

Applicant contact details

Title	
First given name	Chris
Other given name/s	
Family name	Kennedy
Contact number	[REDACTED]
Email	[REDACTED]
Address	[REDACTED]
Application on behalf of a company, business or body corporate	Yes
ABN	[REDACTED]
ACN	
Name	[REDACTED]
Trading name	[REDACTED]
Is the nominated company the applicant for this application	Yes

Owner/s of the development site

Owner/s of the development site	A company, business, government entity or other similar body owns the development site
Owner #	1
Company, business or body corporate name	Kennedy Property Investments Pty Ltd
ABN / ACN	[REDACTED]

I declare that I have shown this document, including all attached drawings, to the owner(s) of the land, and that I have obtained their consent to submit this application. - Yes

Note: It is an offence under Section 10.6 of the Environmental Planning and Assessment Act 1979 to provide false or misleading information in relation to this application.

Site access details

Are there any security or site conditions which may impact the person undertaking the inspection? For example, locked gates, animals etc.	No
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Developer details

ABN	[REDACTED]
ACN	
Name	[REDACTED]
Trading name	
Address	
Email Address	[REDACTED]

Development details

Application type	Development Application
Site address #	1
Street address	3/39/758726
Local government area	FEDERATION

Lot / Section Number / Plan	
Primary address?	Yes
Planning controls affecting property	Land Application LEP NA Land Zoning NA Height of Building NA Floor Space Ratio (n:1) NA Minimum Lot Size NA Heritage NA Land Reservation Acquisition NA Foreshore Building Line NA

Proposed development

Selected common application types	Subdivision
Description of development	MultiLot Subdivision
Dwelling count details	
Number of dwellings / units proposed	
Number of storeys proposed	
Number of pre-existing dwellings on site	
Number of dwellings to be demolished	
Number of proposed occupants	0
Existing gross floor area (m2)	0
Proposed gross floor area (m2)	0
Total site area (m2)	0
Total net lettable area (m2)	0
What is the estimated development cost, including GST?	\$1,559,300.00
Estimated development cost	\$1,417,545.00
Do you have one or more BASIX certificates?	
Climate Zone	
What climate zone/s is the development in?	Climate zone 8 - alpine
Has the climate zone impacted the design of the development?	No
Subdivision	
Number of existing lots	2
Type of subdivision proposed	Torrens Title
Number of proposed lots	13
Proposed operating details	
Number of staff/employees on the site	

Number of parking spaces

Number of loading bays	
Is a new road proposed?	Yes
Description of the proposed roadworks	Construction of new road to provide subdivision access

Concept development	
Is the development to be staged?	No, this application is not for concept or staged development.
Crown development	
Is this a proposed Crown development?	No

Related planning information

Is the application for integrated development?	No
Is your proposal categorised as designated development?	No
Is your proposal likely to significantly impact on threatened species, populations, ecological communities or their habitats, or is it located on land identified as critical habitat?	No
Is this application for biodiversity compliant development?	No
Does the application propose a variation to a development standard in an environmental planning instrument (eg LEP or SEPP)?	No
Is the application accompanied by a Planning Agreement ?	No
Section 68 of the Local Government Act	
Is approval under s68 of the Local Government Act 1993 required?	No
10.7 Certificate	
Have you already obtained a 10.7 certificate?	
Tree works	
Is tree removal and/or pruning work proposed?	No
Local heritage	
Does the development site include an item of environmental heritage or sit within a heritage conservation area.	No
Are works proposed to any heritage listed buildings?	No
Is heritage tree removal proposed?	No
Affiliations and Pecuniary interests	
Is the applicant or owner a staff member or councillor of the council assessing the application?	No
Does the applicant or owner have a relationship with any staff or councillor of the council assessing the application?	No
Political Donations	
Are you aware of any person who has financial interest in the application who has made a political donation or gift in the last two years?	No
Please provide details of each donation/gift which has been made within the last 2 years	

Sustainable Buildings

Is the development exempt from the State Environmental Policy (Sustainable Buildings) 2022 Chapter 3, relating to non-residential buildings?	Yes
Provide reason for exemption. Is the development any of the following:	Development on land wholly in RU1, RU2, RU3, E5, IN3, C1, C2, C3, W1, W2, W3 or W4 Development that is wholly residential

Payer details

Provide the details of the person / entity that will make the fee payment for the assessment.

