A	ROADWORKS - PLAN & PROFILE - SHEET 2 OF 6
B00703-DD-GA04	A	ROADWORKS - PLAN & PROFILE - SHEET 3 OF 6
B00703-DD-GA05	A	ROADWORKS - PLAN & PROFILE - SHEET 4 OF 6
B00703-DD-GA06	A	ROADWORKS - PLAN & PROFILE - SHEET 5 OF 6
B00703-DD-GA07	A	ROADWORKS - PLAN & PROFILE - SHEET 6 OF 6
B00703-DD-GA08	A	PAVEMENT DETAILS
B00703-DD-GA09	A	SIGNAGE & LINEMARKING
DRAINAGE		
B00703-DD-SW01	A	DRAINAGE LAYOUT - SHEET 1 OF 3
B00703-DD-SW02	A	DRAINAGE LAYOUT - SHEET 2 OF 3

DRAWING INDEX

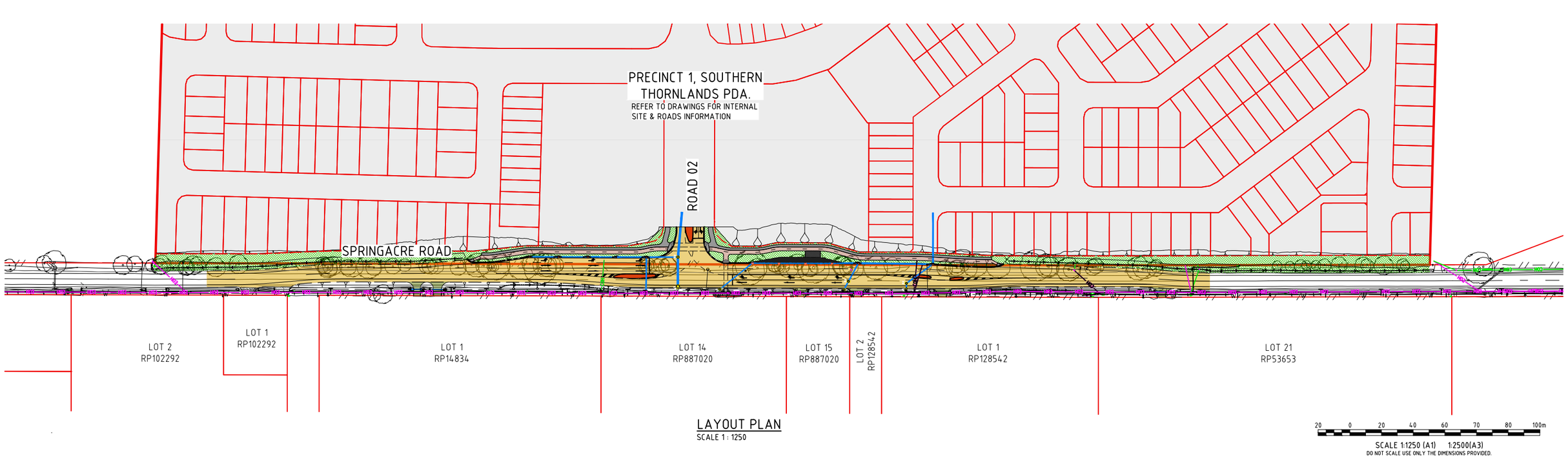
SHEET NUMBER	REVISION	SHEET TITLE
B00703-DD-SW03	A	DRAINAGE LAYOUT - SHEET 3 OF 3
B00703-DD-SW04	A	DRAINAGE LONGITUDINAL SECTIONS - SHEET 1 OF 3
B00703-DD-SW05	A	DRAINAGE LONGITUDINAL SECTIONS - SHEET 2 OF 3
B00703-DD-SW06	A	DRAINAGE LONGITUDINAL SECTIONS - SHEET 3 OF 3
ANNOTATED SECTIONS		
B00703-DD-XS01	A	ANNOTATED SECTIONS - RD01 - SHEET 1 OF 12
B00703-DD-XS02	A	ANNOTATED SECTIONS - RD01 - SHEET 2 OF 12
B00703-DD-XS03	A	ANNOTATED SECTIONS - RD01 - SHEET 3 OF 12
B00703-DD-XS04	A	ANNOTATED SECTIONS - RD01 - SHEET 4 OF 12
B00703-DD-XS05	A	ANNOTATED SECTIONS - RD01 - SHEET 5 OF 12
B00703-DD-XS06	A	ANNOTATED SECTIONS - RD01 - SHEET 6 OF 12
B00703-DD-XS07	A	ANNOTATED SECTIONS - RD01 - SHEET 7 OF 12
B00703-DD-XS08	A	ANNOTATED SECTIONS - RD01 - SHEET 8 OF 12
B00703-DD-XS09	A	ANNOTATED SECTIONS - RD01 - SHEET 9 OF 12
B00703-DD-XS10	A	ANNOTATED SECTIONS - RD01 - SHEET 10 OF 12
B00703-DD-XS11	A	ANNOTATED SECTIONS - RD01 - SHEET 11 OF 12
B00703-DD-XS12	A	ANNOTATED SECTIONS - RD01 - SHEET 12 OF 12
B00703-DD-XS13	A	ANNOTATED SECTIONS - RD02
MISCELLANEOUS		
B00703-DD-UL01	A	ULTIMATE ARRANGEMENT
B00703-DD-TP01	A	SWEPT-PATH ANALYSIS

NOTES

1. DIMENSIONS SHOWN IN METERS UNLESS NOTED OTHERWISE.
2. VERTICAL DATUM IS AUSTRALIAN HEIGHT DATUM (AHD).
3. COORDINATE SYSTEM & SURVEY SUPPLIED BY 'RPS AAP CONSULTING' PACKAGE NO> AU011113.
4. THE CONTRACTOR SHALL ESTABLISH SURVEY BASELINES AND BENCHMARKS. PRIOR TO THE COMMENCEMENT OF WORK THE CONTRACTOR SHALL VERIFY THE EXISTING SURVEY LEVELS AND AGREE WITH THE COMPANY'S REPRESENTATIVE ON ANY VARIATIONS FORM THOSE SHOWN ON THE DRAWINGS.
5. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH TMR SPECIFICATIONS & RELEVANT STATURTORY AUTHORITIES.
6. SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE SITE CONTRACTOR.
7. REFER ALL DISCREPANCIES TO THE COMPANY'S REPRESENTATIVE BEFORE PROCEEDING WITH THE WORKS.
8. LOCATION OF ALL EXISTING SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND ANY TREATMENT SHALL BE APPROVED BY COMPANY'S REPRESENTATIVE.



LOCALITY PLAN
NOT TO SCALE



LAYOUT PLAN
SCALE 1 : 1250

SCALE 1:1250 (A1) 1:2500(A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: COVERSHEET & DRAWING INDEX

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

Project No.	Drawing No.	Rev
	B00703-DD-DI01	A

Plot Date: 12/12/2025 10:33:59 AM User: DESIGN CIVIL
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\COVER

GENERAL NOTES

GN1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL SPECIFICATIONS, ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS. ALL DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER FOR DECISION BEFORE PROCEEDING WITH THE WORK.

GN2 THE ACCURACY AND COMPLETENESS OF EXISTING SERVICE INFORMATION SHOWN ON THE DRAWINGS IS NOT GUARANTEED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL SERVICES PRIOR TO CONSTRUCTION AND ADVISE THE SUPERINTENDENT OF ANY DIFFERENCES FROM THE DRAWINGS.

GN3 THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK, BEFORE CONSTRUCTION AND/OR FABRICATION IS COMMENCED.

GN4 THE ENGINEER'S DRAWINGS SHALL NOT BE SCALED UNLESS SPECIFICALLY NOTED OTHERWISE.

GN5 DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE IN A STABLE CONDITION AND ENSURING NO PART SHALL BE OVERSTRESSED UNDER CONSTRUCTION ACTIVITIES.

GN6 WORKMANSHIP AND MATERIALS TO BE IN ACCORDANCE WITH THE RELEVANT CURRENT STANDARDS AUSTRALIA CODES INCLUDING ALL AMENDMENTS, AND THE LOCAL STATUTORY AUTHORITIES,EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

GN7 THE APPROVAL OF A SUBSTITUTION SHALL BE SOUGHT FROM THE ENGINEER BUT IS NOT AN AUTHORISATION FOR AN EXTRA. ANY EXTRA INVOLVED MUST BE TAKEN UP WITH THE ARCHITECT BEFORE THE WORK COMMENCES.

GN8 ABBREVIATIONS:
- UNO - UNLESS NOTED OTHERWISE
- AHD - AUSTRALIAN HEIGHT DATUM
- NTS - NOT TO SCALE
- ULS - ULTIMATE LIMIT STATE
- SLS - SERVICEABILITY LIMIT STATE
- APE - ANNUAL PROBABILITY OF EXCEEDENCE
- EDC - EARTHQUAKE DESIGN CATEGORY
- AS - AUSTRALIAN STANDARD

GN9 ALL NON-LOAD BEARING WALLS SHALL BE KEPT 20 MM CLEAR OF THE UNDERSIDE OF SLABS AND BEAMS UNO.

GN10 ALL DIMENSIONS ON STRUCTURAL DRAWINGS ARE IN MILLIMETRES UNO. ALL DIMENSIONS ON CIVIL DRAWINGS ARE IN METRES UNO. ALL REDUCED LEVELS IN METRES TO AHD UNO. DIMENSIONS TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO CONSTRUCTION WORKS.

GEOTECHNICAL NOTES

GE1 EARTHWORKS LIMITS OF CUTTING AND FILLING AS SHOWN ON THE DRAWING TO BE VERIFIED ON SITE. THE ACTUAL LIMITS TO BE DETERMINED ON SITE BY THE SUPERINTENDENT DURING CONSTRUCTION.

GE2 THE FILL MATERIAL WILL COMPRISE ONLY OF NATURAL EARTH AND ROCK AND SHALL BE FREE OF ALL CONTAMINATES, NOXIOUS, HAZARDOUS, DELETERIOUS AND ORGANIC MATERIAL. THE FILL SHALL BE COMPACTED IN LAYERS NOT EXCEEDING 300MM TO A MAXIMUM DRY DENSITY SPECIFIED BY THE LOCAL AUTHORITY OR THE RELEVANT AUSTRALIAN STANDARD IN ACCORDANCE WITH AS1289 LEVEL 1 CERTIFICATION.

GE3 THE PLACEMENT OF FILL TO BE EXECUTED SUCH THAT TO BE FREE DRAINING AT ALL TIMES, WON'T CAUSE PONDING AND TO NOT CAUSE NUISANCE TO ADJOINING PROPERTY OR ROADS.

GE4 NO DEMOLITION MATERIAL TO BE USED AS FILL MATERIAL.

GE5 WHERE UNSUITABLE MATERIAL IS ENCOUNTER WITHIN THE FILL, IT WILL BE REMOVED AND REPLACED WITH SUITABLE FILL.

GE6 ALL VEHICLES EXITING FROM THE SITE TO BE CLEAN - TO PREVENT MATERIAL BEING TRACKED OR DEPOSITED ON THE ADJOINING PUBLIC ROADS. REFER ENVIRONMENTAL MANAGEMENT NOTES. ACCESS TRACKS THROUGH THE SITE WILL BE LIMITED TO THOSE APPROVED BY THE SUPERINTENDENT AND THE CONTRACTOR PRIOR TO ANY WORK COMMENCING.

LOCATION	DENSITY & FREQUENCY
PAVEMENT	98% MODIFIED
SUBGRADE	95% MODIFIED
GRAVEL BELOW CONCRETE PAVEMENT	95% MODIFIED
TRENCH BACKILL	95% MODIFIED
BELOW STRUCTURES	95% MODIFIED
ELSEWHERE	90% MODIFIED

GE7 GEOTECHNICAL ENGINEER TO SUPERVISE AND INSPECT FOUNDING MATERIALS TO ENSURE ADEQUATELY STIFF/DENSE SOIL IS REACHED. MINIMUM ALLOWABLE BEARING CAPACITY = 250KPA.

GE8 IF GROUND WATER FOUND DURING EXCAVATION OF STRUCTURES, THE DESIGN ENGINEER IS TO BE ADVISED.

REFINEMENT OF THESE NOTES TO BE FINALISED IN THE DETAIL DESIGN PHASE

CONCRETE NOTES

CN1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600. SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES. THE DESIGN & CERTIFICATION OF TEMPORARY SUPPORTS & STRIPPING OF FORMWORK IS THE RESPONSIBILITY OF THE CONTRACTOR

CN2 CONCRETE STRENGTH UNO.
N50

CN3 CONCRETE COVER UNO.
70mm COVER

CN4 CONCRETE EXPOSURE CLASSIFICATIONS UNO:
B2

CN5 READY-MIX CONCRETE IN ACCORDANCE WITH AS1379. REFER ALSO ELEMENTS FOR GRADES.
SLUMP 80 +/- 15 UNO
20 AGGREGATE UNO
NO ADDITION OF WATER PERMITTED ON SITE. ALL CONCRETE MUST BE VIBRATED. NON LOADBEARING ELEMENTS SHALL BE KEPT 20mm CLEAR OF SOFFIT OF STRUCTURE. ALLOWANCE TO BE MADE IN ANY CONNECTIONS TO SOFFIT FOR 20mm DEFLECTION.

CN6 ALL REINFORCEMENT SHALL BE SUPPORTED IN ITS CORRECT POSITION DURING CONCRETING BY PLASTIC BAR CHAIRS. WIRE CHAIRS NOT PERMITTED. COVERS MUST BE MAINTAINED AT ALL TIMES INCLUDING DRIP GROOVES. ENSURE TIE WIRES DO NOT PROTRUDE INTO THE COVER ZONES. PENETRATIONS ARE TO BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR APPROVAL. DOCUMENTED REINFORCEMENT TO BE DISPLACED AT PENETRATIONS.

CN7 IN HOT AND/OR WINDY WEATHER APPLY ALIPHATIC ALCOHOL TO THE SCREEDED CONCRETE TO MINIMISE MOISTURE LOSS AND PLASTIC SHRINKAGE CRACKING. ALIPHATIC ALCOHOL MUST BE RE-APPLIED AFTER EACH CONCRETE OPERATION. THE SURFACE OF THE CONCRETE MUST NOT BE LEFT IN AN UNPROTECTED STATE.
NOTE - THIS DOES NOT REPLACE CURING.

CN8 CURE ALL SLABS FOR 7 DAYS MINIMUM BY AN APPROVED METHOD.
NOTE - CURING MUST BE IN PLACE WITHIN 3 HOURS OF COMPLETING THE SLABS. LEAVE FORMWORK IN PLACE. COVER WITH PLASTIC SHEET (SECURELY HELD DOWN). SPRAYED CURING COMPOUND COMPLYING WITH AS3799.

CN9 NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER.

CN10 CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR SPECIFICALLY APPROVED BY THE ENGINEER. SHEAR KEYS AND SCABBLING OF CONCRETE REQUIRED TO ALL VERTICAL JOINTS IN SUSPENDED SLABS AND BEAMS. THE FACE OF ALL CONCRETE AGAINST WHICH NEW CONCRETE IS TO BE CAST IS TO BE THOROUGHLY MECHANICALLY SCABBLED, FULLY EXPOSING THE AGGREGATE MATRIX.

CN11 CONCRETE FINISHED TO BE CLASS 2 AS PER AS3640-1995

CN12 ALL CONCRETE WORK IS COMPLY WITH THE FOLLOWING AUSTRALIAN STANDARDS, BUT NOT LIMITED TO:
AS 1012, AS1289, AS3600, AS3610, AS3735, AS/NZS4671

REINFORCEMENT NOTES

RE1 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

RE2 SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN OR AS OTHERWISE APPROVED IN WRITING BY THE DESIGN ENGINEER.

RE3 WELDING OR SITE BENDING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.

RE4 UNO ALL COGS AND HOOKS ARE TO BE IN ACCORDANCE WITH AS3600. REFER ALSO TO SECTION & BEAM ELEVATIONS.

RE5 ALL REINFORCEMENT IS TO BE IN ACCORDANCE WITH AS4671.
REINFORCEMENT SYMBOLS:
- S GRADE D250N DEFORMED BAR
- R GRADE R250N PLAN BAR
- N GRADE D500N DEFORMED BAR
- SL,RL GRADE D500L DEFORMED MESH

RE6 ALL REINFORCEMENT SHALL BE GRADE D500N TO AS4671 UNO.

RE7 EXPOSURE CLASSIFICATIONS TO AS3600:
ALL B2

RE8 UNO THE MINIMUM LAP LENGTH OF ALL REINFORCING SHALL BE IN ACCORDANCE WITH THE BELOW TABLE:

MINIMUM LAPPED SPLICE LENGTHS FOR REINFORCING BARS

EXPOSURE CLASSIFCATION	f'c	DEFORMED BAR DIAMETER								
		10	12	16	20	24	28	32	36	40
B1	32 MPa	450	550	800	1000	1250	1500	1800	2100	2400
B2	40 MPa	400	500	700	900	1100	1350	1600	1850	2150
	50 MPa	400	500	650	800	1000	1200	1450	1700	1950
C, C1, AND C2	50 MPa	400	500	650	800	1000	1200	1450	1700	1950

FOR TOP/HORIZONTAL BARS WITH MORE THAT 300 OF CONCRETE BELOW THE ABOVE BARS, THE LAP LENGTHS IN THIS TABLE SHALL BE MULTIPLIED BY 1.3. WHERE LAPS ARE REQUIRED BUT NOT SHOWN ON THE DRAWINGS, THEY SHOULD BE STAGGERED AND POSITIONED AWAY FROM POINTS OF MAXIMUM STRESS. WHERE MORE THAN 50% OF REINFORCEMENT IS SPLICED AT POINTS OF MAXIMUM STRESS, LAP LENGTHS SHOWN IN THE TABLE ABOVE ARE TO BE MULTIPLIED BY 1.3.

FORMWORK NOTES

FW1 FORMWORK DESIGN, CONSTRUCTION AND STRIPPING SHALL COMPLY WITH AS3610. THE FORMWORK DESIGN SHALL BE UNDERTAKEN BY AN EXPERIENCED FORMWORK DESIGNER AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ALSO REFER TO THE SPECIFICATION.

FW2 FORMWORK CLASSES:
CLASS 3 ALL EXPOSED FACES.
CLASS 4 ALL CONCEALED FACES.

FW3 19MM CHAMFER TO ALL EDGES.
12MM DRIP GROOVE TO ALL SOFFIT EDGES.

FW4 PROPS TO REMAIN IN PLACE FOR 12 DAYS MINIMUM (IF AVERAGE AIR TEMPERATURE IS MORE THAN 20°C) OR 18 DAYS MINIMUM IF LOWER.

RETAINING WALL DESIGN PARAMETERS

1. COMPLY WITH AS4678-2002 "EARTH RETAINING STRUCTURES"
2. MINIMUM DESIGN LIFE OF 100 YEARS
3. DESIGN TO CARRY WIND LOADS IMPOSED BY A 2m (MAX) HIGH FENCE
4. COMPLY WITH REDLAND CITY COUNCIL PLANNING SCHEME AND ALL RELEVANT COUNCIL STANDARDS.
5. PROVIDE RPEQ CERTIFICATION FOR DESIGN & CONSTRUCTION AND PROVIDE FORM 15 AND 16 CERTIFICATION.
6. WALL LOADING TO BE min. 20 KPa AND IS TO BE DESIGNED TO ALLOW FOR LOADING OF GUARD RAIL, ROAD LIVE & DEAD LOADS, STREET LIGHT FOOTINGS AND FENCING AS REQUIRED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX | EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: GENERAL NOTES

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

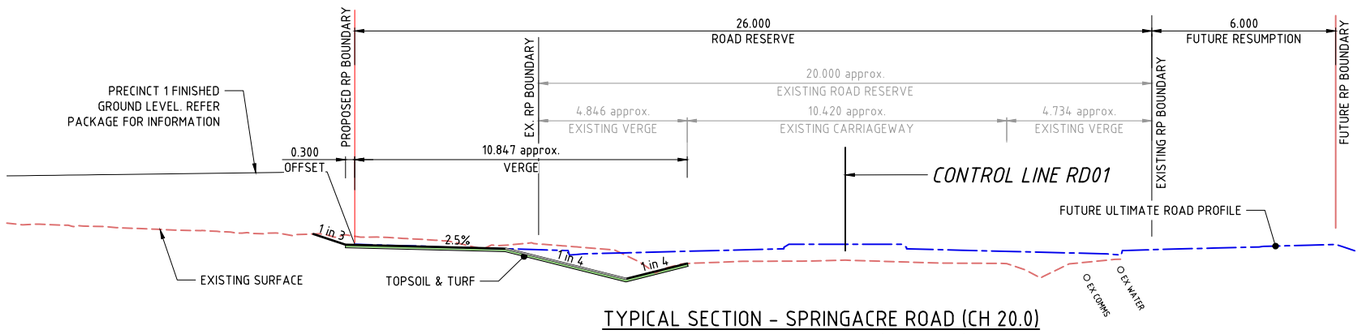
ISSUE FOR REVIEW

Project No. B00703-DD-DI02
Drawing No.
Rev A

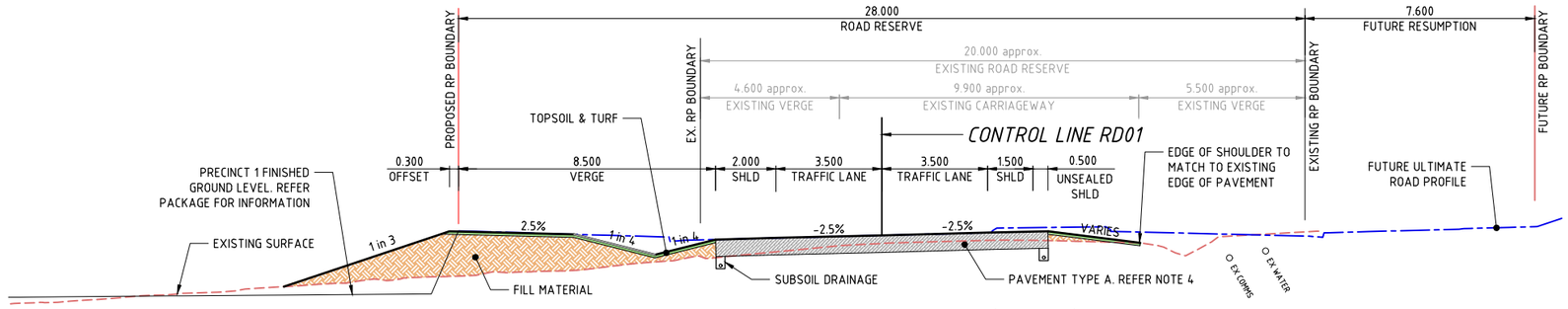
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NOTES

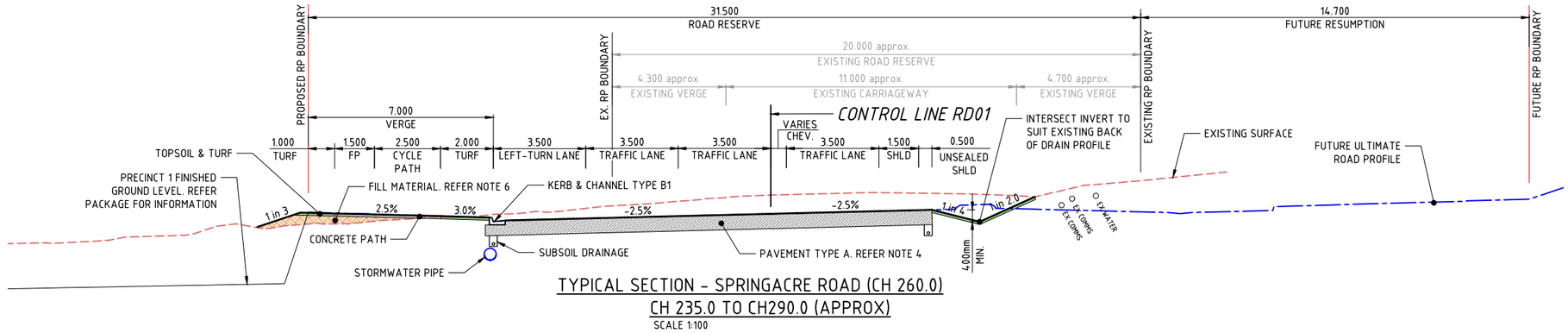
1. FOR DRAINAGE INFORMATION REFER DRGS B00703-DD-SW01 TO B00703-DD-SW06.
2. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11.
3. FOR PAVEMENT INFORMATION REFER TO DRG B00703-DD-PA01.
4. FILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS.



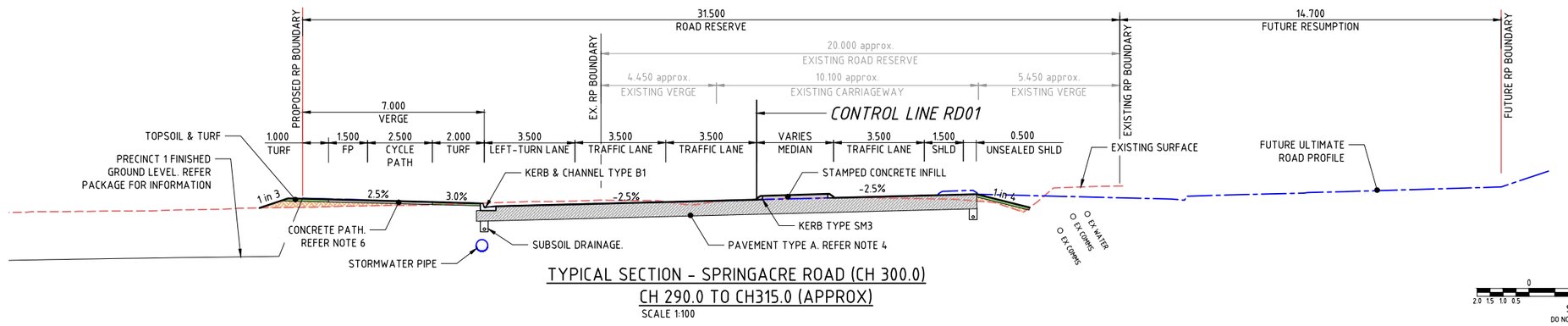
TYPICAL SECTION - SPRINGACRE ROAD (CH 20.0)
CH 0.0 TO CH33.0 (APPROX)
SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 140.0)
CH 85.0 TO CH190.0 (APPROX)
SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 260.0)
CH 235.0 TO CH290.0 (APPROX)
SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 300.0)
CH 290.0 TO CH315.0 (APPROX)
SCALE 1:100

0 2 4 6 8 10m
2.0 1.5 1.0 0.5
SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX | EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: TYPICAL SECTIONS & DETAILS SHEET 1 OF 3

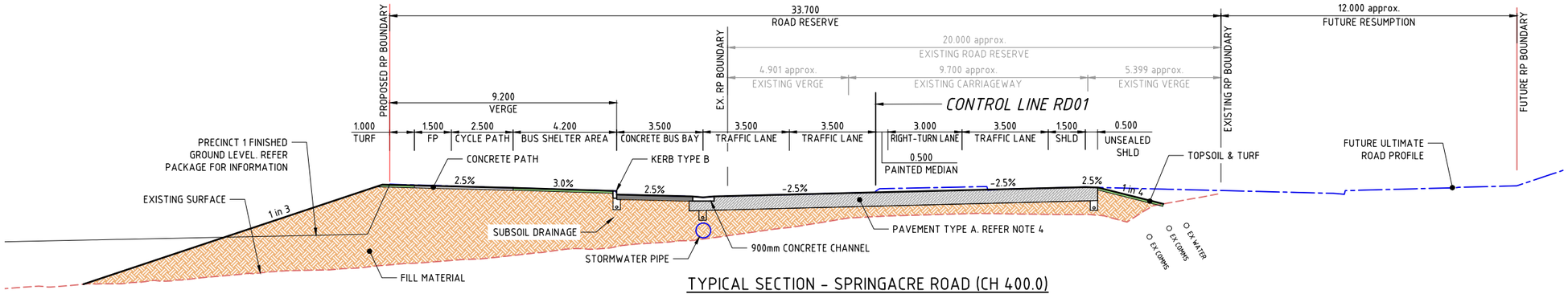
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RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

Project No. B00703-DD-TC01
Drawing No.
Rev A

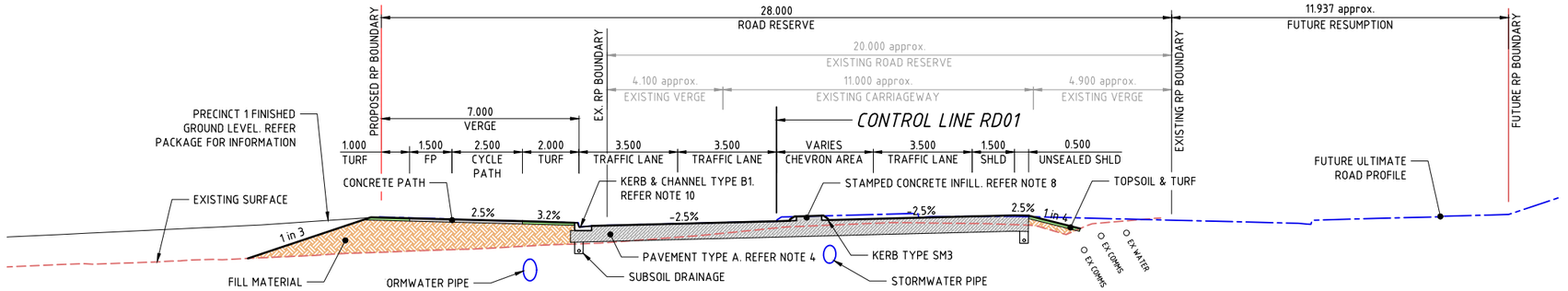
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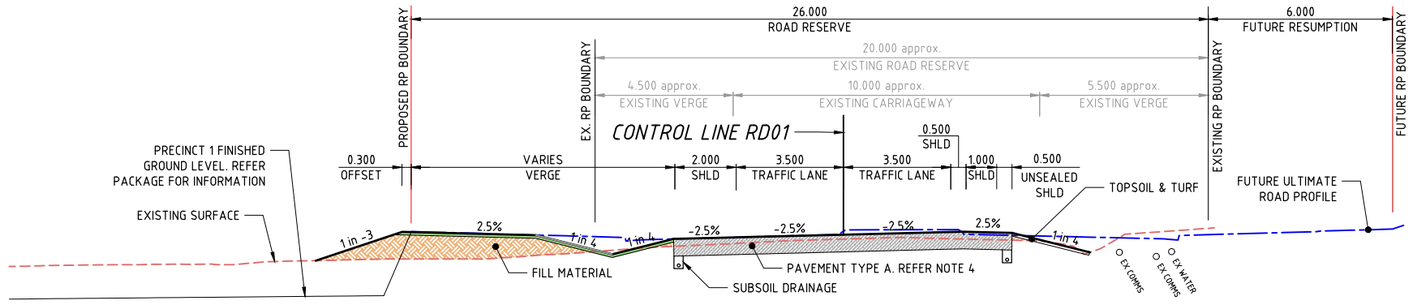
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CH 365.0 TO CH460.0 (APPROX)

SCALE 1:100



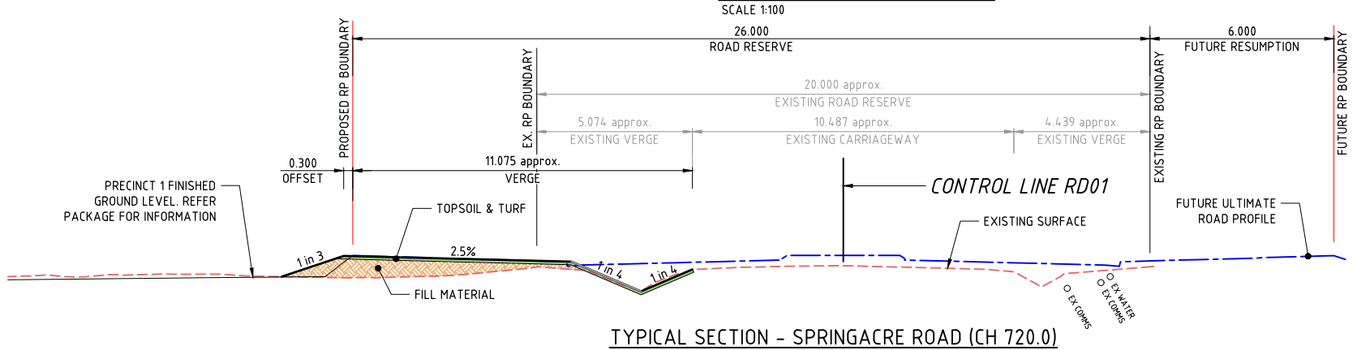
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CH 480.0 TO CH510.0 (APPROX)

SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 620.0)
CH 615.0 TO CH666.0 (APPROX)

SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 720.0)
CH 666.0 TO END

SCALE 1:100

NOTES

1. FOR DRAINAGE INFORMATION REFER DRGS B00703-DD-SW01 TO B00703-DD-SW06.
2. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11.
3. FOR PAVEMENT INFORMATION REFER TO DRG B00703-DD-PA01.
4. FILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS.

0 2 4 6 8 10m
2.0 1.5 1.0 0.5

SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: TYPICAL SECTIONS & DETAILS
SHEET 2 OF 3

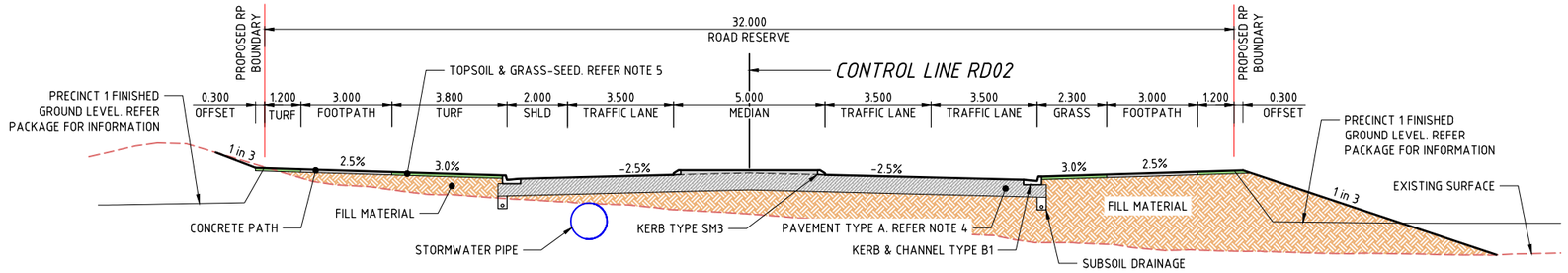
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PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

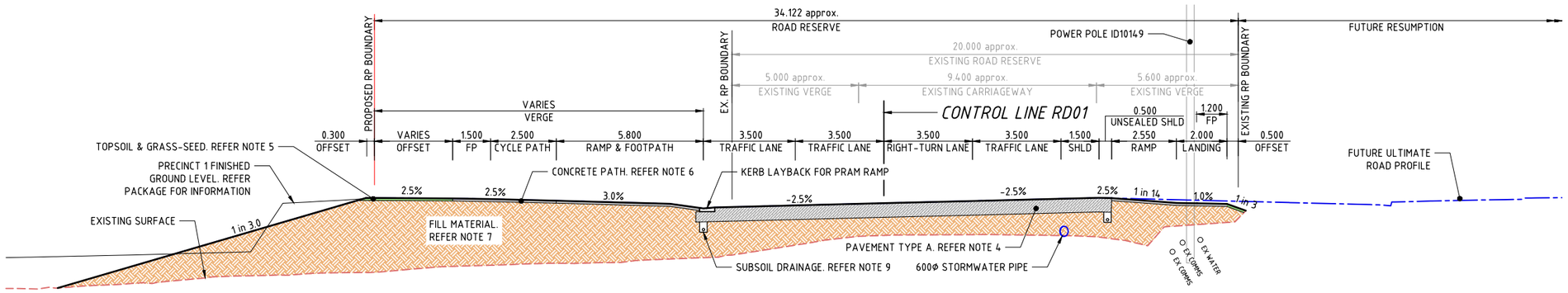
Project No. B00703 | Drawing No. DD-TC02 | Rev A

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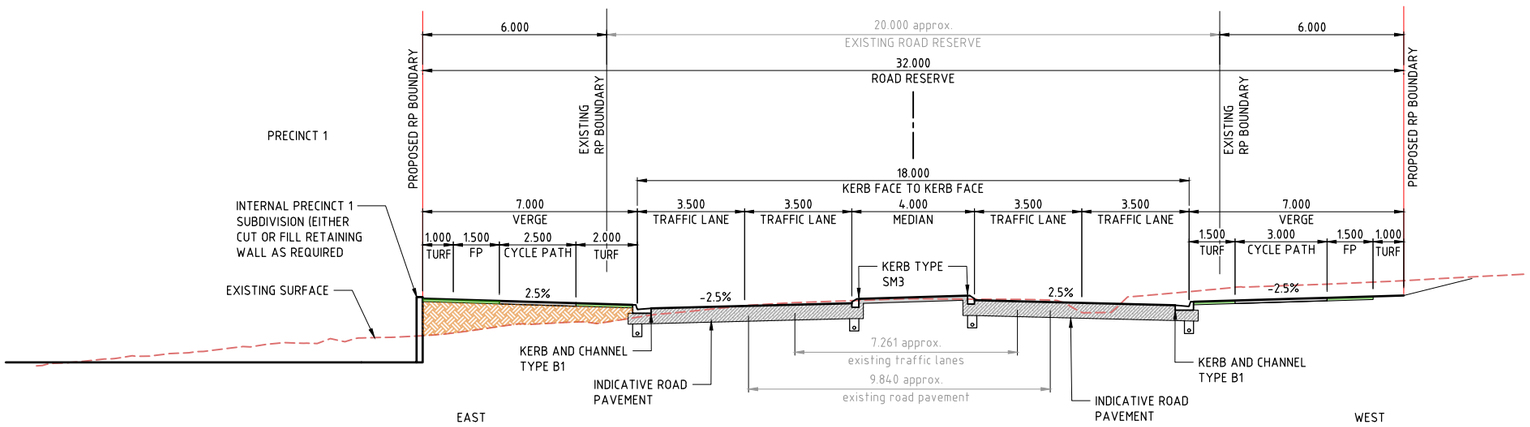
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TYPICAL SECTION - ROAD 02 (CH 30.0)
CH 20.0 TO END
SCALE 1:100



TYPICAL SECTION - SPRINGACRE ROAD (CH 400.0)
PEDESTRIAN CROSSING
SCALE 1:100



TYPICAL SECTION - MID BLOCK
SPRINGACRE ROAD ULTIMATE
(EDQ NOMINATED CROSS SECTION AS OF 20/08/25)
SCALE 1:100

NOTES
1. FOR DRAINAGE INFORMATION REFER DRGS B00703-DD-SW01 TO B00703-DD-SW06.
2. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11.
3. FOR PAVEMENT INFORMATION REFER TO DRG B00703-DD-PA01.
4. FILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS.

0 2 4 6 8 10m
2.0 1.5 1.0 0.5
SCALE 1:100 (A1) 1:200 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX | EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: TYPICAL SECTIONS & DETAILS SHEET 3 OF 3

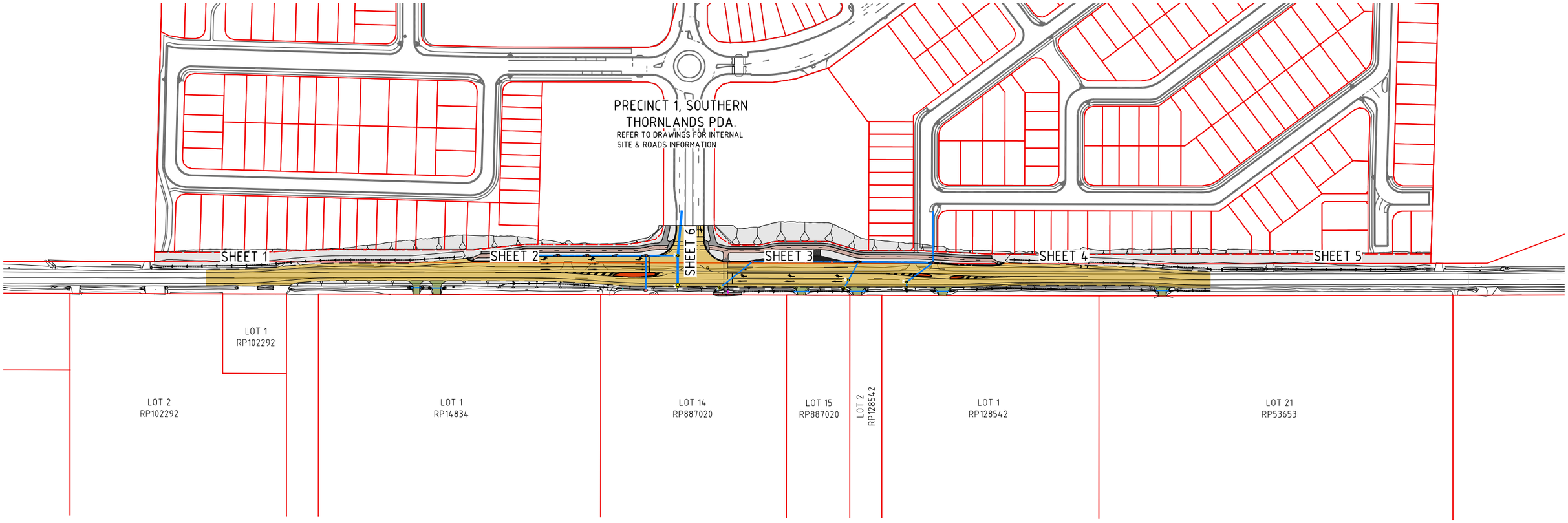
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ISSUE FOR REVIEW

Project No.	Drawing No.	Rev
B00703	DD-TC03	A

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DRAWING KEY PLAN
SCALE 1 : 1250

EXISTING FEATURES LEGEND

- OHP — EXISTING OVERHEAD ELECTRICITY
- E — EXISTING UNDERGROUND ELECTRICITY
- T — EXISTING UNDERGROUND TELECOMMUNICATIONS
- W — EXISTING UNDERGROUND WATER MAIN
- SWD — EXISTING STORMWATER CULVERT
- G — EXISTING UNDERGROUND GAS
- S — EXISTING SEWER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING CONTOURS (200mm INC)

PROPOSED FEATURES LEGEND

- PROPERTY BOUNDARY
- RESUMPTION BOUNDARY
- DRAINAGE INVERT
- CONTROL LINE
- EDGE OF PAVEMENT
- SURFACE CONTOURS (200mm INC.)
- TRAFFIC ISLAND
- PAVEMENT TYPE A
- CONCRETE BUS BAY
- PEDESTRIAN PATHWAY
- CYCLE PATHWAY
- BUS SHELTER SLAB
- CULVERT/CROSSING

NOTES

1. FOR DRAINAGE INFORMATION REFER DRGS B00703-DD-SW01 TO B00703-DD-SW06.
2. FOR PAVEMENT INFORMATION REFER TO DRG B00703-DD-PA01.
3. FILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: GENERAL ARRANGEMENT & KEY PLAN

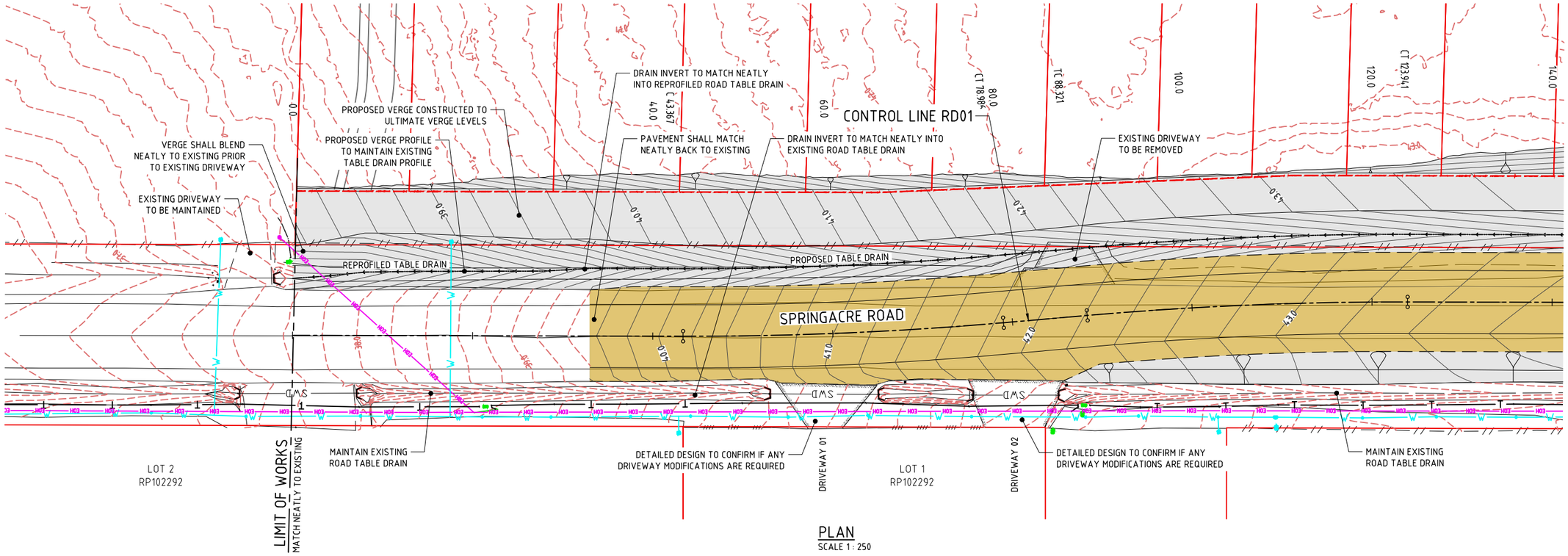
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ISSUE FOR REVIEW

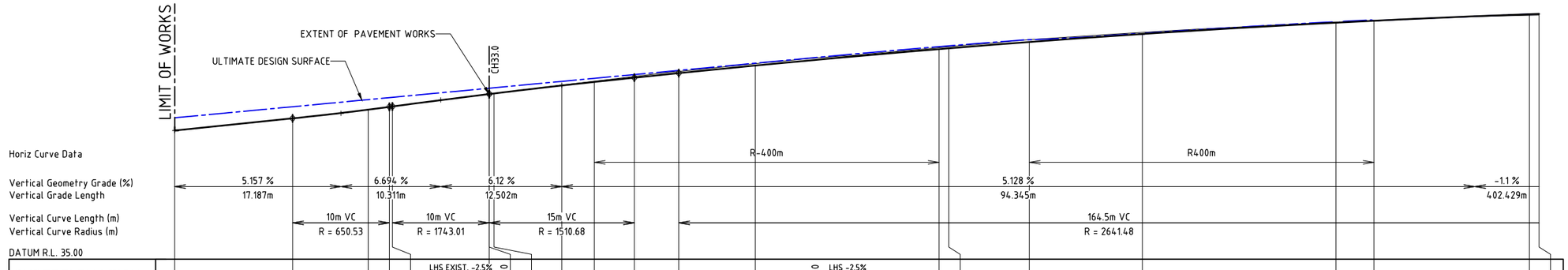
Project No.	Drawing No.	Rev
B00703	DD-GA01	A

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REFER TO DWG No. B00703-DD-GA01
FOR LEGEND AND NOTES

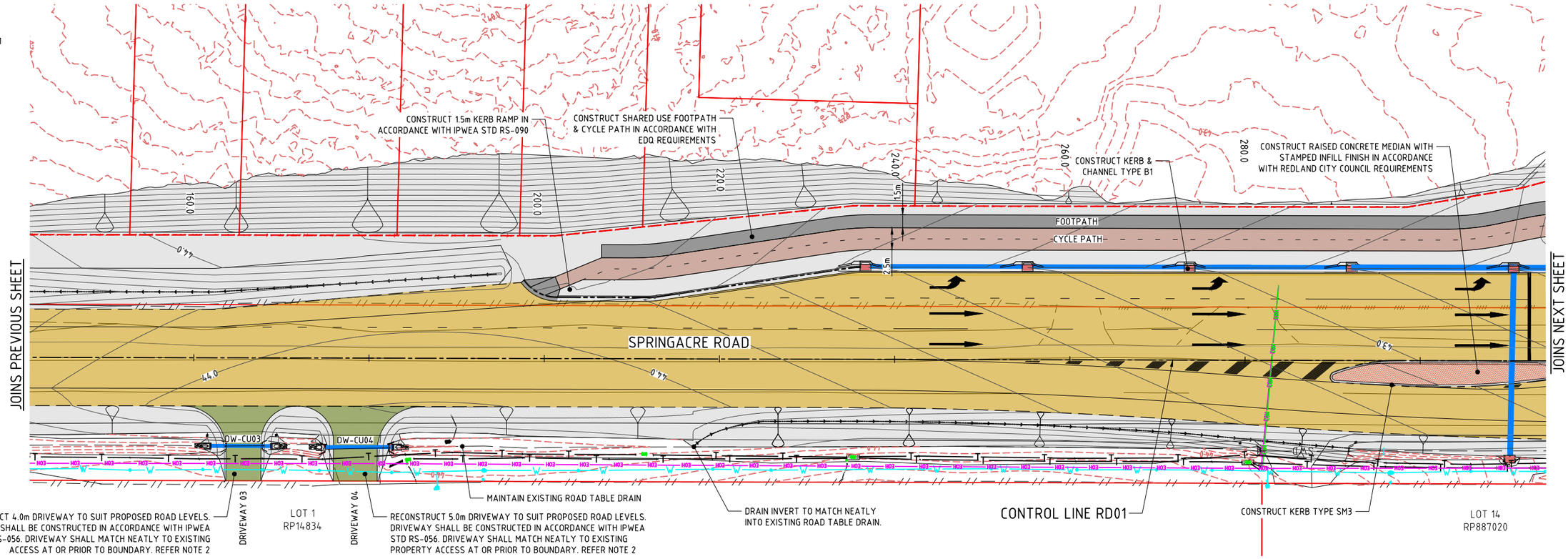


PLAN
SCALE 1 : 250



| | | |

REFER TO DWG No. B00703-DD-GA01
FOR LEGEND AND NOTES



PLAN
SCALE 1 : 250

NOTES

1. REFER TO GENERAL ARRANGEMENT KEY PLAN FOR ROADWORKS NOTES.
2. FOR ROAD 2 CONTINUATION REFER TO 'PRECINCT 1' INTERNAL SITE DRAWINGS.