The *Environmental Planning and Assessment Regulation 2021* and Council's adopted fees and charges establish how to calculate the fee payable for your development application. For development that involves building or other works, the fee for your application is based on the estimated cost of the development.

If your application is for integrated development or requires concurrence from a state agency, additional fees will be required. Other charges may be payable based on the Council's adopted fees and charges. If your development needs to be advertised, the Council may charge additional advertising fees. Once this application form is completed, it and the supporting documents will be submitted to the Council for lodgement, at which time the fees will be calculated. The Council will contact you to obtain payment. Note: When submitting documents via the NSW Planning Portal, credit card information should not be displayed on documents attached to your development application. The relevant consent authority will contact you to seek payment.

The application may be cancelled if the fees are not paid:

Company Name	Kennedy Property Investments Pty Ltd
ABN	58 273 547 211
ACN	
Trading Name	
Email address	[REDACTED]
Billing address	[REDACTED]

Application documents

The following documents support the application.

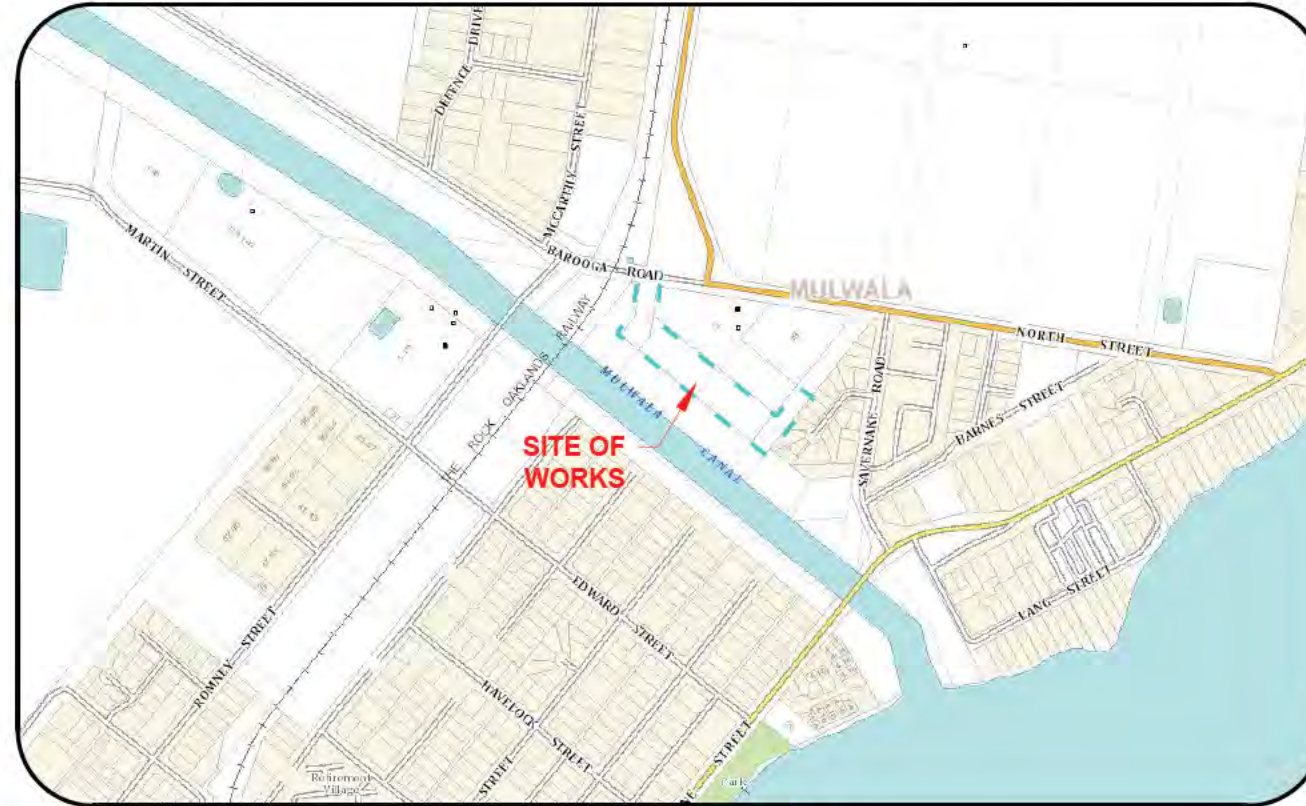
Document type	Document file name
Cost estimate report	21087 F1328 Development Cost Estimate AJM 270324
Preliminary Engineering Drawings	21087 F1328 - Infrastructure Servicing Strategy RevA (c) SLC280224
Preliminary Stormwater Management Plan	21087 F1328 Stormwater Management Plan V1 (c) AJM 270324
Statement of environmental effects	21087 - Lucan Street Mulwala - SEE Vers01 - AJM 260324
Subdivision Plan	21087 RE+EC Development Plan AJM 121223
Survey plan	CP30.1629 21087 RE+EC MGA2020 AHD 121223
Title Documentation / Certificate of Title	8_39_758726 3_39_758726_NSW_Title