| | | |

REFER TO DWG No. B00703-DD-DA01
FOR LEGEND AND NOTES

FOR CONTINUATION OF STORMWATER NETWORK REFER TO PROJECT 'PRECINCT 1 - B00702 INTERNAL WORKS' FOR INFORMATION

CONSTRUCT KERB TYPE SM3

CONSTRUCT RAISED CONCRETE MEDIAN WITH STAMPED INFILL FINISH IN ACCORDANCE WITH REDLAND CITY COUNCIL REQUIREMENTS

CONSTRUCT KERB RAMP IN ACCORDANCE WITH IPWEA STD RS-090

CONSTRUCT KERB & CHANNEL TYPE B1

CONCRETE BUS BAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH IPWEA STD RS-183

FUTURE BUS SHELTER & SLAB

CONSTRUCT KERB TYPE B3

EXISTING STAY POLE TO RE REMOVED & RELOCATED TO SUIT NEW KERB-LINE. POLE TO BE ERECTED IN ACCORDANCE WITH ERGON ENERGY REQUIREMENTS. NO WORKS SHALL BE UNDERTAKEN WITHOUT PRIOR CONSENT BY ERGON ENERGY

CONSTRUCT RAISED CONCRETE MEDIAN WITH STAMPED INFILL FINISH IN ACCORDANCE WITH REDLAND CITY COUNCIL REQUIREMENTS

CONSTRUCT KERB TYPE SM3

LIMIT OF WORKS
MATCH NEATLY TO EXISTING

CONSTRUCT KERB & CHANNEL TYPE B1

TGSI's TO BE INSTALLED IN ACCORDANCE WITH THE AUSTRALIAN STANDARDS

CONSTRUCT KERB RAMP IN ACCORDANCE WITH IPWEA STD RS-090

CONSTRUCT SHARED USE FOOTPATH & CYCLE PATH IN ACCORDANCE WITH REDLAND CITY COUNCIL STD R-RCC-4

CONTROL LINE RD02

CONTROL LINE RD01

ROAD 01
REFER NOTE 3

FOOTPATH

CYCLE PATH

SPRINGACRE ROAD

JOINS PREVIOUS SHEET

JOINS NEXT SHEET

S.W.D

DW-CU05

DW-CU06

DRIVEWAY 05

DRIVEWAY 06

LOT 2 RP128542

LOCALLY GRADE SURROUNDING EARTHWORKS TOWARDS INLET

EXISTING POWER POLE (ID.10149) TO BE MAINTAINED. BACKFILL, COMPACTION & CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH ENERGEX REQUIREMENTS. NO WORKS SHALL BE UNDERTAKEN WITHOUT PRIOR CONSENT BY ENERGEX.

CONSTRUCT FOOTPATH IN ACCORDANCE WITH REDLAND CITY COUNCIL STD R-RCC-4

RECONSTRUCT 5.0m DRIVEWAY TO SUIT PROPOSED ROAD LEVELS. DRIVEWAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH IPWEA STD RS-056. DRIVEWAY SHALL MATCH NEATLY TO EXISTING PROPERTY ACCESS AT OR PRIOR TO BOUNDARY. REFER NOTE 2

RECONSTRUCT 5.0m DRIVEWAY TO SUIT PROPOSED ROAD LEVELS. DRIVEWAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH IPWEA STD RS-056. DRIVEWAY SHALL MATCH NEATLY TO EXISTING PROPERTY ACCESS AT OR PRIOR TO BOUNDARY. REFER NOTE 2

MAINTAIN EXISTING ROAD TABLE DRAIN

PLAN
SCALE 1 : 250

NOTES
1. REFER TO GENERAL ARRANGEMENT KEY PLAN FOR ROADWORKS NOTES.
2. FOR ROAD 2 CONTINUATION REFER TO 'PRECINCT 1' INTERNAL SITE DRAWINGS.

ULTIMATE DESIGN SURFACE

STORMWATER

STORMWATER

STORMWATER

STORMWATER

R400m

185m VC
R = 2621.67

Horiz Curve Data

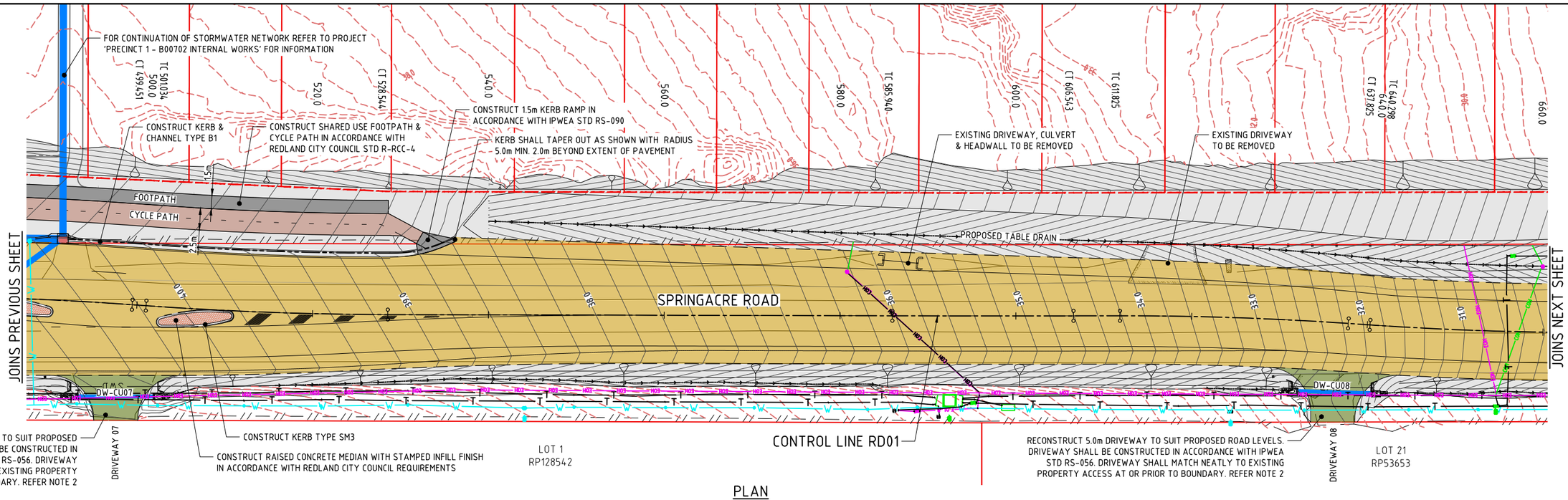
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Vertical Grade Length 402.429m

Vertical Curve Length (m)
Vertical Curve Radius (m)

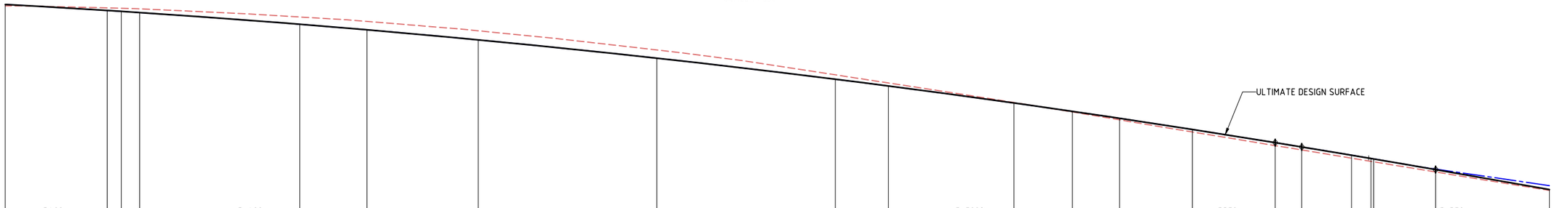
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REFER TO DWG No. B00703-DA-GA01
FOR LEGEND AND NOTES



PLAN
SCALE 1 : 250

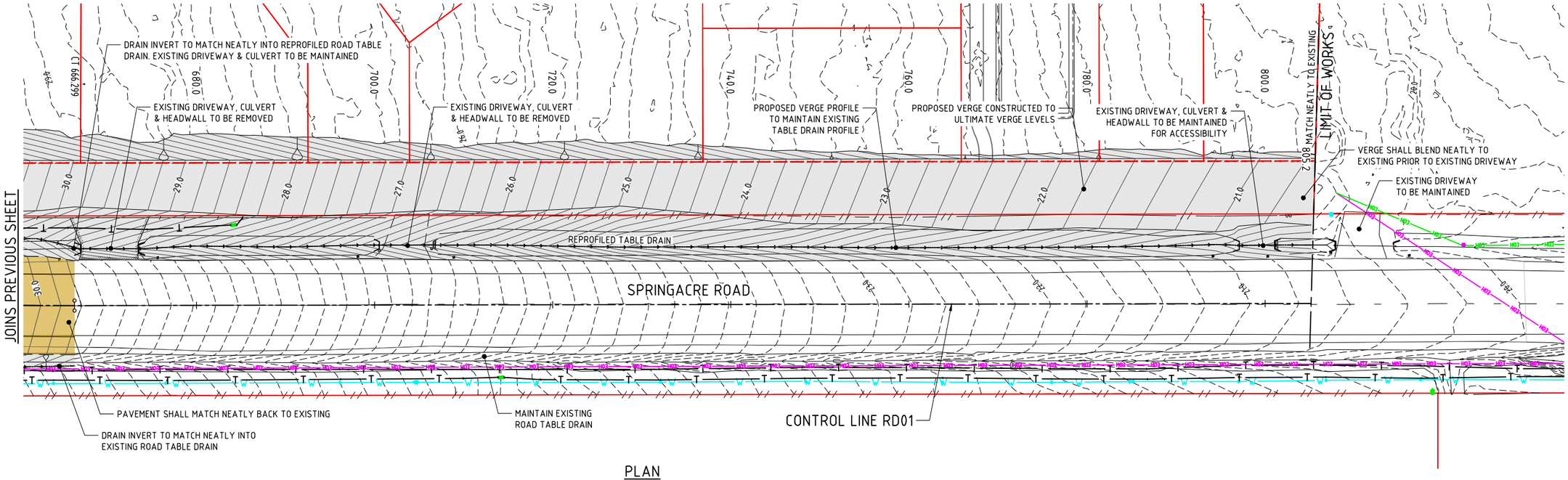


NOTES

1. REFER TO GENERAL ARRANGEMENT KEY PLAN FOR ROADWORKS NOTES.
2. FOR ROAD 2 CONTINUATION REFER TO 'PRECINCT 1' INTERNAL SITE DRAWINGS.

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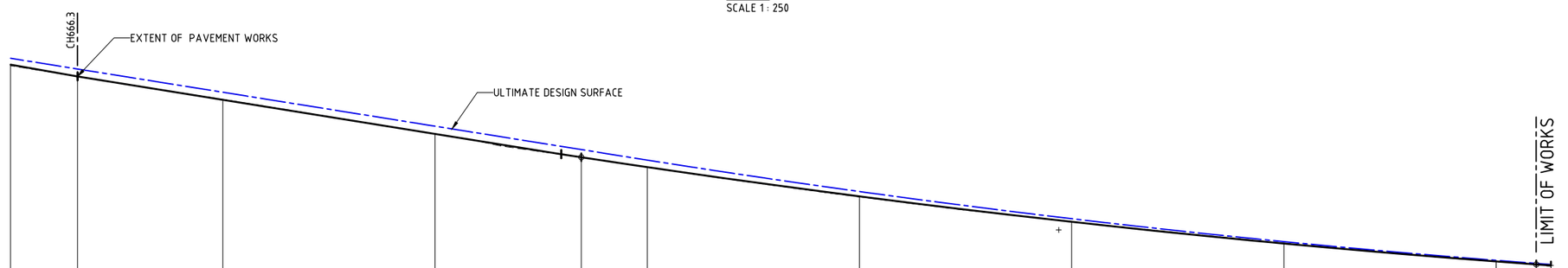
REFER TO DWG No. B00703-DA-GA01
FOR LEGEND AND NOTES



PLAN
SCALE 1 : 250

NOTES

1. REFER TO GENERAL ARRANGEMENT KEY PLAN FOR ROADWORKS NOTES.
2. FOR ROAD 2 CONTINUATION REFER TO 'PRECINCT 1' INTERNAL SITE DRAWINGS.

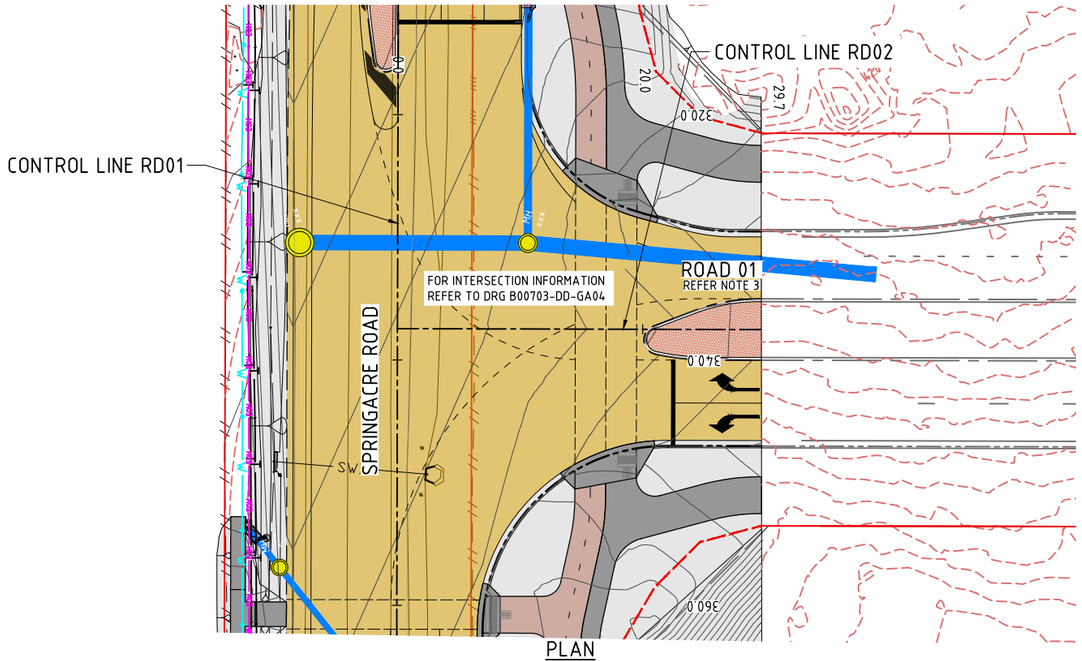


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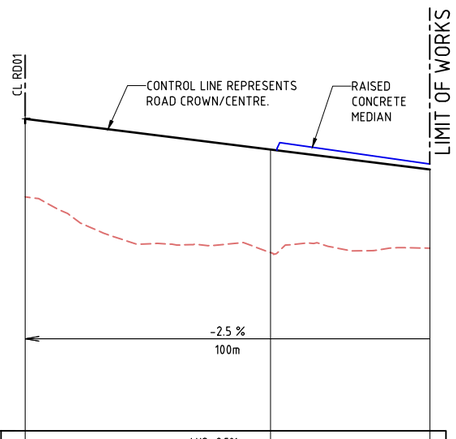
REFER TO DWG No. B00703-DD-GA01
FOR LEGEND AND NOTES

NOTES

1. REFER TO GENERAL ARRANGEMENT KEY PLAN FOR ROADWORKS NOTES.
2. FOR ROAD 2 CONTINUATION REFER TO 'PRECINCT 1' INTERNAL SITE DRAWINGS.



PLAN
SCALE 1 : 250



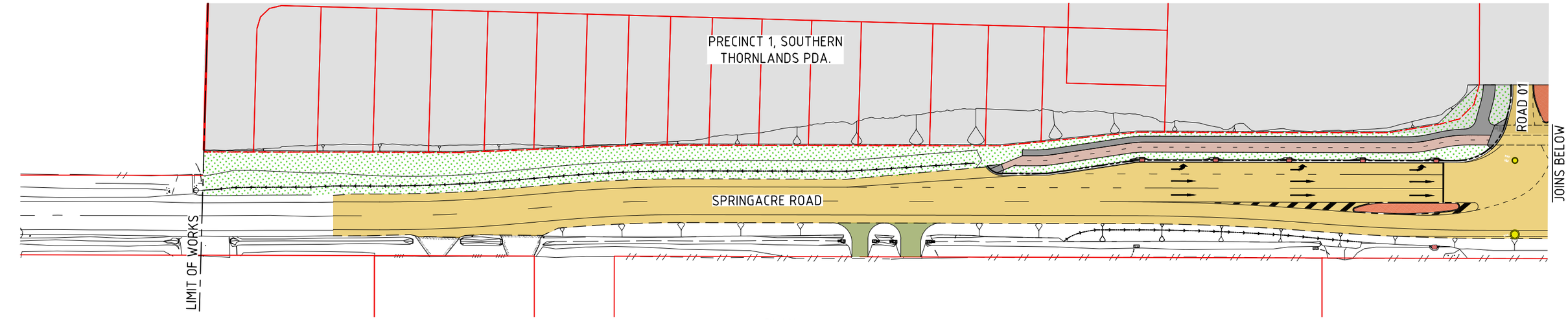
Horiz Curve Data

Vertical Geometry Grade (%) -2.5 %
Vertical Grade Length 100m

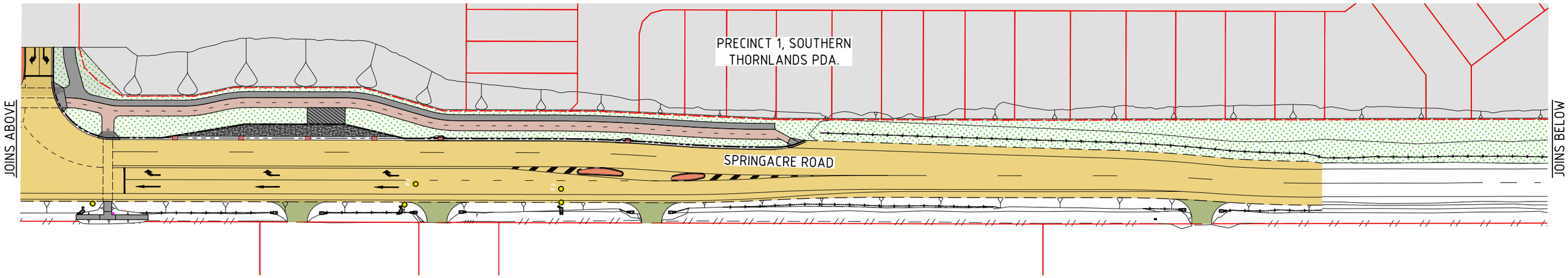
Vertical Curve Length (m)
Vertical Curve Radius (m)

DATUM R.L. 14.50

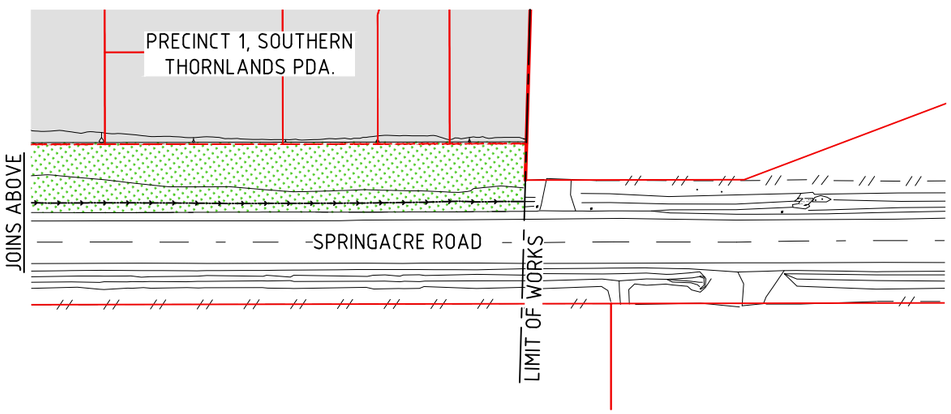
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PLAN
SCALE 1 : 500



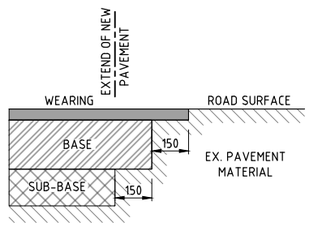
PLAN – CONTINUED
SCALE 1 : 500



PLAN – CONTINUED
SCALE 1 : 500

NOTES

1. FOR DRAINAGE INFORMATION REFER DRGS B00703-DD-SW01 TO B00703-DD-SW06.
2. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11



PAVEMENT TIE-IN DETAIL
NOT TO SCALE

FEATURES LEGEND

- PRECINCT 1 AREA - REFER TO RESPECTIVE PACKAGE
- TURFED AREA
- DRIVEWAY PAVEMENT
- CONCRETE STAMPED TRAFFIC ISLAND
- PAVEMENT TYPE A
- CONCRETE BUS BAY
- PEDESTRIAN PATHWAY
- CYCLE PATHWAY
- BUS SHELTER SLAB

0 10 20 30 40 50m
10 7.5 5 2.5
SCALE 1:500 (A1) 1:1000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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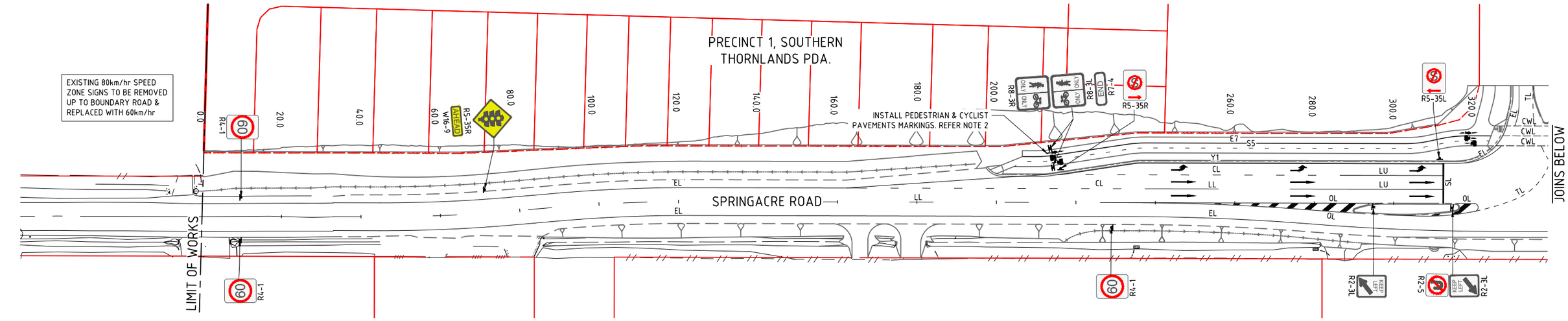
Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: PAVEMENT DETAILS

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

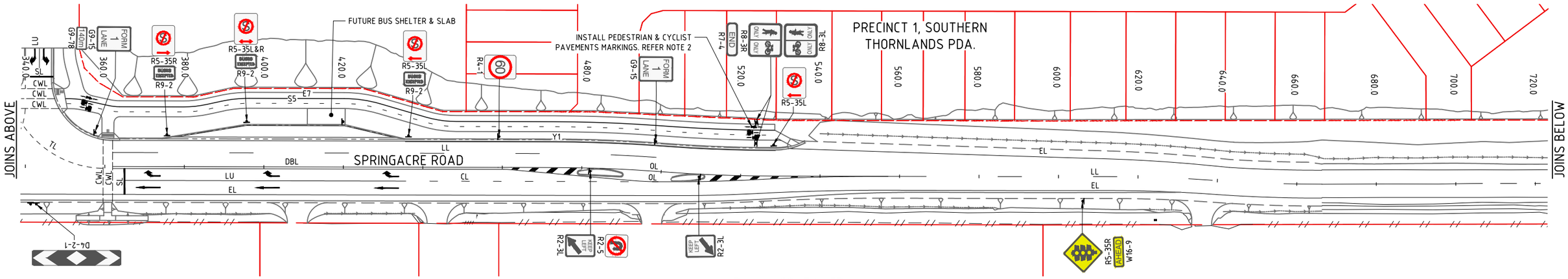
ISSUE FOR REVIEW

Project No.	Drawing No.	Rev
B00703-DD-PA01		A

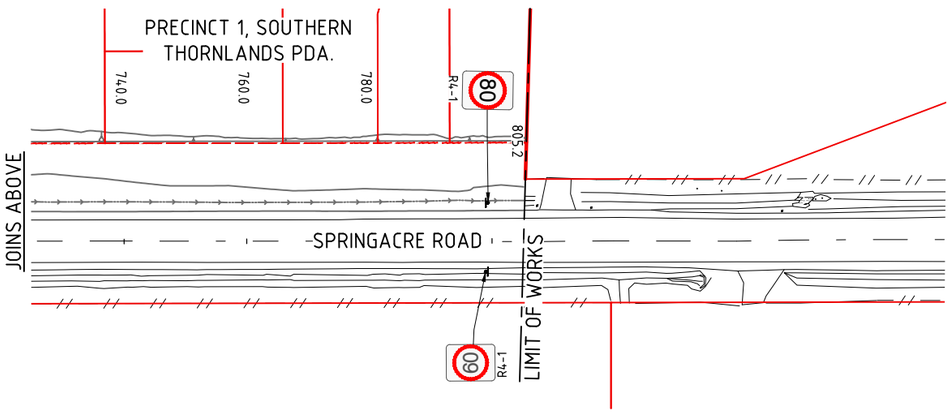
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PLAN
SCALE 1 : 500



PLAN – CONTINUED
SCALE 1 : 500



PLAN – CONTINUED
SCALE 1 : 500

NOTES

1. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11.
2. ALL SIGNAGE & LINEMARKING SHALL BE INSTALLED OR ERECTED IN ACCORDANCE WITH THE CURRENT MUTCD.
3. BUS SHELTER SIGNAGE SHALL BE IN ACCORDANCE WITH TRANSLINK REQUIREMENTS.

LINEMARKING LEGEND

CL	CONTINUITY LINE	TL	TURN LINE
LU	LANE LINE (UNBROKEN)	SL	STOP LINE
LL	LANE LANE (BROKEN)	E7	EDGE LINE FOR OFF-ROAD CYCLE-PATH
EL	EDGE LINE	S5	OFF-ROAD CYCLE-PATH BROKEN SEPARATION LINE
OL	OUTLINE MARKING	CWL	PEDESTRAIAN CROSSWALK LINE
Y1	YELLOW 'NO STOPPING' LINE	DBL	DOUBLE BARRIER LINE

0 10 20 30 40 50m
10 7.5 5 2.5
SCALE 1:500 (A1) 1:1000 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: SIGNAGE & LINEMARKING PLAN

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

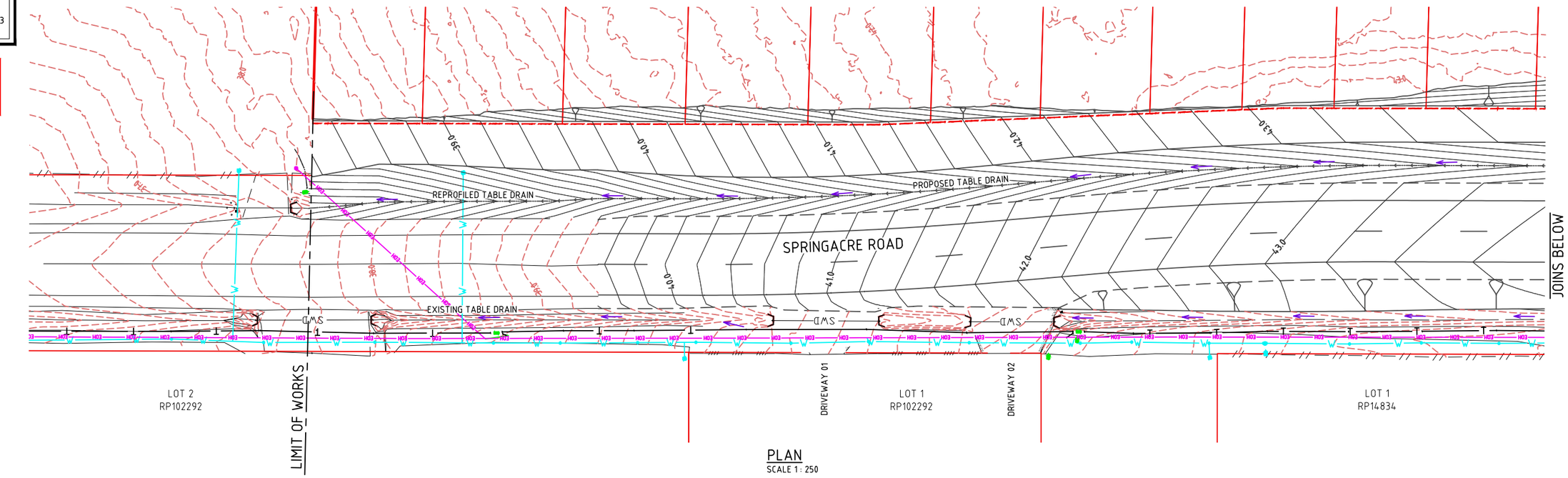
ISSUE FOR REVIEW

Project No. B00703-DD-SL01
Drawing No.
Rev A

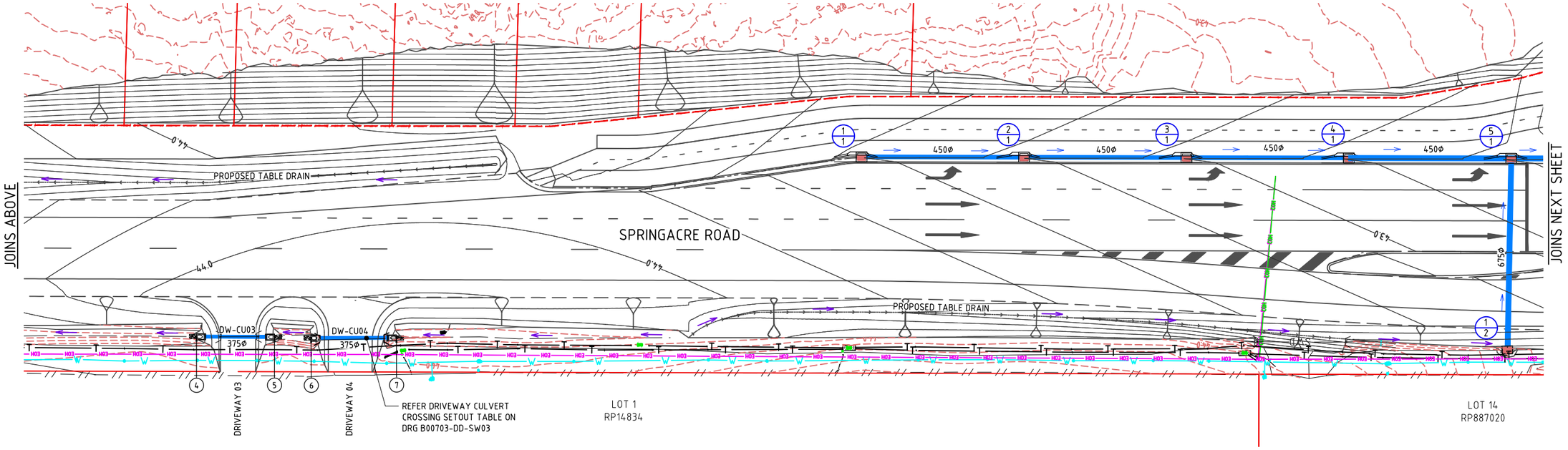
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NOTE:
REFER TO DWG No. B00703-DD-SW03
FOR LEGEND AND NOTES

FURTHER REFINEMENT OF STORMWATER NETWORK TO BE FINALISED IN THE DETAIL DESIGN



PLAN
SCALE 1 : 250



PLAN
SCALE 1 : 250

0 5 10 15 20 25m
5 3.75 2.5 1.25
SCALE 1:250 (A1) 1:500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
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Registered Engineer
Date " "
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EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: DRAINAGE PLAN
SHEET 1 OF 3

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

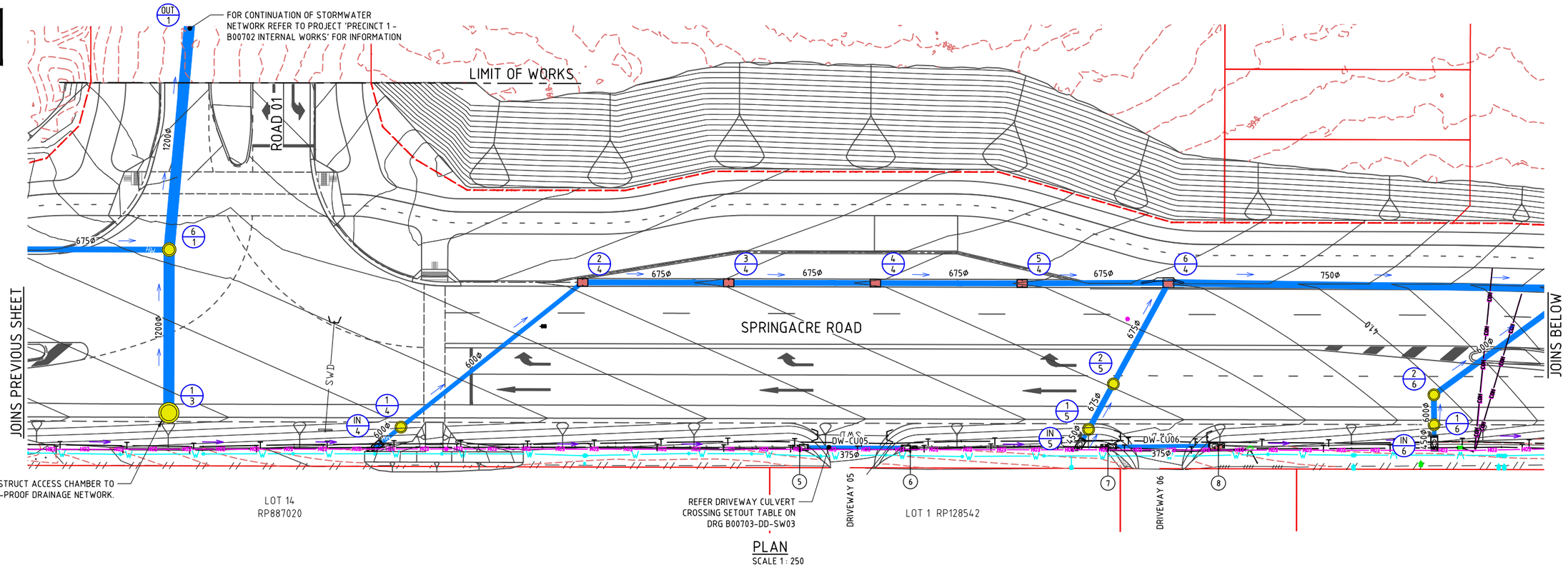
ISSUE FOR REVIEW

Project No. B00703 | Drawing No. DD-SW01 | Rev A

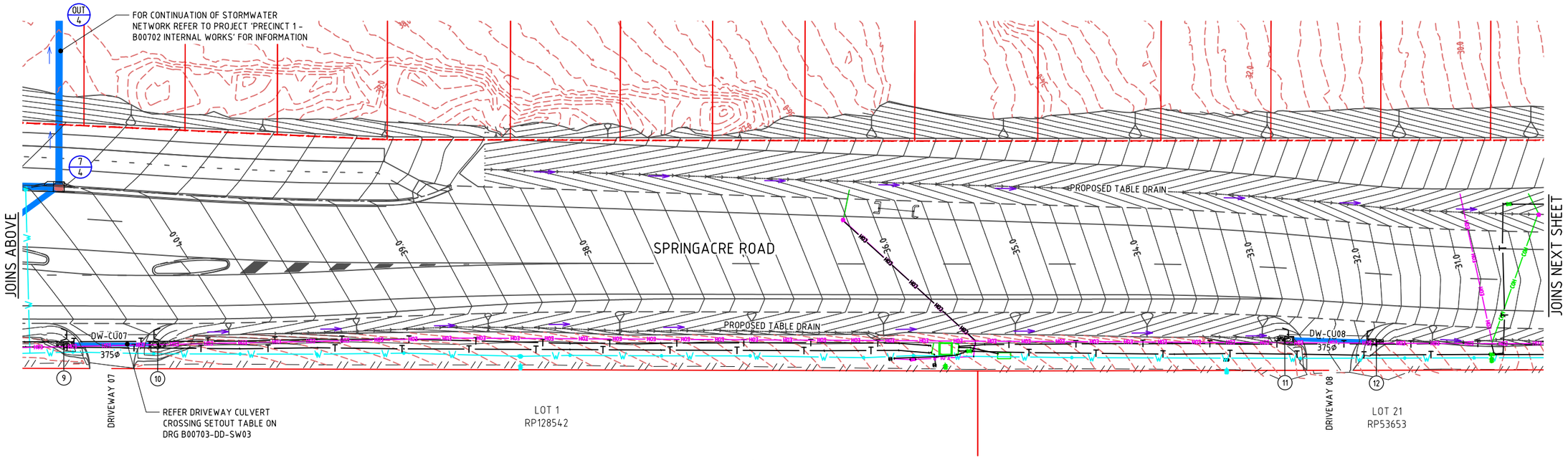
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NOTE:
REFER TO DWG No. B00703-DD-SW03 FOR LEGEND AND NOTES

FURTHER REFINEMENT OF STORMWATER NETWORK TO BE FINALISED IN THE DETAIL DESIGN



PLAN
SCALE 1 : 250



PLAN
SCALE 1 : 250

0 5 10 15 20 25m
5 3.75 2.5 1.25
SCALE 1:250 (A1) 1:500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

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Registered Engineer
Date " "
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URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: DRAINAGE PLAN SHEET 2 OF 3

Datum: AHD PSM 79006 RL 67.474 (MGA) COORD

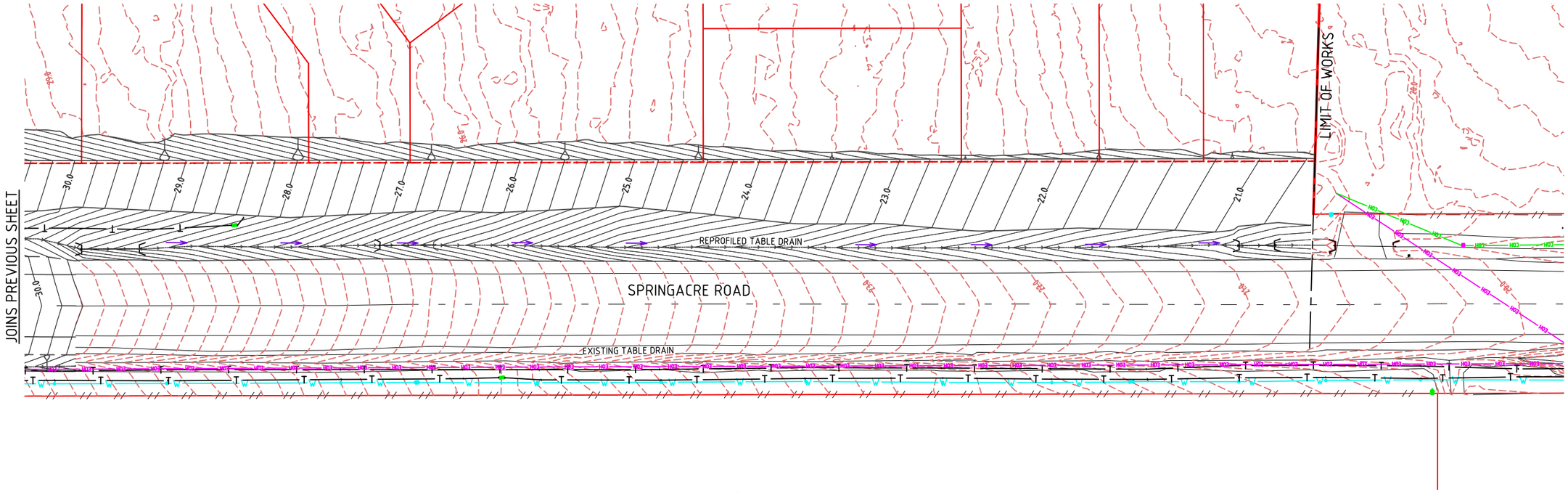
ISSUE FOR REVIEW

Project No. B00703 | Drawing No. DD-SW02 | Rev A

"

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FURTHER REFINEMENT OF STORMWATER NETWORK TO BE FINALISED IN THE DETAIL DESIGN



PLAN
SCALE 1 : 250

EXISTING FEATURES LEGEND

OHP	EXISTING OVERHEAD ELECTRICITY
E	EXISTING UNDERGROUND ELECTRICITY
T	EXISTING UNDERGROUND TELECOMMUNICATIONS
W	EXISTING UNDERGROUND WATER MAIN
SWD	EXISTING STORMWATER CULVERT
G	EXISTING UNDERGROUND GAS
S	EXISTING SEWER MAIN

LEGEND

	ROAD RESERVE BOUNDARY
	RESUMPTION BOUNDARY
	PROPOSED SURFACE CONTOURS (200mm INC.)
	EX. SURFACE CONTOURS (200mm INC.)
	CULVERT/CROSSING
	KERB INLET GULLY. REFER NOTE 1
	TYPE 2 FIELD INLET. REFER NOTE 1
	MANHOLE. REFER NOTE 1
	HEADWALL. REFER NOTE 2
	SLOPED ENDWALL. REFER NOTE 2
	DUMP ROCK (D_{50}=200mm) 0.8m LONG x 0.5m WIDE @ 400mm THICK
2/1	PIT/STRUCTURE I.D
	PIPE FLOW DIRECTION
	DRAIN FLOW DIRECTION

NOTES

1. FOR ROADWORKS INFORMATION REFER DRGS B00703-DD-GA01 TO B00703-DD-GA11.

DRIVEWAY CULVERT CROSSING SETOUT TABLE

POINT	EASTING	NORTHING	LEVEL (m)	COMMENT	CROSSING	TYPE	SIZE
1	25361.165	148340.029	43.244	DS INVERT	DW-CU03	RCP, CL3	375ø
2	25359.885	148331.232	43.337	US INVERT			
3	25359.189	148327.128	43.315	DS INVERT	DW-CU04	RCP, CL3	375ø
4	25357.824	148317.496	43.390	US INVERT			
5	25324.894	148101.252	41.382	US INVERT	DW-CU05	RCP, CL3	375ø
6	25323.029	148088.775	41.231	DS INVERT			
7	25320.009	148066.418	41.034	US INVERT	DW-CU06	RCP, CL3	375ø
8	25318.340	148053.936	40.921	DS INVERT			
9	25312.369	148012.459	40.171	US INVERT	DW-CU07	RCP, CL3	375ø
10	25310.894	148001.853	39.988	DS INVERT			
11	25293.461	147874.870	31.502	US INVERT	DW-CU08	RCP, CL3	375ø
12	25291.708	147864.593	31.096	DS INVERT			

(TO BE CONFIRMED IN DETAIL DESIGN)

0 5 10 15 20 25m
5 3.75 2.5 1.25
SCALE 1:250 (A1) 1:500 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

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Registered Engineer
Date " "
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URBEX
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Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: DRAINAGE PLAN
SHEET 3 OF 3

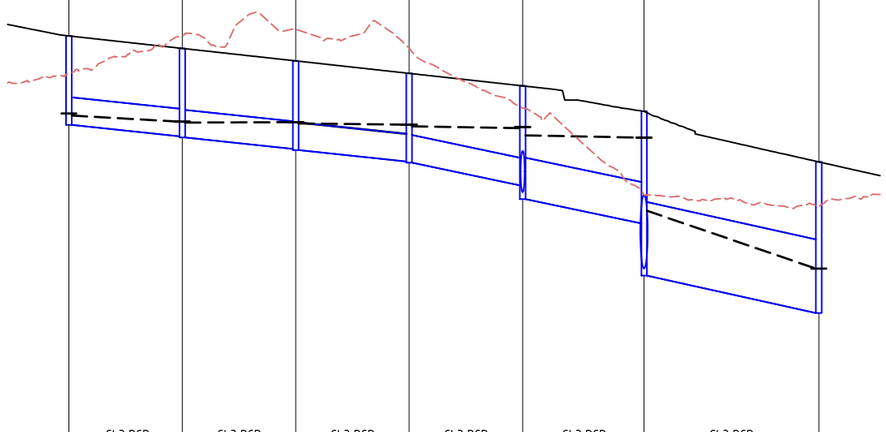
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PSM 79006
RL 67.474
(MGA) COORD

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Project No. B00703-DD-SW03
Drawing No.
Rev A

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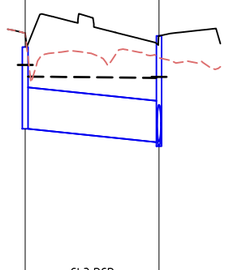
STRUCTURE NAME & SETOUT COORDINATES	1/1 KERB INLET 25368.780 E 14824.8.290 N	2/1 KERB INLET	3/1 KERB INLET	4/1 KERB INLET 25364.483 E 14821.8.599 N	5/1 KERB INLET 25360.185 E 14818.908 N	6/1 ACCESS CHAMBER 25357.350 E 14.8169.318 N	OUT/1 ACCESS CHAMBER
STRUCTURE DESCRIPTION	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061	1500mm DIA ACCESS CHAMBER IN ACCORDANCE WITH IPWEA STD DS-015	1500mm DIA ACCESS CHAMBER IN ACCORDANCE WITH IPWEA STD DS-015
PIPE CLASS & TYPE	CL3 RCP	CL3 RCP	CL3 RCP	CL3 RCP	CL3 RCP	CL3 RCP	
FLOW (CUMECS)	0.0 m3/s	0.1 m3/s	0.1 m3/s	0.1 m3/s	0.4 m3/s	3.9 m3/s	
PIPE GRADE	1.00%	1.00%	1.00%	2.00%	2.00%	2.14%	
PIPE DIAMETER	450 DIA.	450 DIA.	450 DIA.	450 DIA.	675 DIA.	1200 DIA.	
FULL PIPE VELOCITY	0.3 m/s	0.4 m/s	0.6 m/s	0.7 m/s	1.0 m/s	3.4 m/s	
DATUM RL	33.000						
HGL IN PIPE	42.289 / 42.254	42.156 / 42.141	42.148 / 42.126	42.108 / 42.080	42.050 / 42.069 / 41.933	41.895 / 40.704	39.761
FINISHED SURFACE LEVEL	43.554 (42.939)	43.350 (43.559)	43.147 (43.661)	42.943 (43.352)	42.740 (42.379)	42.324 (40.963)	41.500 (40.774)
DEPTH OF INVERT BELOW FSL	1.451	1.433	1.453 / 1.434	1.454 / 1.436	1.456 / 1.622	1.847 / 1.828	2.679 / 2.464 / 2.464
INVERT LEVEL	42.102	41.917	41.897 / 41.712	41.692 / 41.507	41.487 / 41.117	40.892 / 40.496	39.645 / 39.036 / 39.036
CHAINAGE	0.000	18.500	37.000	55.500	74.000	93.795	122.299



DRAINAGE LONGITUDINAL SECTION - LINE 1

SCALE 1 : 500 (HORIZ.), 2:1 (VERT. EXAGGERATION)