Applicant declarations

I declare that all the information in my application and accompanying documents is , to the best of my knowledge, true and correct.	Yes
I understand that the development application and the accompanying information will be provided to the appropriate consent authority for the purposes of the assessment and determination of this development application.	Yes
I understand that if incomplete, the consent authority may request more information, which will result in delays to the application.	Yes
I understand that the consent authority may use the information and materials provided for notification and advertising purposes, and materials provided may be made available to the public for inspection at its Offices and on its website and/or the NSW Planning Portal	Yes
I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the Government Information (Public Access) 2009 (NSW) (GIPA Act) under which it may be required to release information which you provide to it.	Yes

I agree to appropriately delegated assessment officers attending the site for the purpose of inspection.	Yes
I have read and agree to the collection and use of my personal information as outlined in the Privacy Notice	Yes
I confirm that the change(s) entered is/are made with appropriate authority from the applicant(s).	

RESIDENTIAL DEVELOPMENT LUCAN STREET, MULWALA CONCEPT SUBDIVISION PLANS



LOCALITY PLAN

DRAWING LIST:

F1328DP01	LOCALITY PLAN & COVER SHEET
F1328DP02	EXISTING CONDITIONS PLAN
F1328DP03	OVERALL DEVELOPMENT PLAN
F1328DP04	PROPOSED PLAN OF SUBDIVISION
F1328DP05	DRAINAGE CATCHMENT PLAN
F1328DP06	DETAIL PLAN - DRAINAGE
F1328DP07	DETAIL PLAN - SEWER
F1328DP08	DETAIL PLAN - WATER
F1328DP09	EARTHWORKS PLAN
F1328DP10	LANDSCAPE PLAN

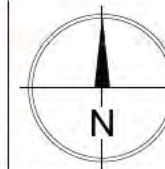
TABLE OF OFFSETS FOR SERVICES

STREET	GAS	NDW	DW	TELCO	OH ELEC	SRM	BOK
NORTH STREET	-	-	4.00 S	1.63 S	5.81 S	3.62 S	N/A
LUCAN STREET	-	-	-	-	-	-	-

NOTE: LOCATION OF EXISTING SERVICES SPECIFIED ARE APPROXIMATE ONLY. CONTRACTOR TO LOCATE SERVICES PRIOR TO CONSTRUCTION

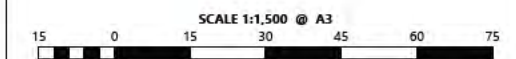


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RESIDENTIAL SUBDIVISION
LUCAN STREET, MULWALA
8/39/758726 & 3/39/758726