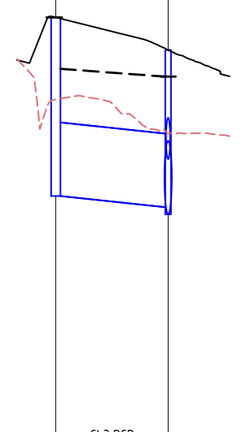
STRUCTURE NAME & SETOUT COORDINATES	1/2 FIELD INLET 25341.921 E 14.8191.864 N	5/1 KERB INLET 25360.185 E 14.8188.908 N
STRUCTURE DESCRIPTION	TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050. DOME TOP COVER SHALL BE INSTALLED IN ACCORDANCE WITH IPWEA STD DS-069	AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061
PIPE CLASS & TYPE	CL3 RCP	
FLOW (CUMECS)	0.3 m3/s	
PIPE GRADE	1.00%	
PIPE DIAMETER	675 DIA.	
FULL PIPE VELOCITY	0.7 m/s	
DATUM RL	33.000	
HGL IN PIPE	42.265 / 42.075	42.054 / 42.071 / 41.933
FINISHED SURFACE LEVEL	42.771	42.740 (42.379)
DEPTH OF INVERT BELOW FSL	1.548	1.734 / 1.799
INVERT LEVEL	41.224	41.006 / 40.940
CHAINAGE	0.000	21.821



DRAINAGE LONGITUDINAL SECTION - LINE 2

SCALE 1 : 500 (HORIZ.), 2:1 (VERT. EXAGGERATION)

	1/3 MANHOLE 25339.214 E 14.8171.943 N	6/1 ACCESS CHAMBER 25357.350 E 14.8169.318 N
	HEADWALL	
	1500mm DIA ACCESS CHAMBER IN ACCORDANCE WITH IPWEA STD DS-015	1500mm DIA ACCESS CHAMBER IN ACCORDANCE WITH IPWEA STD DS-015
PIPE CLASS & TYPE	CL3 RCP	
FLOW (CUMECS)	3.5 m3/s	
PIPE GRADE	1.00%	
PIPE DIAMETER	1200 DIA.	
FULL PIPE VELOCITY	3.1 m/s	
DATUM RL	32.000	
HGL IN PIPE	42.856 / 42.017	41.890 / 40.703
FINISHED SURFACE LEVEL	42.856 (41520)	42.324 (40.963)
DEPTH OF INVERT BELOW FSL	2.911	2.563 / 2.679
INVERT LEVEL	39.944	39.761 / 39.645
CHAINAGE	0.000	18.325



DRAINAGE LONGITUDINAL SECTION - LINE 3

SCALE 1 : 500 (HORIZ.), 2:1 (VERT. EXAGGERATION)

0 5 10 15 20 25m

5 3.75 2.5 1.25

SCALE 1:250 (A1) 1:500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION

Peter Ingerman
Registered Engineer
Date " "

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

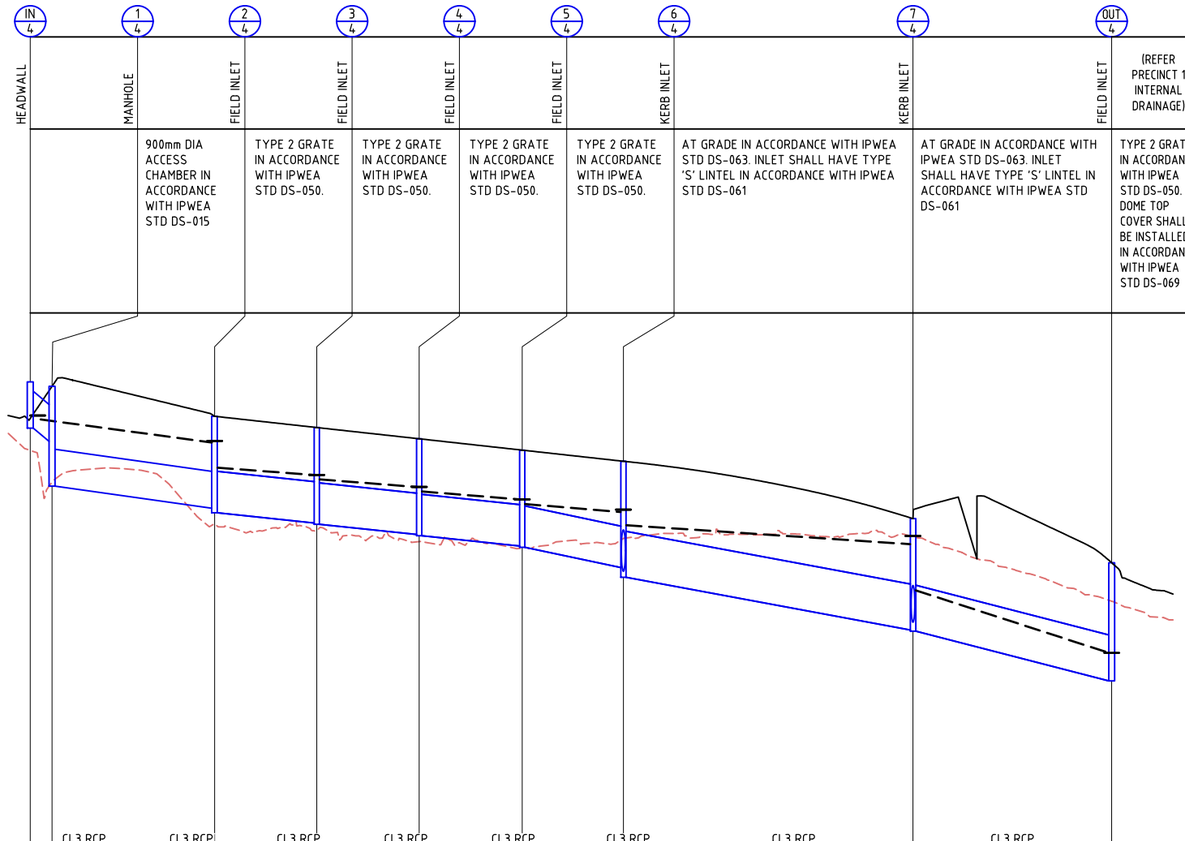
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Datum: AHD PSM 79006 RL 67.474 (MGA) COORD

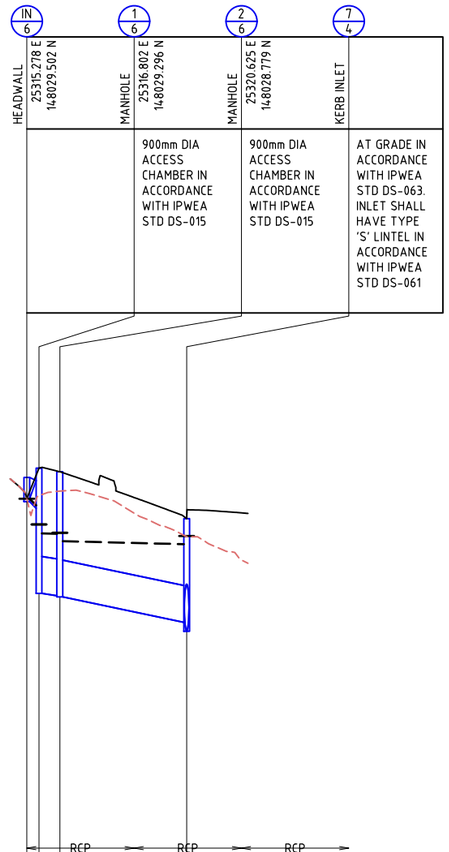
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Project No. B00703 | Drawing No. DD-SW04 | Rev A

Plot Date: 12/12/2025 11:09:39 AM User: DESIGN CIVIL
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IN 4
1 4
2 4
3 4
4 4
5 4
6 4
7 4
OUT 4
HEADWALL
MANHOLE
FIELD INLET
FIELD INLET
FIELD INLET
FIELD INLET
KERB INLET
KERB INLET
FIELD INLET
(REFER PRECINCT 1 INTERNAL DRAINAGE)
900mm DIA ACCESS CHAMBER IN ACCORDANCE WITH IPWEA STD DS-015
TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050.
TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050.
TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050.
TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050.
AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061
AT GRADE IN ACCORDANCE WITH IPWEA STD DS-063. INLET SHALL HAVE TYPE 'S' LINTEL IN ACCORDANCE WITH IPWEA STD DS-061
TYPE 2 GRATE IN ACCORDANCE WITH IPWEA STD DS-050. DOME TOP COVER SHALL BE INSTALLED IN ACCORDANCE WITH IPWEA STD DS-069

| | | |



PIPE CLASS, TYPE		RCP			RCP			RCP				
FLOW (CUMECS)		0.3 m3/s			0.3 m3/s			0.3 m3/s				
PIPE GRADE		5.42%			1.13%			2.00%				
PIPE DIAMETER		450 DIA.			600 DIA.			600 DIA.				
FULL PIPE VELOCITY		33.6 m/s			1.0 m/s			1.1 m/s				
DATUM RL		31.000										
HGL IN PIPE		40.597		40.489 40.176	40.032		40.024 40.041	39.904		38.855 39.988	39.102	
FINISHED SURFACE LEVEL	40.597	(40.595)		41.095	(40.651)		41.037	(40.721)		40.271	(39.982)	
DEPTH OF INVERT BELOW FSL		0.047		0.653	2.041		2.021	2.041		1.689	1.835	
INVERT LEVEL		40.550		40.442	39.054		39.016	38.996		38.582	38.436	
CHAINAGE	0.000			1.991			5.395			26.069		

DRAINAGE LONGITUDINAL SECTION - LINE 6

SCALE 1 : 500 (HORIZ.), 2:1 (VERT. EXAGGERATION)

0 5 10 15 20 25m

5 3.75 2.5 1.25

SCALE 1:250 (A1) 1:500 (A3)

DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION

Peter Ingerman
Registered Engineer
Date " "

Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: DRAINAGE LONGITUDINAL SECTIONS SHEET 3 OF 3

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

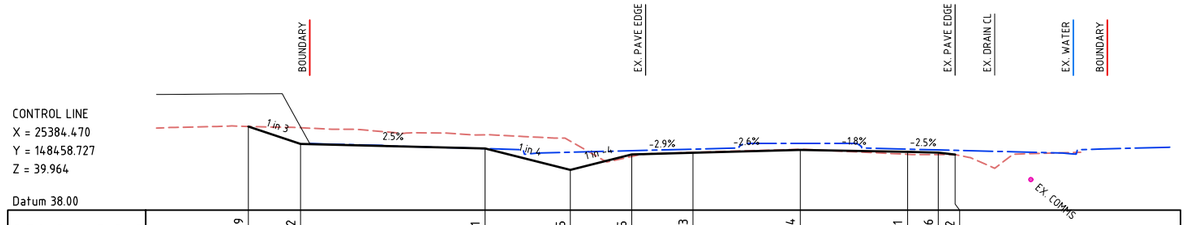
ISSUE FOR REVIEW

Project No. B00703-DD-SW06

Drawing No.

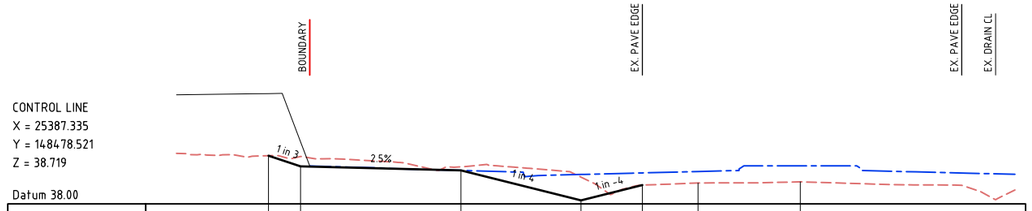
Rev A

Plot Date: 12/12/2025 11:10:45 AM
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\STORMWATER
User: DESIGN CIVIL



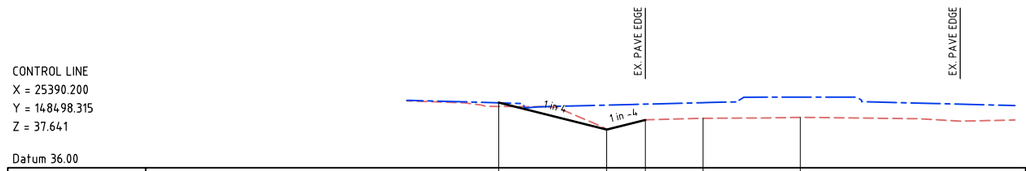
DESIGN HEIGHT	40.729	40.162	40.011	39.315	39.815	39.873	39.964	39.901	39.876	39.812
EX. SURFACE	40.729	40.688	40.458	40.250	39.750	39.886	39.983	39.821	39.813	39.812
OFFSETS	-18.003	-16.301	-10.285	-7.500	-5.500	-3.500	0.000	3.500	4.500	5.052

CH 40.0



DESIGN HEIGHT	39.571	39.222	39.091	38.112	38.612	38.682	38.719
EX. SURFACE	39.571	39.546	39.207	38.872	38.612	38.682	38.718
OFFSETS	-17.348	-16.301	-11.070	-7.154	-5.154	-3.338	0.000

CH 20.0



DESIGN HEIGHT	38.122	37.242	37.557	37.611	37.641	
EX. SURFACE	37.997	37.258	37.557	37.611	37.641	
OFFSETS	-9.837	-6.317	-5.054	-3.176	0.000	

CH 0.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 1 OF 12

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

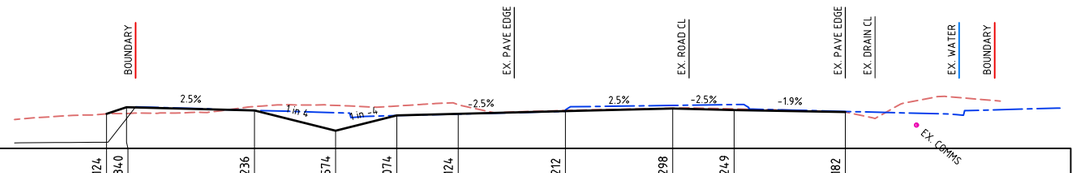
ISSUE FOR REVIEW

Project No. B00703-DD-XS01
Drawing No.
Rev A

Plot Date: 12/12/2025 11:16:39 AM
User: DESIGN CIVIL
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\CROSS_SECTIONS

CONTROL LINE
X = 25376.968
Y = 148379.112
Z = 43.212

Datum 42.00

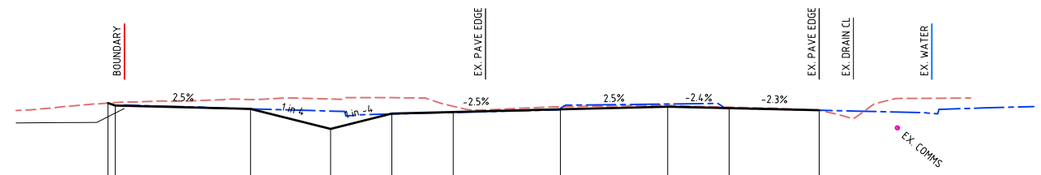


DESIGN HEIGHT	43.124	43.340	43.236	42.574	43.074	43.124	43.212	43.298	43.249	43.182	
EX. SURFACE	43.124	43.133	43.363	43.399	43.381	43.418	43.233	43.307	43.285	43.182	
OFFSETS	-14.971	-14.321	-10.147	-7.500	-5.500	-3.500	0.000	3.500	5.500	9.131	

CH 120.0

CONTROL LINE
X = 25379.142
Y = 148398.991
Z = 42.625

Datum 40.00

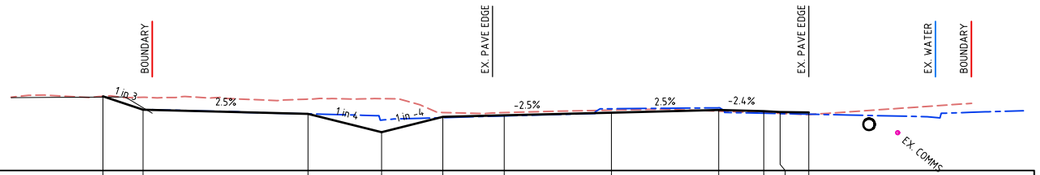


DESIGN HEIGHT	42.830	42.750	42.640	41.987	42.487	42.538	42.625	42.711	42.662	42.595	
EX. SURFACE	42.830	42.846	42.943	42.961	43.005	42.725	42.707	42.753	42.693	42.595	
OFFSETS	-14.761	-14.523	-10.110	-7.500	-5.500	-3.500	0.000	3.500	5.500	8.441	

CH 100.0

CONTROL LINE
X = 25380.405
Y = 148418.951
Z = 41.886

Datum 40.00

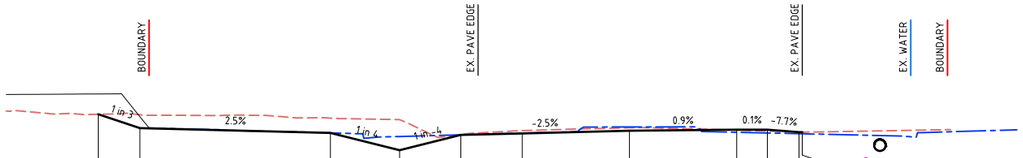


DESIGN HEIGHT	42.419	41.983	41.848	41.249	41.749	41.799	41.886	41.912	41.937	41.907	41.895	
EX. SURFACE	42.419	42.388	42.330	42.343	41.890	41.888	41.968	41.936	41.884	41.863	41.821	
OFFSETS	-16.586	-15.278	-9.899	-7.500	-5.500	-3.500	0.000	3.500	4.967	5.500	6.439	

CH 80.0

CONTROL LINE
X = 25381.948
Y = 148438.889
Z = 40.996

Datum 40.00



DESIGN HEIGHT	41.531	41.078	40.922	40.359	40.859	40.908	40.996	41.027	41.029	40.950	40.950
EX. SURFACE	41.531	41.515	41.404	41.354	40.870	40.998	41.091	41.014	40.985	40.947	40.941
OFFSETS	-17.329	-15.969	-9.755	-7.500	-5.500	-3.500	0.000	3.500	4.500	5.530	5.636

CH 60.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 2 OF 12

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

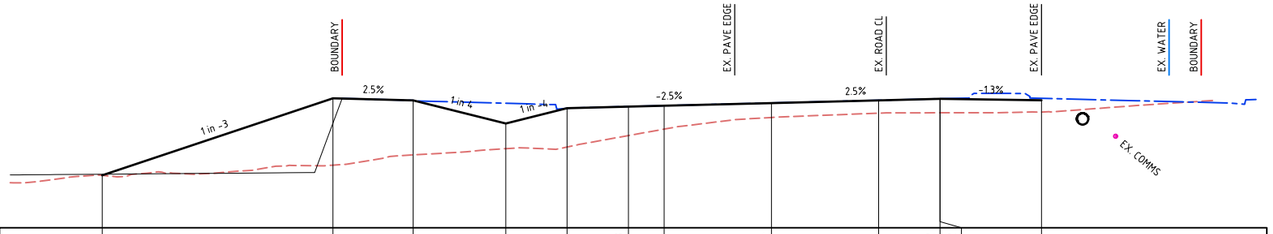
ISSUE FOR REVIEW

Project No. B00703-DD-XS02

Drawing No.

Rev A

Plot Date: 12/12/2025 11:16:39 AM
User: DESIGN CIVIL
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\CROSS_SECTIONS

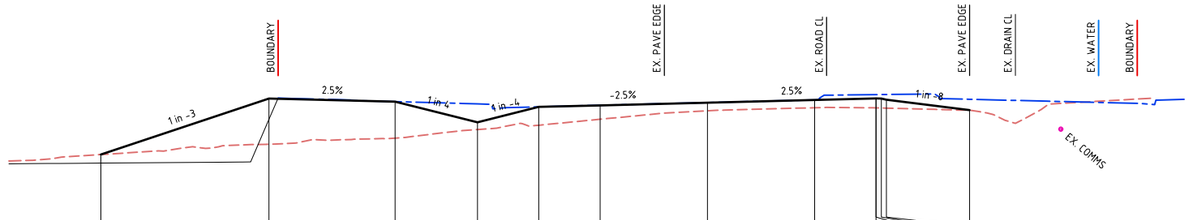


CONTROL LINE
X = 25368.393
Y = 148319.728
Z = 44.064

Datum 40.00

DESIGN HEIGHT	41.709	44.219	44.154	43.398	43.898	43.948	43.977	44.064	44.152	44.202	44.158	
EX. SURFACE	41.709	42.041	42.375	42.579	42.631	43.005	43.215	43.595	43.736	43.749	43.770	
OFFSETS	-21.831	-14.300	-11.688	-8.664	-6.664	-4.664	-3.500	0.000	3.500	5.500	5.500	8.809	

CH 180.0

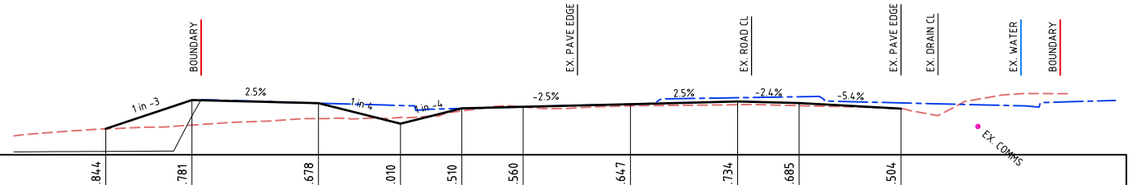


CONTROL LINE
X = 25371.258
Y = 148339.522
Z = 43.932

Datum 40.00

DESIGN HEIGHT	42.241	44.069	43.966	43.294	43.794	43.844	43.932	44.019	44.069	44.069	44.066	44.027	43.689
EX. SURFACE	42.241	42.581	42.776	43.056	43.197	43.392	43.667	43.768	43.763	43.763	43.758	43.754	43.689
OFFSETS	-19.785	-14.300	-10.188	-7.500	-5.500	-3.500	0.000	3.500	5.500	5.500	5.675	5.839	8.552

CH 160.0



CONTROL LINE
X = 25374.123
Y = 148359.316
Z = 43.647

Datum 42.00

DESIGN HEIGHT	42.844	43.781	43.678	43.010	43.510	43.560	43.647	43.734	43.685	43.504	
EX. SURFACE	42.844	42.965	43.175	43.214	43.426	43.555	43.590	43.630	43.599	43.504	
OFFSETS	-17.112	-14.301	-10.173	-7.500	-5.500	-3.500	0.000	3.500	5.500	8.827	

CH 140.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 3 OF 12

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

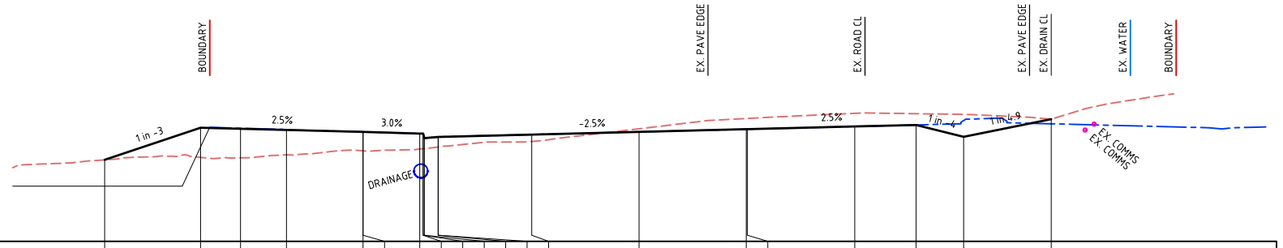
ISSUE FOR REVIEW

Project No. B00703-DD-XS03

Drawing No.

Rev A

Plot Date: 12/12/2025 11:16:39 AM
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\CROSS_SECTIONS
User: DESIGN CIVIL



CONTROL LINE
X = 25359.798
Y = 148260.347
Z = 43.658

Datum 40.00

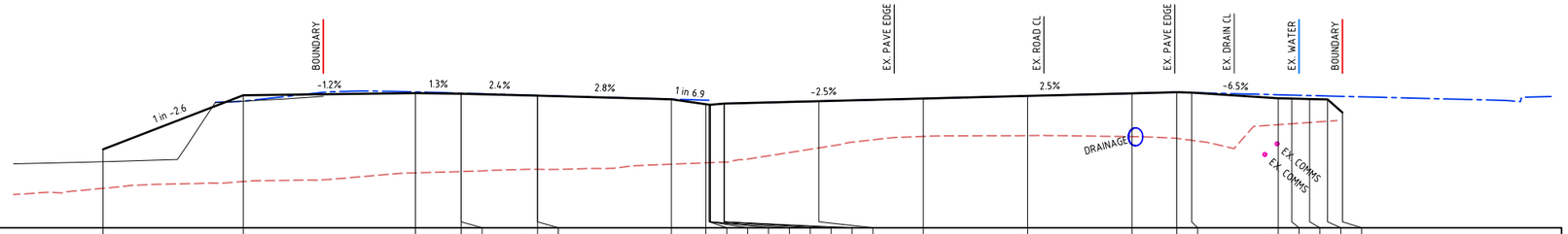
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CONTROL LINE
X = 25351.202
Y = 148200.966
Z = 42.998

Datum 40.00

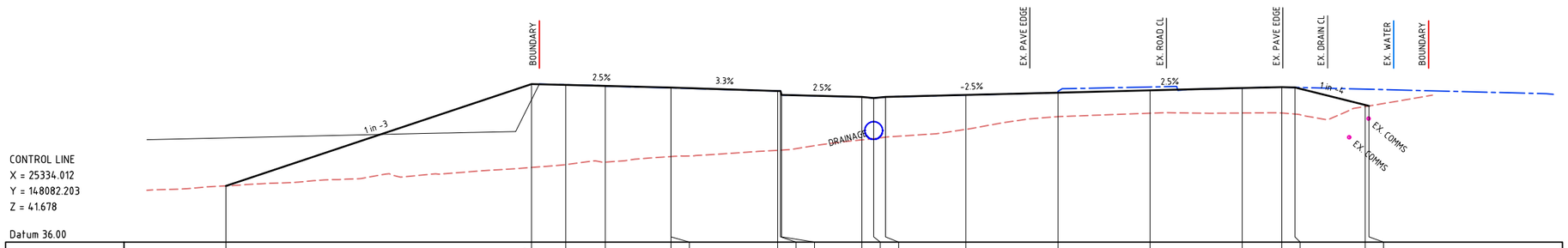
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CONTROL LINE
X = 25342.607
Y = 148141.585
Z = 42.338

Datum 38.00

| | | |



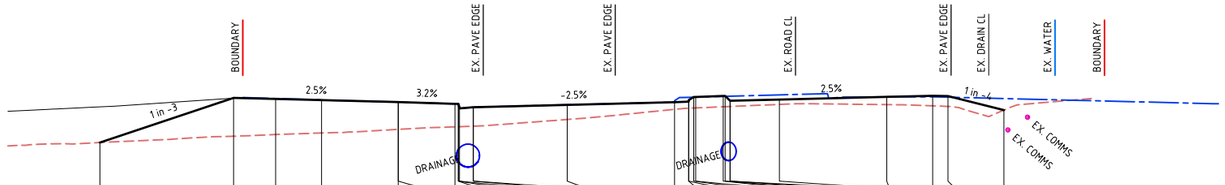
CONTROL LINE
X = 25334.012
Y = 148082.203
Z = 41.678

Datum 36.00

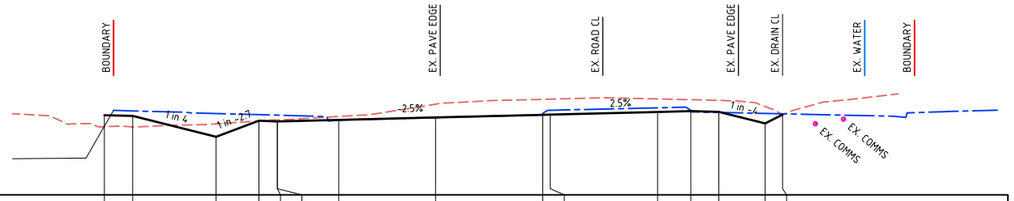
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CONTROL LINE
X = 25325.337
Y = 148022.834
Z = 40.775

Datum 38.00



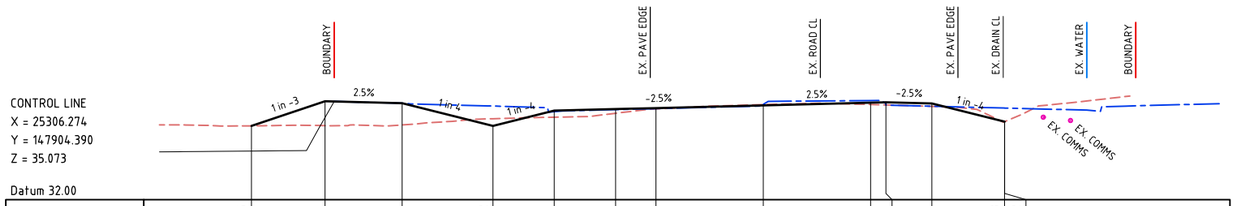
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CONTROL LINE
X = 25314.850
Y = 147963.774
Z = 38.610

Datum 36.00

| | | |

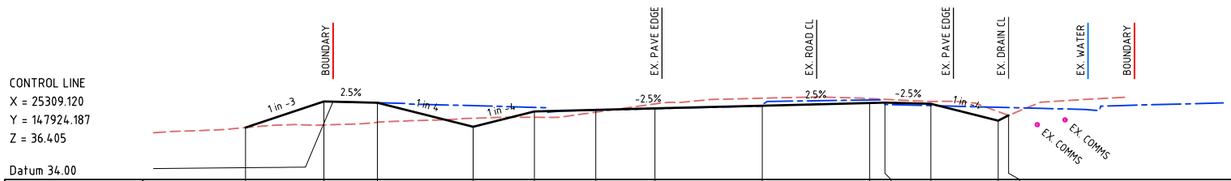


CONTROL LINE
X = 25306.274
Y = 147904.390
Z = 35.073

Datum 32.00

DESIGN HEIGHT	34.405	35.205	35.142	34.402	34.902	34.952	34.985	35.073	35.160	35.173	35.135	34.543	34.542	
EX. SURFACE	34.405	34.411	34.434	34.637	34.687	34.815	34.958	35.097	35.102	35.087	35.039	34.540	34.542	
OFFSETS	-16.697	-14.296	-11.779	-8.819	-6.819	-4.819	-3.500	0.000	3.500	4.000	5.500	7.868	7.872	

CH 600.0

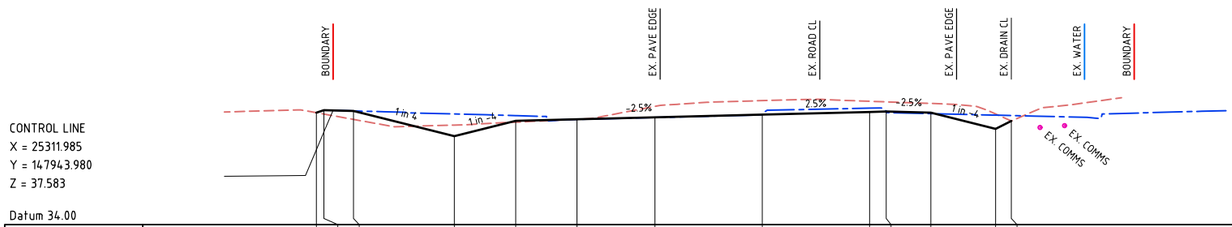


CONTROL LINE
X = 25309.120
Y = 147924.187
Z = 36.405

Datum 34.00

DESIGN HEIGHT	35.691	36.544	36.500	35.719	36.219	36.269	36.317	36.405	36.492	36.505	36.467	35.918	36.088	
EX. SURFACE	35.691	35.776	35.864	35.994	36.025	36.193	36.464	36.648	36.637	36.612	36.541	36.209	36.088	
OFFSETS	-16.858	-14.300	-12.557	-9.432	-7.432	-5.432	-3.500	0.000	3.500	4.000	5.500	7.695	8.035	

CH 580.0



CONTROL LINE
X = 25311.985
Y = 147943.980
Z = 37.583

Datum 34.00

DESIGN HEIGHT	37.647	37.729	37.705	36.883	37.383	37.433	37.496	37.583	37.671	37.685	37.648	37.120	37.377	
EX. SURFACE	37.647	37.602	37.428	37.244	37.338	37.431	37.855	38.041	38.019	38.000	37.950	37.605	37.377	
OFFSETS	-14.546	-14.300	-13.334	-10.045	-8.045	-6.045	-3.500	0.000	3.500	4.044	5.500	7.612	8.125	

CH 560.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

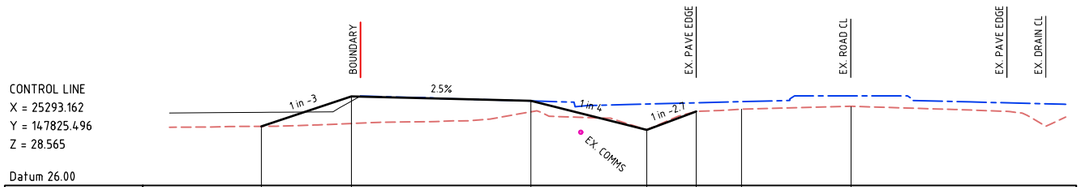
Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 10 OF 12

Datum
AHD
PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

Project No.	Drawing No.	Rev
B00703-DD-XS10		A

Plot Date: 12/12/2025 11:16:44 AM
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\CROSS_SECTIONS
User: DESIGN CIVIL

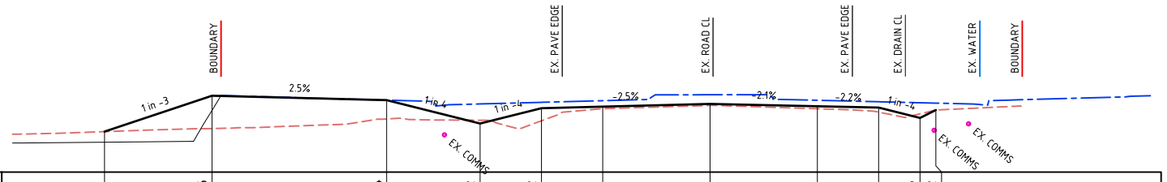


CONTROL LINE
X = 25293.162
Y = 147825.496
Z = 28.565

Datum 26.00

DESIGN HEIGHT	27.926	28.904	28.758	27.812	28.412	28.488	28.565	
EX. SURFACE	27.926	28.019	28.400	27.812	28.412	28.488	28.581	
OFFSETS	-19.235	-16.300	-10.445	-6.662	-5.049	-3.573	0.000	

CH 680.0

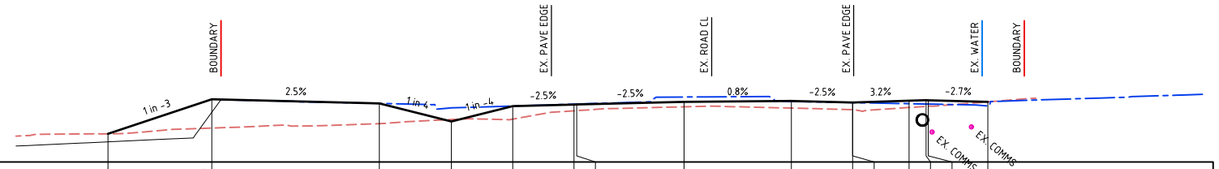


CONTROL LINE
X = 25295.999
Y = 147845.294
Z = 30.219

Datum 28.00

DESIGN HEIGHT	29.318	30.486	30.344	29.582	30.082	30.131	30.219	30.146	30.102	29.765	30.022
EX. SURFACE	29.318	29.419	29.732	29.689	29.670	30.067	30.170	30.065	29.953	29.898	30.022
OFFSETS	-19.754	-16.249	-10.548	-7.500	-5.500	-3.500	0.000	3.500	5.500	6.850	7.364

CH 660.0

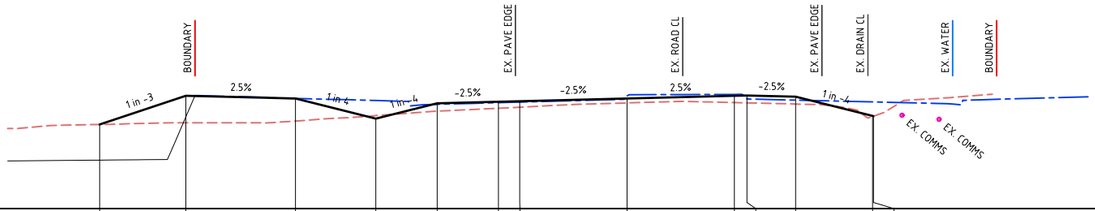


CONTROL LINE
X = 25299.651
Y = 147864.955
Z = 31.961

Datum 30.00

DESIGN HEIGHT	30.916	32.046	31.910	31.322	31.822	31.872	31.873	31.961	31.988	31.939	31.998	32.016	32.011	31.960
EX. SURFACE	30.916	31.105	31.249	31.385	31.395	31.667	31.673	31.798	31.757	31.704	31.776	31.813	31.818	31.960
OFFSETS	-18.792	-15.403	-9.941	-7.589	-5.589	-3.589	-3.500	0.000	3.500	5.500	7.340	7.894	7.966	9.908

CH 640.0



CONTROL LINE
X = 25303.397
Y = 147884.599
Z = 33.588

Datum 30.00

DESIGN HEIGHT	32.741	33.678	33.589	32.934	33.434	33.484	33.501	33.588	33.676	33.686	33.647	33.020	33.012
EX. SURFACE	32.741	32.797	32.853	33.033	33.176	33.271	33.303	33.444	33.455	33.446	33.409	33.002	33.012
OFFSETS	-17.205	-14.394	-10.814	-8.194	-6.194	-4.194	-3.500	0.000	3.500	3.911	5.500	8.008	8.038

CH 620.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

Client: URBEX PTY LTD

Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161

Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 11 OF 12

Datum: AHD
PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

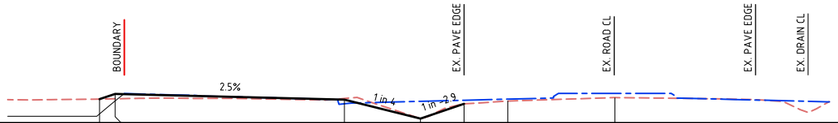
Project No.	Drawing No.	Rev
B00703-DD-XS11		A

"

Plot Date: 12/12/2025 11:16:44 AM User: DESIGN CIVIL
File Name: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\CAD\CROSS_SECTIONS

CONTROL LINE
X = 25282.029
Y = 147746.275
Z = 22.811

Datum 22.00

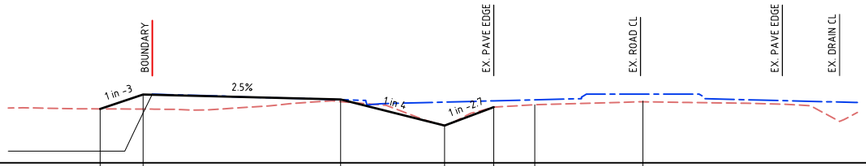


DESIGN HEIGHT	22.774	22.943	22.756	22.135	22.621	22.710	22.811		
EX. SURFACE	22.774	22.783	22.793	22.135	22.621	22.710	22.822		
OFFSETS	-16.808	-16.300	-8.820	-6.339	-4.919	-3.493	0.000		

CH 760.0

CONTROL LINE
X = 25284.812
Y = 147766.080
Z = 24.011

Datum 22.00

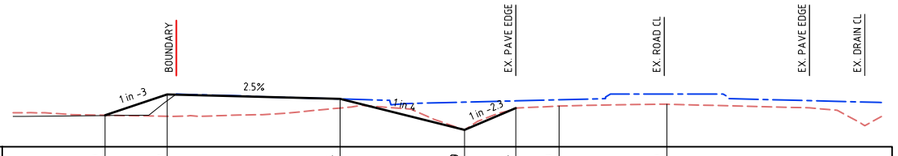


DESIGN HEIGHT	23.757	24.224	24.063	23.215	23.816	23.892	24.011		
EX. SURFACE	23.757	23.751	23.993	23.215	23.816	23.892	23.987		
OFFSETS	-17.701	-16.300	-9.858	-6.466	-4.865	-3.525	0.000		

CH 740.0

CONTROL LINE
X = 25287.595
Y = 147785.885
Z = 25.390

Datum 24.00

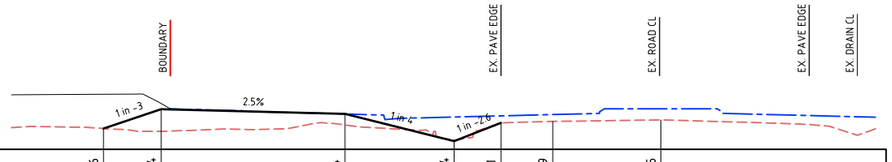


DESIGN HEIGHT	25.030	25.705	25.564	24.549	25.264	25.329	25.390		
EX. SURFACE	25.030	24.995	25.264	24.549	25.264	25.329	25.388		
OFFSETS	-18.327	-16.300	-10.659	-6.600	-4.926	-3.513	0.000		

CH 720.0

CONTROL LINE
X = 25290.379
Y = 147805.691
Z = 26.955

Datum 26.00

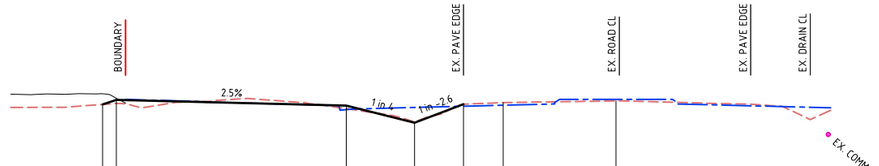


DESIGN HEIGHT	26.676	27.304	27.154	26.264	26.861	26.909	26.955		
EX. SURFACE	26.676	26.582	26.793	26.298	26.861	26.909	26.956		
OFFSETS	-18.183	-16.300	-10.304	-6.743	-5.216	-3.523	0.000		

CH 700.0

CONTROL LINE
X = 25275.744
Y = 147701.558
Z = 20.753

Datum 18.00

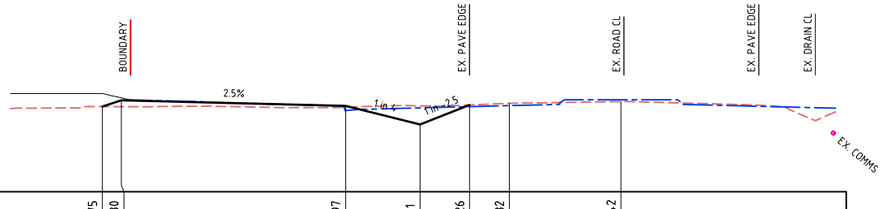


DESIGN HEIGHT	20.636	20.785	20.598	20.041	20.644	20.697	20.753		
EX. SURFACE	20.636	20.667	20.498	20.063	20.644	20.697	20.751		
OFFSETS	-16.747	-16.300	-8.796	-6.569	-4.974	-3.678	0.000		

CH 805.2

CONTROL LINE
X = 25276.462
Y = 147706.664
Z = 20.942

Datum 18.00

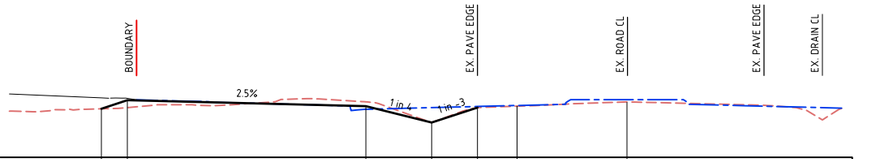


DESIGN HEIGHT	20.775	20.980	20.797	20.191	20.826	20.882	20.942		
EX. SURFACE	20.775	20.772	20.754	20.797	20.826	20.882	20.938		
OFFSETS	-16.916	-16.300	-8.979	-6.555	-4.943	-3.643	0.000		

CH 800.0

CONTROL LINE
X = 25279.245
Y = 147726.469
Z = 21.788

Datum 20.00



DESIGN HEIGHT	21.580	21.862	21.667	21.130	21.621	21.666	21.788		
EX. SURFACE	21.580	21.617	21.808	21.130	21.621	21.666	21.805		
OFFSETS	-17.146	-16.300	-8.520	-6.373	-4.877	-3.585	0.000		

CH 780.0

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: ANNOTATED CROSS SECTIONS - RD01
SHEET 12 OF 12

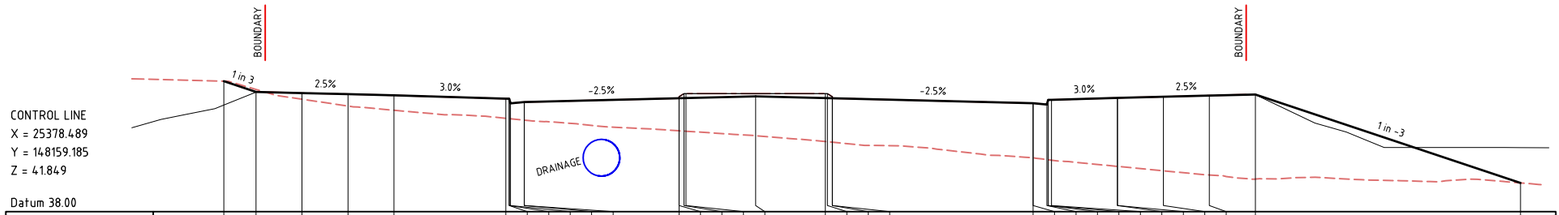
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PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

Project No. B00703-DD-XS12
Drawing No.
Rev A

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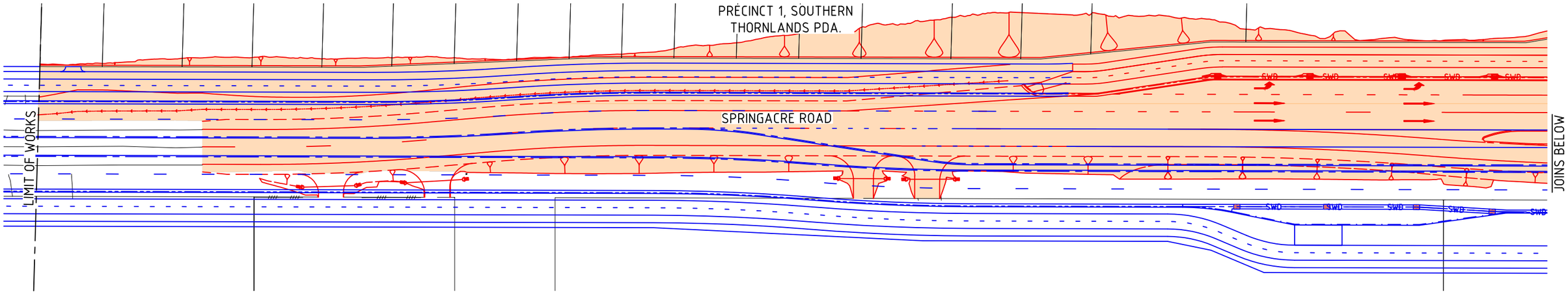
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User: DESIGN CIVIL



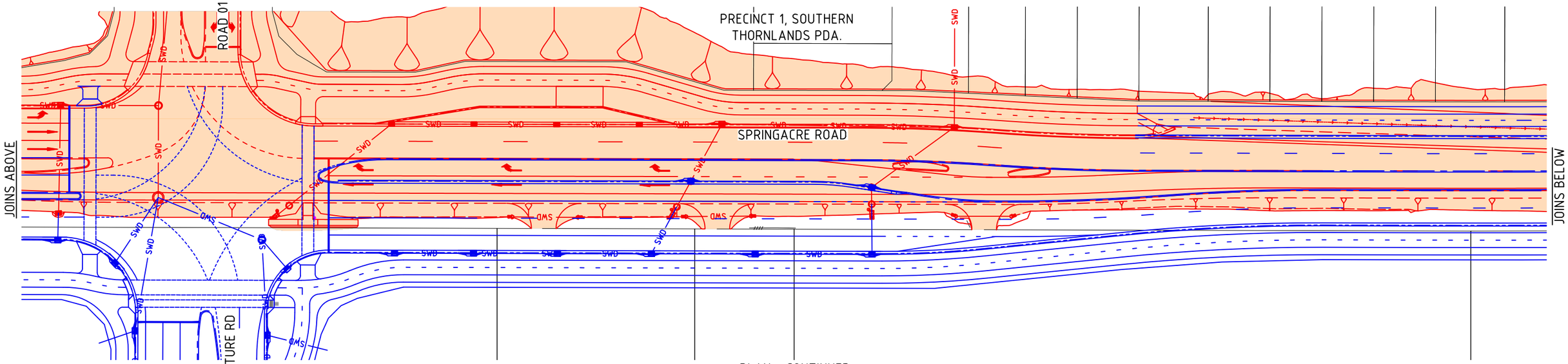
CONTROL LINE
X = 25378.489
Y = 148159.185
Z = 41.849

Datum 38.00

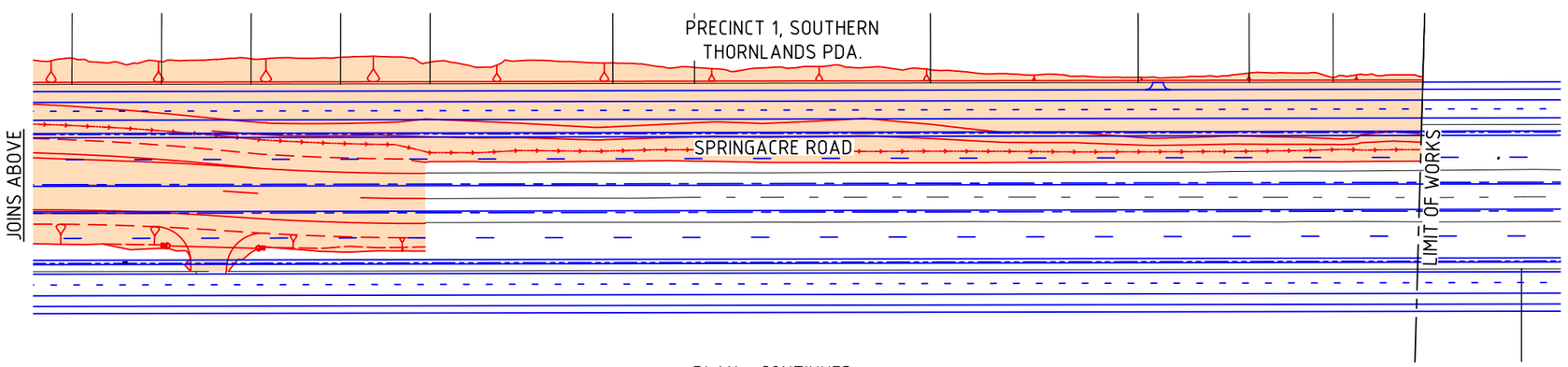
| | | |



PLAN
SCALE 1 : 400



PLAN – CONTINUED
SCALE 1 : 400



PLAN – CONTINUED
SCALE 1 : 400

NOTES

1. ULTIMATE LAYOUT IS SUBJECT TO CHANGE & CURRENT AS AT TIME OF REVISION.

LEGEND

- ROINTERIM ARRANGEMENT
- ULTIMATE ARRANGEMENT
- BOUNDARIES

0 8 16 24 32 40m
4 3 2 1
SCALE 1:400 (A1) 1:800 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

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URBEX

EMPOWER

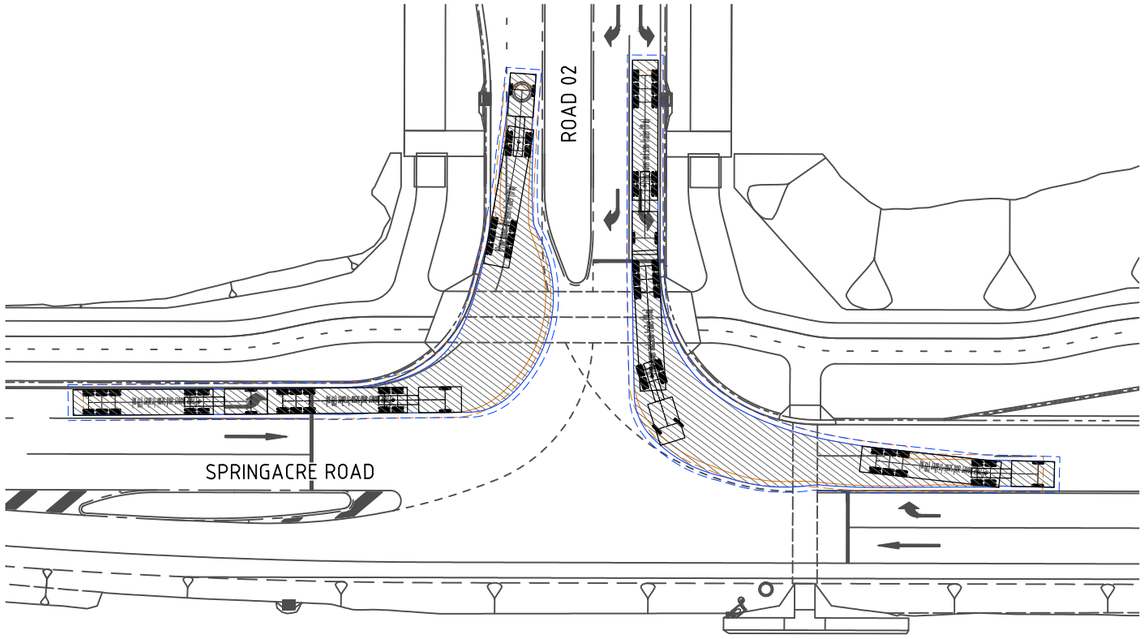
Client: URBEX PTY LTD
Project: SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title: ULTIMATE ARRANGEMENT

Datum
AHD
PSM 79006
RL 67.474
(MGA) COORD

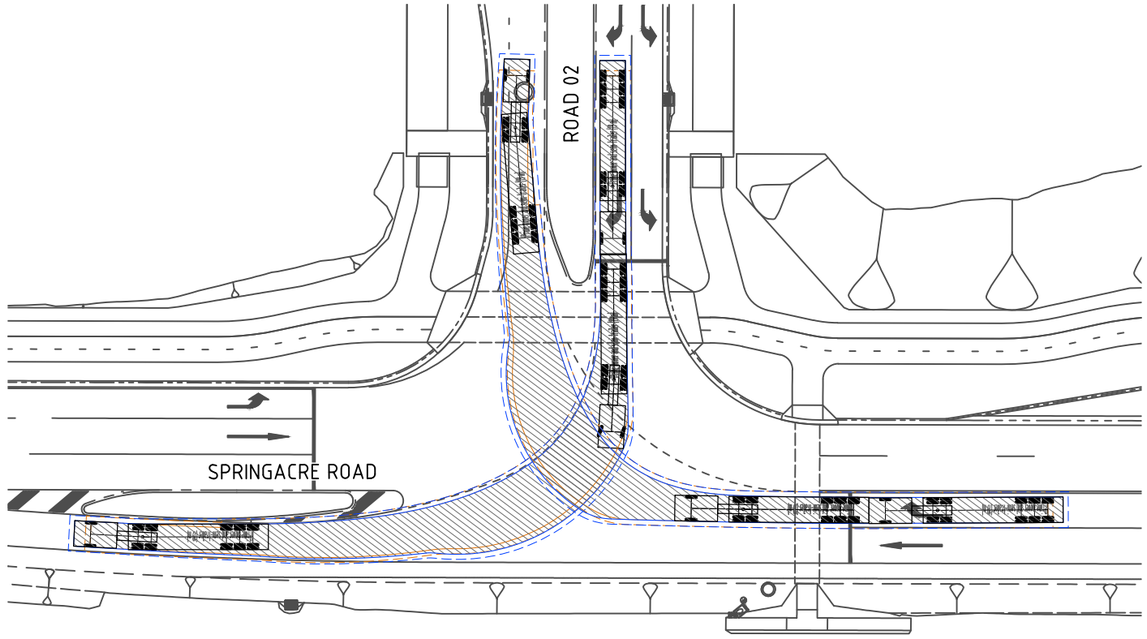
ISSUE FOR REVIEW

Project No.	Drawing No.	Rev
B00703	DD-UL01	A

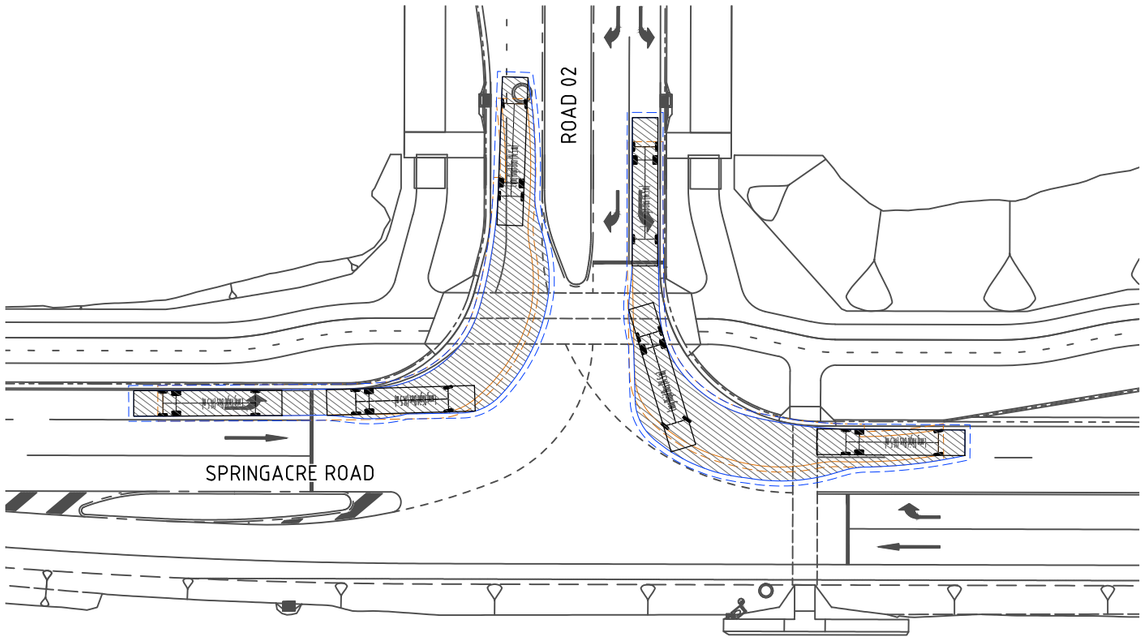
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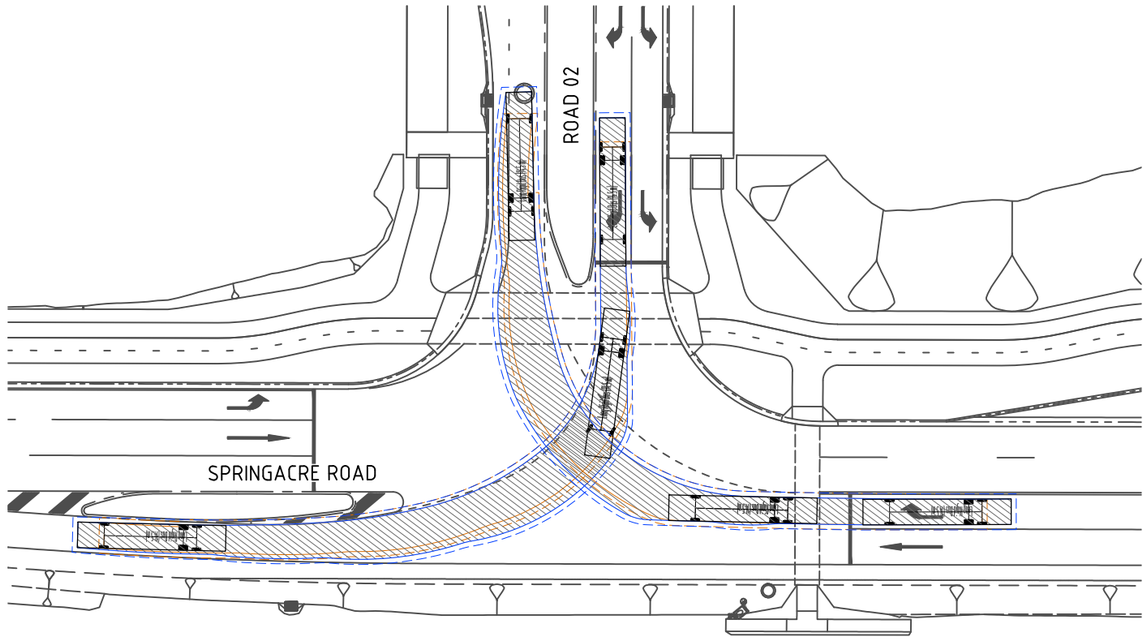
SWEPT-PATH ANALYSIS - 19.0m SEMI - LEFT TURNS
SCALE 1 : 300



SWEPT-PATH ANALYSIS - 19.0m SEMI - RIGHT TURNS
SCALE 1 : 300



SWEPT-PATH ANALYSIS - 14.5m BUS - LEFT TURNS
SCALE 1 : 300



SWEPT-PATH ANALYSIS - 14.5m BUS - RIGHT TURNS
SCALE 1 : 300

NOTES

1. NOMINATED VEHICLE DIMENSIONS, BODY & CLEARANCES IN ACCORDANCE WITH THE AUSTROADS STANDARDS.

0 6 12 18 24 30m

SCALE 1:300 (A1) 1:600 (A3)
DO NOT SCALE USE ONLY THE DIMENSIONS PROVIDED.

No.	Amendments	Drawn	Design	Design Chk	Appd	Date
A	ISSUED FOR INFORMATION	SM	SM	LD	PI	8/12/25

ENGINEERING CERTIFICATION
Peter Ingerman
Registered Engineer
Date " "
Registered Accreditation

URBEX

EMPOWER

Client URBEX PTY LTD
Project SPRINGACRE ROAD, THORNLANDS, QLD, 4161
Title SWEPT-PATH ANALYSIS

Datum AHD
PSM 79006
RL 67.474
(MGA) COORD

ISSUE FOR REVIEW

Project No. B00703-DD-TP01
Drawing No.
Rev A

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Plot Date: 12/12/2025 11:18:21 AM User: DESIGN CIVIL
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Xref: o:\12dS\data\MAN12DSYN01\Autodesk_807\ACAD\Blocks\Title Block\URBEX Logo.dwg

Sight Distance Report

Project: Springacre Rd
Directory: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\12d\Design\Springacre Rd
User: Design Civil
Created: 2025-12-08T12:59:09

Parameters

General

Centreline: CONTROL/ROAD->RD01
Ground tin: tin super ALL
Start chainage: 0.000
End chainage: 805.161
Chainage interval: 5.000
Trial interval: 10.000
Minimum distance: Calculated by safe limit
Maximum distance: 200.000
Assumed safe at ends? true

Eye & Target

Eye height: 1.100
Eye offset: -1.750
Target height: 1.250
Target offset: -1.750

Safe Limit

Speed value: 70
Reaction time: 2.00
Deceleration coefficient: 0.41
Safe distance rounding: 5 (up)

Sight distance forward

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
5.000	161.959	85.000	passed	Tin	89.660	-1.309	42.229	tin super ALL
10.000	158.975	85.000	passed	Tin	91.844	-1.088	42.315	tin super ALL
15.000	156.328	85.000	passed	Tin	94.000	-0.877	42.397	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
20.000	154.799	85.000	passed	Tin	97.000	-0.625	42.508	tin super ALL
25.000	154.145	85.000	passed	Tin	101.000	-0.352	42.649	tin super ALL
30.000	154.053	85.000	passed	Tin	105.485	-0.104	42.798	tin super ALL
35.000	154.209	85.000	passed	Tin	110.000	0.092	42.939	tin super ALL
40.000	154.271	85.000	passed	Tin	114.500	0.231	43.071	tin super ALL
45.000	154.140	85.000	passed	Tin	118.545	0.321	43.182	tin super ALL
50.000	153.913	85.000	passed	Tin	122.597	0.345	43.286	tin super ALL
55.000	154.007	85.000	passed	Tin	127.500	0.293	43.400	tin super ALL
60.000	154.188	85.000	passed	Tin	132.973	0.192	43.516	tin super ALL
65.000	154.480	85.000	passed	Tin	138.000	0.068	43.612	tin super ALL
70.000	155.179	85.000	passed	Tin	143.500	-0.097	43.706	tin super ALL
75.000	156.424	85.000	passed	Tin	149.000	-0.293	43.787	tin super ALL
80.000	158.339	85.000	passed	Tin	154.000	-0.508	43.850	tin super ALL
85.000	161.050	85.000	passed	Tin	159.500	-0.736	43.908	tin super ALL
90.000	164.801	85.000	passed	Tin	165.000	-0.964	43.955	tin super ALL
95.000	169.880	85.000	passed	Tin	170.500	-1.176	43.991	tin super ALL
100.000	176.746	85.000	passed	Tin	175.500	-1.353	44.014	tin super ALL
105.000	186.165	85.000	passed	Tin	181.000	-1.501	44.030	tin super ALL
110.000	199.402	85.000	passed	Tin	186.000	-1.616	44.034	tin super ALL
115.000	200.000	85.000	passed	Object				
120.000	200.000	85.000	passed	Object				
125.000	200.000	85.000	passed	Object				
130.000	200.000	90.000	passed	Object				
135.000	200.000	90.000	passed	Object				
140.000	200.000	90.000	passed	Object				
145.000	200.000	90.000	passed	Object				
150.000	200.000	90.000	passed	Object				
155.000	200.000	90.000	passed	Object				
160.000	200.000	90.000	passed	Object				
165.000	200.000	90.000	passed	Object				
170.000	200.000	90.000	passed	Object				
175.000	200.000	90.000	passed	Object				

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
180.000	200.000	90.000	passed	Object				
185.000	200.000	90.000	passed	Object				
190.000	200.000	90.000	passed	Object				
195.000	200.000	90.000	passed	Object				
200.000	200.000	90.000	passed	Object				
205.000	200.000	90.000	passed	Object				
210.000	200.000	90.000	passed	Object				
215.000	200.000	90.000	passed	Object				
220.000	200.000	90.000	passed	Object				
225.000	200.000	90.000	passed	Object				
230.000	200.000	90.000	passed	Object				
235.000	200.000	90.000	passed	Object				
240.000	200.000	90.000	passed	Object				
245.000	200.000	90.000	passed	Object				
250.000	200.000	90.000	passed	Object				
255.000	200.000	90.000	passed	Object				
260.000	200.000	90.000	passed	Object				
265.000	200.000	90.000	passed	Object				
270.000	200.000	90.000	passed	Object				
275.000	200.000	90.000	passed	Object				
280.000	200.000	90.000	passed	Object				
285.000	200.000	90.000	passed	Object				
290.000	200.000	90.000	passed	Object				
295.000	200.000	90.000	passed	Object				
300.000	200.000	90.000	passed	Object				
305.000	200.000	90.000	passed	Object				
310.000	200.000	90.000	passed	Object				
315.000	200.000	90.000	passed	Object				
320.000	200.000	90.000	passed	Object				
325.000	200.000	90.000	passed	Object				
330.000	200.000	90.000	passed	Object				
335.000	200.000	90.000	passed	Object				
340.000	200.000	90.000	passed	Object				
345.000	200.000	90.000	passed	Object				
350.000	200.000	90.000	passed	Object				
355.000	196.494	90.000	passed	Tin	472.000	-0.559	40.945	tin super ALL
360.000	192.730	90.000	passed	Tin	473.500	-0.572	40.912	tin super ALL
365.000	189.068	90.000	passed	Tin	474.586	-0.594	40.887	tin super ALL
370.000	185.523	90.000	passed	Tin	476.000	-0.619	40.854	tin super ALL
375.000	182.106	90.000	passed	Tin	477.094	-0.651	40.828	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
380.000	178.832	90.000	passed	Tin	478.599	-0.690	40.791	tin super ALL
385.000	175.720	90.000	passed	Tin	480.106	-0.736	40.753	tin super ALL
390.000	172.787	90.000	passed	Tin	482.000	-0.795	40.705	tin super ALL
395.000	170.054	90.000	passed	Tin	484.125	-0.870	40.648	tin super ALL
400.000	167.544	90.000	passed	Tin	486.000	-0.953	40.596	tin super ALL
405.000	165.280	90.000	passed	Tin	488.152	-1.055	40.535	tin super ALL
410.000	163.292	90.000	passed	Tin	490.500	-1.179	40.465	tin super ALL
415.000	161.603	90.000	passed	Tin	493.192	-1.335	40.383	tin super ALL
420.000	160.243	90.000	passed	Tin	496.500	-1.545	40.278	tin super ALL
425.000	159.250	90.000	passed	Tin	499.754	-1.780	40.169	tin super ALL
430.000	158.633	90.000	passed	Tin	503.707	-2.058	40.032	tin super ALL
435.000	158.337	90.000	passed	Tin	508.666	-2.344	39.853	tin super ALL
440.000	158.299	90.000	passed	Tin	514.500	-2.588	39.633	tin super ALL
445.000	158.497	90.000	passed	Tin	520.608	-2.746	39.391	tin super ALL
450.000	158.704	90.000	passed	Tin	526.600	-2.809	39.142	tin super ALL
455.000	158.737	90.000	passed	Tin	532.500	-2.807	38.886	tin super ALL
460.000	158.744	90.000	passed	Tin	537.500	-2.788	38.658	tin super ALL
465.000	158.699	95.000	passed	Tin	542.500	-2.736	38.422	tin super ALL
470.000	158.604	95.000	passed	Tin	547.500	-2.652	38.177	tin super ALL
475.000	158.562	95.000	passed	Tin	552.500	-2.533	37.923	tin super ALL
480.000	158.502	95.000	passed	Tin	557.500	-2.353	37.661	tin super ALL
485.000	158.302	95.000	passed	Tin	562.500	-2.136	37.391	tin super ALL
490.000	158.060	95.000	passed	Tin	567.500	-1.914	37.111	tin super ALL
495.000	158.002	95.000	passed	Tin	572.500	-1.685	36.822	tin super ALL
500.000	158.262	95.000	passed	Tin	577.000	-1.465	36.554	tin super ALL
505.000	158.856	95.000	passed	Tin	581.500	-1.279	36.278	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
510.000	162.133	95.000	passed	Tin	586.500	-1.172	35.959	tin super ALL
515.000	169.414	95.000	passed	Tin	591.339	-1.125	35.640	tin super ALL
520.000	179.864	95.000	passed	Tin	596.000	-1.119	35.323	tin super ALL
525.000	200.000	95.000	passed	Object				
530.000	200.000	95.000	passed	Object				
535.000	200.000	95.000	passed	Object				
540.000	200.000	95.000	passed	Object				
545.000	200.000	95.000	passed	Object				
550.000	200.000	95.000	passed	Object				
555.000	200.000	100.000	passed	Object				
560.000	200.000	100.000	passed	Object				
565.000	200.000	100.000	passed	Object				
570.000	200.000	100.000	passed	Object				
575.000	200.000	100.000	passed	Object				
580.000	200.000	100.000	passed	Object				
585.000	200.000	100.000	passed	Object				
590.000	200.000	100.000	passed	Object				
595.000	200.000	100.000	passed	Object				
600.000	200.000	100.000	passed	Object				
605.000	200.000	100.000	passed	Object				
610.000	190.000	100.000	passed	Object				
615.000	190.000	100.000	passed	Object				
620.000	180.000	100.000	passed	Object				
625.000	180.000	100.000	passed	Object				
630.000	170.000	100.000	passed	Object				
635.000	170.000	100.000	passed	Object				
640.000	160.000	100.000	passed	Object				
645.000	160.000	100.000	passed	Object				
650.000	150.000	100.000	passed	Object				
655.000	150.000	100.000	passed	Object				
660.000	140.000	100.000	passed	Object				
665.000	140.000	100.000	passed	Object				
670.000	130.000	100.000	passed	Object				
675.000	130.000	100.000	passed	Object				
680.000	120.000	100.000	passed	Object				
685.000	120.000	100.000	passed	Object				
690.000	110.000	100.000	passed	Object				
695.000	110.000	100.000	passed	Object				
700.000	100.000	95.000	passed	Object				
705.000	100.000	95.000	passed	Object				
710.000	90.000	95.000	passed	Object				
715.000	90.000	95.000	passed	Object				

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
720.000	80.000	95.000	passed	Object				
725.000	80.000	95.000	passed	Object				
730.000	70.000	95.000	passed	Object				
735.000	70.000	95.000	passed	Object				
740.000	60.000	95.000	passed	Object				
745.000	60.000	95.000	passed	Object				
750.000	50.000	95.000	passed	Object				
755.000	50.000	95.000	passed	Object				
760.000	40.000	95.000	passed	Object				
765.000	40.000	95.000	passed	Object				
770.000	30.000	95.000	passed	Object				
775.000	30.000	95.000	passed	Object				
780.000	20.000	95.000	passed	Object				
785.000	20.000	95.000	passed	Object				
790.000	10.000	95.000	passed	Object				
795.000	10.000	95.000	passed	Object				
800.000	0.000	95.000	passed	Object				
805.000	0.000	95.000	passed	Object				

Sight distance reverse

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
805.000	200.000	85.000	passed	Object				
800.000	200.000	85.000	passed	Object				
795.000	200.000	85.000	passed	Object				
790.000	200.000	80.000	passed	Object				
785.000	200.000	80.000	passed	Object				
780.000	200.000	80.000	passed	Object				
775.000	200.000	80.000	passed	Object				
770.000	200.000	80.000	passed	Object				
765.000	200.000	80.000	passed	Object				
760.000	200.000	80.000	passed	Object				
755.000	200.000	80.000	passed	Object				
750.000	200.000	80.000	passed	Object				
745.000	200.000	80.000	passed	Object				
740.000	200.000	80.000	passed	Object				
735.000	200.000	80.000	passed	Object				
730.000	200.000	80.000	passed	Object				
725.000	199.850	80.000	passed	Tin	606.547	2.387	34.663	tin super ALL
720.000	194.922	80.000	passed	Tin	606.547	2.411	34.664	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
715.000	190.054	80.000	passed	Tin	606.000	2.430	34.704	tin super ALL
710.000	185.698	80.000	passed	Tin	605.500	2.450	34.741	tin super ALL
705.000	181.653	80.000	passed	Tin	604.500	2.465	34.814	tin super ALL
700.000	177.922	80.000	passed	Tin	603.500	2.479	34.886	tin super ALL
695.000	174.239	80.000	passed	Tin	602.000	2.486	34.993	tin super ALL
690.000	170.844	80.000	passed	Tin	600.500	2.490	35.100	tin super ALL
685.000	167.476	80.000	passed	Tin	599.000	2.493	35.205	tin super ALL
680.000	164.111	80.000	passed	Tin	597.000	2.488	35.344	tin super ALL
675.000	160.789	80.000	passed	Tin	595.500	2.488	35.448	tin super ALL
670.000	157.737	80.000	passed	Tin	593.500	2.477	35.584	tin super ALL
665.000	160.883	80.000	passed	Tin	591.000	2.338	35.749	tin super ALL
660.000	157.614	80.000	passed	Tin	587.500	2.267	35.980	tin super ALL
655.000	154.734	80.000	passed	Tin	582.000	2.116	36.331	tin super ALL
650.000	160.541	80.000	passed	Tin	577.000	1.781	36.636	tin super ALL
645.000	161.088	80.000	passed	Tin	571.500	1.556	36.963	tin super ALL
640.000	160.018	80.000	passed	Tin	566.000	1.331	37.279	tin super ALL
635.000	157.394	80.000	passed	Tin	560.158	1.109	37.603	tin super ALL
630.000	158.023	80.000	passed	Tin	554.636	0.956	37.898	tin super ALL
625.000	158.385	80.000	passed	Tin	549.500	0.857	38.163	tin super ALL
620.000	158.535	80.000	passed	Tin	544.092	0.788	38.432	tin super ALL
615.000	157.453	80.000	passed	Tin	510.534	0.791	40.035	tin super ALL
610.000	154.871	80.000	passed	Tin	510.540	0.835	40.036	tin super ALL
605.000	152.503	85.000	passed	Tin	510.549	0.887	40.038	tin super ALL
600.000	150.406	85.000	passed	Tin	510.557	0.941	40.040	tin super ALL
595.000	148.692	85.000	passed	Tin	510.573	0.999	40.040	tin super ALL
590.000	147.394	85.000	passed	Tin	510.187	1.072	40.057	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
585.000	146.701	85.000	passed	Tin	509.945	1.144	40.067	tin super ALL
580.000	146.860	85.000	passed	Tin	509.665	1.223	40.079	tin super ALL
575.000	147.451	85.000	passed	Tin	502.596	1.609	40.332	tin super ALL
570.000	148.858	85.000	passed	Tin	502.582	1.686	40.336	tin super ALL
565.000	152.149	85.000	passed	Tin	502.580	1.772	40.339	tin super ALL
560.000	158.491	85.000	passed	Tin	502.608	1.867	40.341	tin super ALL
555.000	170.223	85.000	passed	Tin	502.676	1.972	40.342	tin super ALL
550.000	193.386	85.000	passed	Tin	502.766	2.092	40.340	tin super ALL
545.000	200.000	85.000	passed	Object				
540.000	200.000	85.000	passed	Object				
535.000	200.000	85.000	passed	Object				
530.000	200.000	85.000	passed	Object				
525.000	200.000	85.000	passed	Object				
520.000	200.000	85.000	passed	Object				
515.000	200.000	85.000	passed	Object				
510.000	200.000	85.000	passed	Object				
505.000	200.000	85.000	passed	Object				
500.000	200.000	85.000	passed	Object				
495.000	200.000	85.000	passed	Object				
490.000	200.000	85.000	passed	Object				
485.000	200.000	85.000	passed	Object				
480.000	200.000	85.000	passed	Object				
475.000	200.000	85.000	passed	Object				
470.000	200.000	85.000	passed	Object				
465.000	200.000	85.000	passed	Object				
460.000	200.000	85.000	passed	Object				
455.000	200.000	85.000	passed	Object				
450.000	200.000	85.000	passed	Object				
445.000	200.000	85.000	passed	Object				
440.000	200.000	85.000	passed	Object				
435.000	200.000	85.000	passed	Object				
430.000	200.000	85.000	passed	Object				
425.000	200.000	85.000	passed	Object				
420.000	200.000	85.000	passed	Object				
415.000	200.000	85.000	passed	Object				
410.000	200.000	85.000	passed	Object				
405.000	200.000	85.000	passed	Object				
400.000	200.000	85.000	passed	Object				
395.000	200.000	85.000	passed	Object				

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
390.000	200.000	85.000	passed	Object				
385.000	200.000	85.000	passed	Object				
380.000	200.000	85.000	passed	Object				
375.000	200.000	85.000	passed	Object				
370.000	200.000	85.000	passed	Object				
365.000	200.000	85.000	passed	Object				
360.000	200.000	85.000	passed	Object				
355.000	200.000	85.000	passed	Object				
350.000	200.000	85.000	passed	Object				
345.000	200.000	85.000	passed	Object				
340.000	200.000	85.000	passed	Object				
335.000	200.000	85.000	passed	Object				
330.000	200.000	85.000	passed	Object				
325.000	200.000	85.000	passed	Object				
320.000	200.000	85.000	passed	Object				
315.000	200.000	85.000	passed	Object				
310.000	200.000	85.000	passed	Object				
305.000	200.000	85.000	passed	Object				
300.000	197.300	85.000	passed	Tin	183.500	2.065	44.124	tin super ALL
295.000	193.717	85.000	passed	Tin	182.000	2.107	44.122	tin super ALL
290.000	190.187	85.000	passed	Tin	180.500	2.153	44.120	tin super ALL
285.000	183.203	85.000	passed	Tin	182.500	2.076	44.122	tin super ALL
280.000	179.854	85.000	passed	Tin	181.000	2.124	44.120	tin super ALL
275.000	176.637	85.000	passed	Tin	179.000	2.180	44.116	tin super ALL
270.000	173.568	85.000	passed	Tin	177.000	2.244	44.110	tin super ALL
265.000	170.659	85.000	passed	Tin	174.500	2.320	44.101	tin super ALL
260.000	167.927	85.000	passed	Tin	172.500	2.404	44.092	tin super ALL
255.000	165.380	85.000	passed	Tin	169.642	2.506	44.077	tin super ALL
250.000	163.045	85.000	passed	Tin	167.000	2.616	44.061	tin super ALL
245.000	160.942	90.000	passed	Tin	163.608	2.741	44.035	tin super ALL
240.000	159.088	90.000	passed	Tin	160.500	2.870	44.009	tin super ALL
235.000	157.497	90.000	passed	Tin	156.569	3.017	43.969	tin super ALL
230.000	156.206	90.000	passed	Tin	152.500	3.167	43.922	tin super ALL
225.000	155.138	90.000	passed	Tin	148.528	3.301	43.870	tin super ALL

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
220.000	154.181	90.000	passed	Tin	144.011	3.426	43.802	tin super ALL
215.000	153.689	90.000	passed	Tin	140.510	3.510	43.743	tin super ALL
210.000	153.330	90.000	passed	Tin	137.000	3.564	43.678	tin super ALL
205.000	153.057	90.000	passed	Tin	132.031	3.625	43.576	tin super ALL
200.000	152.870	90.000	passed	Tin	127.000	3.658	43.465	tin super ALL
195.000	152.617	90.000	passed	Tin	122.608	3.649	43.361	tin super ALL
190.000	152.182	90.000	passed	Tin	116.500	3.632	43.204	tin super ALL
185.000	151.526	90.000	passed	Tin	111.011	3.522	43.053	tin super ALL
180.000	150.708	90.000	passed	Tin	107.000	3.359	42.931	tin super ALL
175.000	151.410	90.000	passed	Tin	102.445	3.119	42.783	tin super ALL
170.000	151.274	90.000	passed	Tin	97.401	2.814	42.608	tin super ALL
165.000	158.008	90.000	passed	Tin	93.343	2.411	42.456	tin super ALL
160.000	160.000	90.000	passed	Object				
155.000	150.000	90.000	passed	Object				
150.000	150.000	90.000	passed	Object				
145.000	140.000	90.000	passed	Object				
140.000	140.000	95.000	passed	Object				
135.000	130.000	95.000	passed	Object				
130.000	130.000	95.000	passed	Object				
125.000	120.000	95.000	passed	Object				
120.000	120.000	95.000	passed	Object				
115.000	110.000	95.000	passed	Object				
110.000	110.000	95.000	passed	Object				
105.000	100.000	95.000	passed	Object				
100.000	100.000	95.000	passed	Object				
95.000	90.000	95.000	passed	Object				
90.000	90.000	95.000	passed	Object				
85.000	80.000	95.000	passed	Object				
80.000	80.000	95.000	passed	Object				
75.000	70.000	95.000	passed	Object				
70.000	70.000	95.000	passed	Object				
65.000	60.000	95.000	passed	Object				
60.000	60.000	95.000	passed	Object				
55.000	50.000	95.000	passed	Object				
50.000	50.000	95.000	passed	Object				
45.000	40.000	95.000	passed	Object				

CHAINAGE	SIGHT DISTANCE ACHIEVED	SIGHT DISTANCE REQUIRED	STATUS	OBSTRUCTION				
				TYPE	CHAINAGE	OFFSET	HEIGHT	NAME
40.000	40.000	95.000	passed	Object				
35.000	30.000	95.000	passed	Object				
30.000	30.000	95.000	passed	Object				
25.000	20.000	95.000	passed	Object				
20.000	20.000	95.000	passed	Object				
15.000	10.000	95.000	passed	Object				
10.000	10.000	95.000	passed	Object				
5.000	0.000	95.000	passed	Object				

Generated by 12d Model at 2025-12-08T12:59:09

12D AQUAPLANING RISK ASSESSMENT

12D MODEL VERSION 15.0C1t

12D PROJECT: Springacre Rd

12D WORKING FOLDER: C:\Users\Design Civil\OneDrive - Design Civil_PROJECTS\Empower\Springacre Rd\12d\Design\Springacre Rd

DATE: 08-DEC-2025 13:37:50

ASSESSOR: DESIGN CIVIL

VERIFIER:

MODEL OF FLOW PATHS: AQUA/PATH/FLOW

ROAD PAVEMENT TIN: tin super ALL

REFERENCE STRING: CONTROL/ROAD->RD01

RAINFALL INTENSITY (mm/hr): 211.0

PAVEMENT TEXTURE DEPTH (mm): 0.4

FLOW PATH SLOPE: EQUAL-AREA SLOPE

WATER FILM DEPTH RISKS

UNACCEPTABLE RISK >= 4.00 mm

HIGH (ACCEPTABLE) RISK >= 3.25 mm

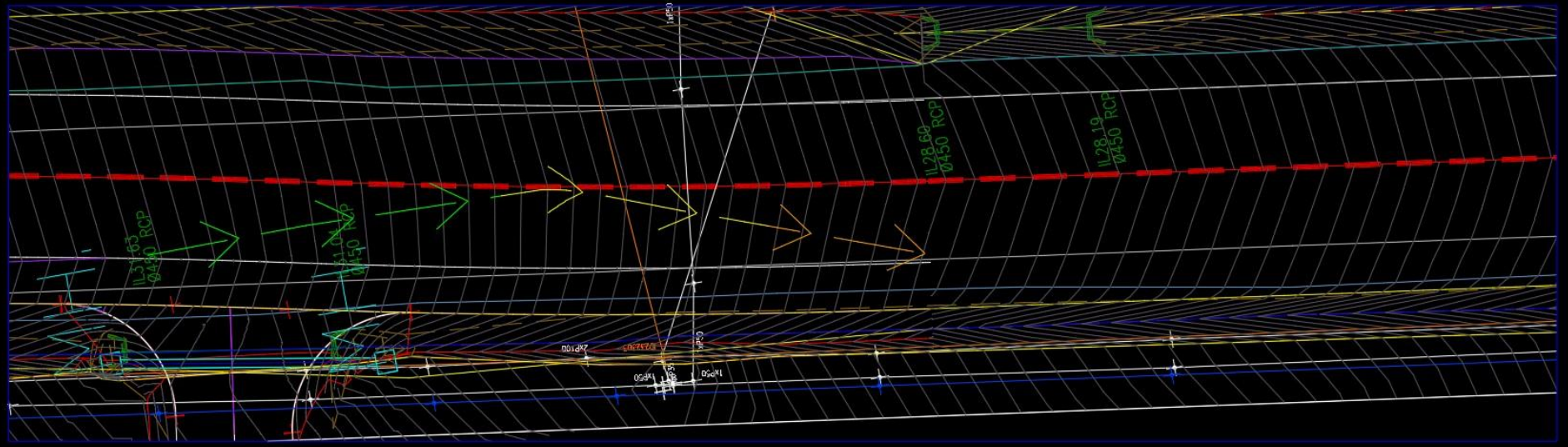
MODERATE (ACCEPTABLE) RISK >= 2.50 mm

LOW (DESIRABLE) RISK < 2.50 mm

WATER FILM DEPTH PREDICTION

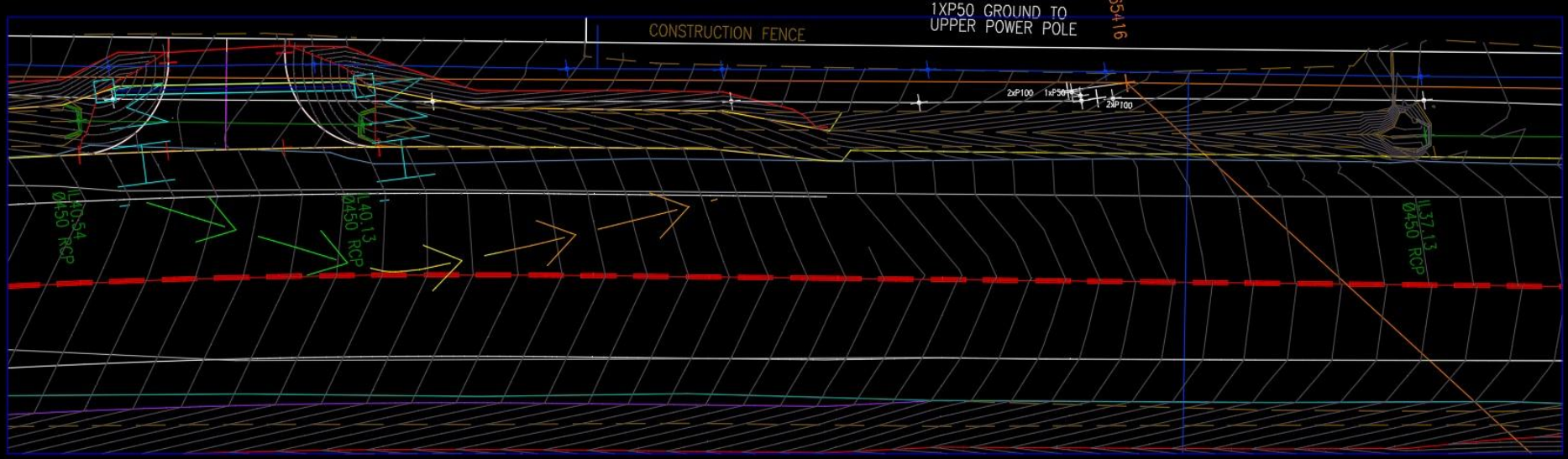
GALLAWAY (1979)

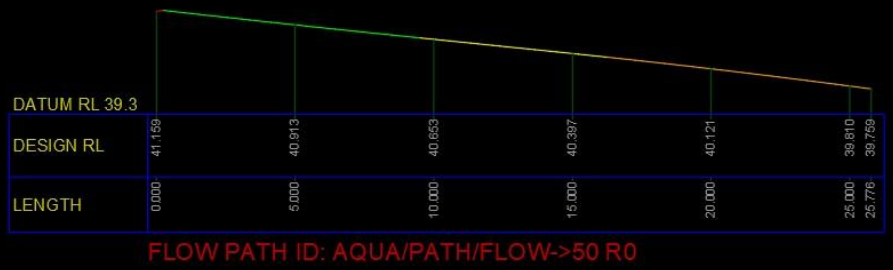
FLOW PATH	ID	POINT	LENGTH (m)	DESIGN RL (m)	SLOPE (%)	DEPTH (mm)	DEPTH RISK	DEPTH RATE (mm/m)	WARNING
50	R0	1	2.578	41.044	5.46	1.21	LOW	0.39	
50	R0	2	5.155	40.905	5.40	1.78	LOW	0.35	
50	R0	3	7.733	40.769	5.34	2.21	LOW	0.29	
50	R0	4	10.310	40.637	5.24	2.58	MODERATE	0.25	
50	R0	5	12.888	40.505	5.20	2.89	MODERATE	0.22	
50	R0	6	15.465	40.372	5.19	3.16	MODERATE	0.20	
50	R0	7	18.043	40.233	5.24	3.39	HIGH	0.19	
50	R0	8	20.621	40.085	5.36	3.58	HIGH	0.17	
50	R0	9	23.198	39.926	5.53	3.73	HIGH	0.16	
50	R0	10	25.776	39.759	5.71	3.86	HIGH	0.15	
650	R0	1	3.546	32.377	8.92	1.11	LOW	0.31	
650	R0	2	7.091	32.059	8.96	1.62	LOW	0.23	
650	R0	3	10.637	31.744	8.91	2.02	LOW	0.19	
650	R0	4	14.182	31.432	8.86	2.34	LOW	0.16	
650	R0	5	17.728	31.122	8.81	2.62	MODERATE	0.15	
650	R0	6	21.273	30.811	8.80	2.87	MODERATE	0.13	
650	R0	7	24.819	30.494	8.84	3.09	MODERATE	0.12	
650	R0	8	28.364	30.170	8.91	3.28	HIGH	0.12	
650	R0	9	31.910	29.839	9.00	3.46	HIGH	0.11	
650	R0	10	35.456	29.509	9.06	3.63	HIGH	0.10	





Aquaplane Check 1





Aquaplane Check 2

12D MODEL - HYDROLOGICAL DESIGN SHEET

Project: Springacre Rd
Drainage Model: STORMWATER/MAIN
Rainfall File: AUS QLD Brisbane.12dhydro
Rainfall Method: IFD Table
Runoff C Method: QUDM 2007

Minor 10 Year Storm Event

Node Name	Node Type	Setout Easting	Setout Northing	Setout RL	Grate RL	Catch ID	Tc Method	Catch Length	Catch Slope	Catch Retardance	Time Tc	Intensity I	Runoff C	Area A	Full CA	Full Sum CA	Full Qc=CIA	Partial CA	Partial Sum CA	Partial Qc=CIA	Catchment Flow Qc	Direct Flow Qdg	Approach Flow Qa	Road Capacity	Flooded Depth	Flooded Width	Flooded Vel.Dep	Road Grade	Road Xfall	Inlet Curve Name	Inlet Flow Qg	Bypass Node
(-)	(-)	(m)	(m)	(m)	(m)	(-)	(-)	(m)	(%)	(-)	(min)	(mm/hr)	(-)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(m)	(sq.m/s)	(%)	(%)	(-)	(L/s)	(-)
1/2	RD PIT	25341.92	148191.86	41.22	42.56	2P	Kinematic Wave	170.00	4.0	0.150	18.13	130.47	0.70	0.8500	0.5950	0.7300	264.6	0.1641	0.2991	178.6	264.6		264.6								264.6	-
						2I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.1500	0.1350			0.1350													
IN/4	HW	25331.77	148149.06	42.50	42.50	2P	Kinematic Wave	140.00	6.0	0.150	13.58	148.08	0.70	1.5817	1.1072	1.4630	601.8	0.4075	0.7634	455.9	601.8	100.0	701.8								701.8	-
						2I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.3954	0.3559			0.3559													
1/4	MH	25333.58	148145.98	42.43	42.43																											-
2/4	RD PIT	25347.01	148123.13	41.94	41.94	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0435	0.0392	0.0392	23.4	0.0392	0.0392	23.4	23.4		23.4	2611.1	0.057	1.68	0.03	1.0	3.0	1G,3.3X	23.4	3/4
3/4	RD PIT	25344.62	148106.64	41.76	41.76	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0394	0.0355	0.0355	21.2	0.0355	0.0355	21.2	21.2		21.2	3788.3	0.056	2.15	0.03	1.0	3.0	1G,3.3X	21.2	4/4
4/4	RD PIT	25342.23	148090.11	41.57	41.57	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0406	0.0365	0.0365	21.8	0.0365	0.0365	21.8	21.8		21.8	3915.8	0.056	2.19	0.03	1.0	3.0	1G,3.3X	21.8	5/4
5/4	RD PIT	25339.82	148073.49	41.39	41.39	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0404	0.0364	0.0364	21.7	0.0364	0.0364	21.7	21.7		21.7	3155.7	0.056	2.19	0.03	1.0	3.0	1G,3.3X	21.7	6/4
6/4	RD PIT	25337.46	148057.15	41.21	41.21	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0412	0.0370	0.0370	22.1	0.0370	0.0370	22.1	22.1		22.1	2608.0	0.069	1.61	0.04	1.0	3.0	1G,3.3X	22.1	7/4
7/4	AL2D	25330.24	148010.48	40.27	40.27	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0773	0.0696	0.0696	41.5	0.0696	0.0696	41.5	41.5		41.5	3782.8	0.071	1.78	0.07				41.5	-
OUT/4	SAL2E	25362.32	148005.83	39.55	39.55																											-
IN/5	HW inlet	25320.75	148069.47	41.00	41.10	1P	Direct				10.00	168.00	0.70	0.0031	0.0021	0.4091	150.8	0.0021	0.2666	124.4	150.8		150.8								150.8	-
						1I	Direct				5.00	215.00	0.90	0.0276	0.0249			0.0249													
						2P	Kinematic Wave	180.00	5.0	0.150	17.43	132.71	0.70	0.4777	0.3344			0.1918													
						2I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0531	0.0478			0.0478													
1/5	MH	25322.26	148068.34	41.55	41.55																											-
2/5	MH	25327.01	148064.81	41.59	41.59																											-
1/3	HW IN	25339.21	148171.94	42.86	42.86																	3500.0	3500.0								3500.0	-
1/1	AL2D	25368.78	148248.29	43.55	43.55	1P	QUDM Standard Inlet Times		3.0		15.00	142.00	0.70	0.0294	0.0206	0.0698	27.5	0.0069	0.0561	33.5	33.5		33.5	2448.5	0.077	1.95	0.05	1.0	3.0	1G,3.3X	33.5	2/1
						1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0547	0.0492			0.0492													
2/1	AL2D	25368.14	148243.84	43.35	43.35	1P	QUDM Standard Inlet Times		3.0		15.00	142.00	0.70	0.0154	0.0108	0.0431	17.0	0.0036	0.0359	21.4	21.4		21.4	2472.1	0.068	1.58	0.04	1.0	3.0	1G,3.3X	21.4	3/1
						1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0359	0.0323			0.0323													
3/1	AL2D	25365.49	148225.53	43.15	43.15	1P	QUDM Standard Inlet Times		3.0		15.00	142.00	0.70	0.0100	0.0070	0.0431	17.0	0.0023	0.0384	23.0	23.0		23.0	2531.0	0.069	1.64	0.04	1.0	3.0	1G,3.3X	23.0	4/1
						1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0401	0.0361			0.0361													
4/1	AL2D	25364.48	148218.60	42.94	42.94	1P	QUDM Standard Inlet Times		3.0		15.00	142.00	0.70	0.0099	0.0069	0.0425	16.8	0.0023	0.0379	22.6	22.6		22.6	2543.7	0.069	1.63	0.04	1.0	3.0	1G,3.3X	22.6	5/1
						1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0396	0.0356			0.0356													
5/1	AL2D	25360.19	148188.91	42.74	42.74	1P	QUDM Standard Inlet Times		3.0		15.00	142.00	0.70	0.0101	0.0071	0.0435	17.2	0.0024	0.0388	23.2	23.2		23.2	2581.0	0.069	1.65	0.04				23.2	-
						1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0405	0.0364			0.0364													
6/1	AL2D	25357.35	148169.32	42.32	42.33																		0.0								0.0	-
OUT/1	HW outlet	25385.09	148162.78	39.04	41.50																											-
IN/6	HW inlet	25315.28	148029.50	40.55	40.60	2P	Kinematic Wave	160.00	5.0	0.150	15.99	138.05	0.70	0.5494	0.3846	0.5082	194.9	0.1203	0.2439	145.7	194.9	100.0	294.9								294.9	-
						2I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.1374	0.1236			0.1236													
1/6	MH	25316.80	148029.30	41.10	41.10																											-
2/6	AL2D	25320.62	148028.78	41.04	41.04	1I	QUDM Standard Inlet Times				5.00	215.00	0.90	0.0134	0.0121	0.0121	7.2	0.0121	0.0121	7.2	7.2		7.2								7.2	-

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