LOCALITY PLAN & COVER SHEET



MUNICIPALITY
FEDERATION COUNCIL

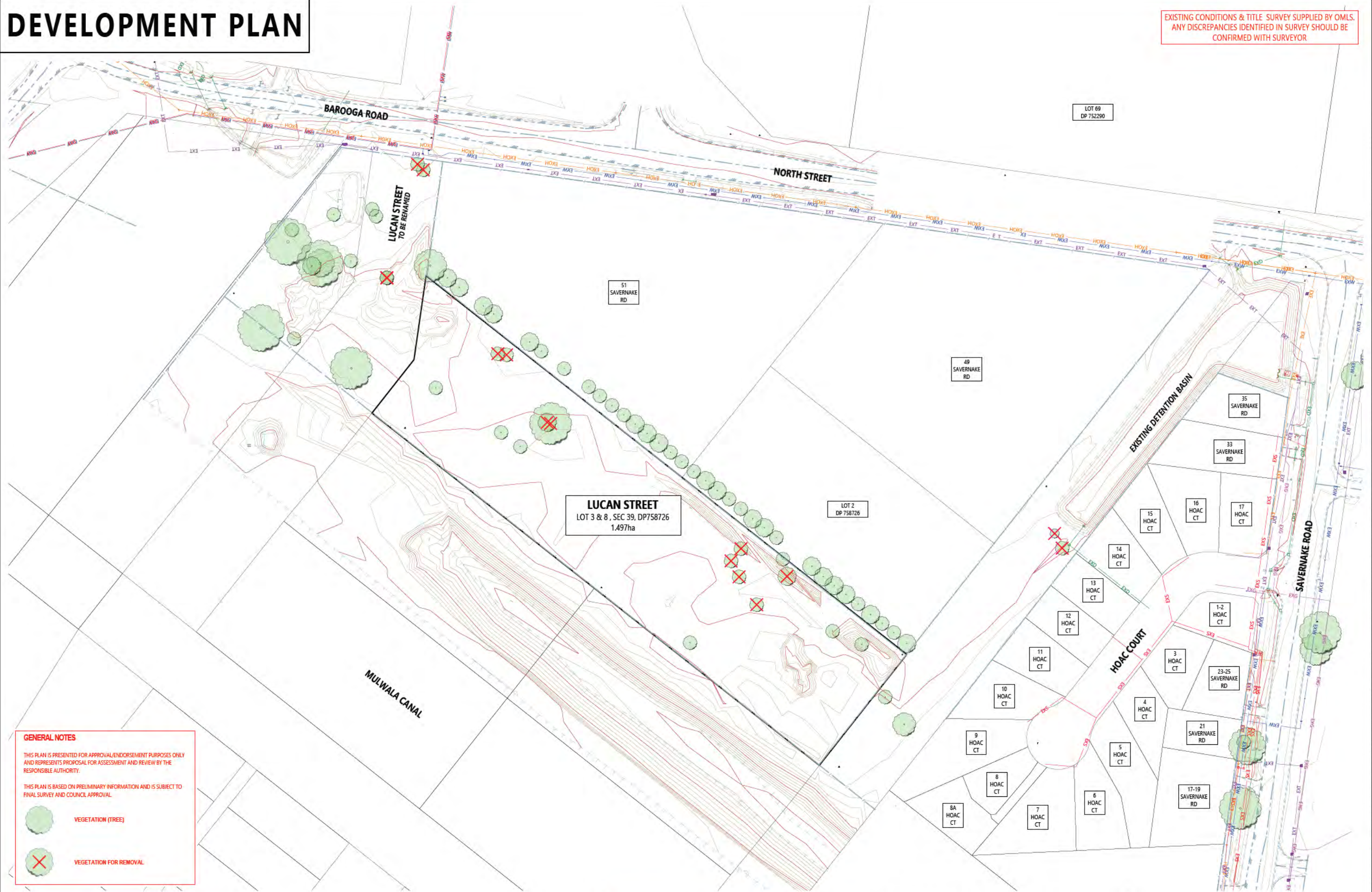
PROJECT & DWG No:
F1328DP01 / 10

REV: X2

X2	RESPONSE TO COUNCIL RF1	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	
REV	DESCRIPTION	DATE

DEVELOPMENT PLAN

EXISTING CONDITIONS & TITLE SURVEY SUPPLIED BY OMLS.
ANY DISCREPANCIES IDENTIFIED IN SURVEY SHOULD BE
CONFIRMED WITH SURVEYOR



GENERAL NOTES

THIS PLAN IS PRESENTED FOR APPROVAL/ENDORSEMENT PURPOSES ONLY AND REPRESENTS PROPOSAL FOR ASSESSMENT AND REVIEW BY THE RESPONSIBLE AUTHORITY.

THIS PLAN IS BASED ON PRELIMINARY INFORMATION AND IS SUBJECT TO FINAL SURVEY AND COUNCIL APPROVAL.

VEGETATION (TREE)

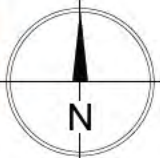
VEGETATION FOR REMOVAL

REV	DESCRIPTION	DATE
X2	RESPONSE TO COUNCIL RF1	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	



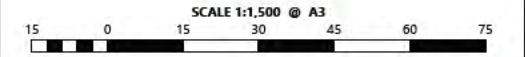
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RESIDENTIAL SUBDIVISION
LUCAN STREET, MULWALA
8/39/758726 & 3/39/758726

LOCALITY PLAN & COVER SHEET

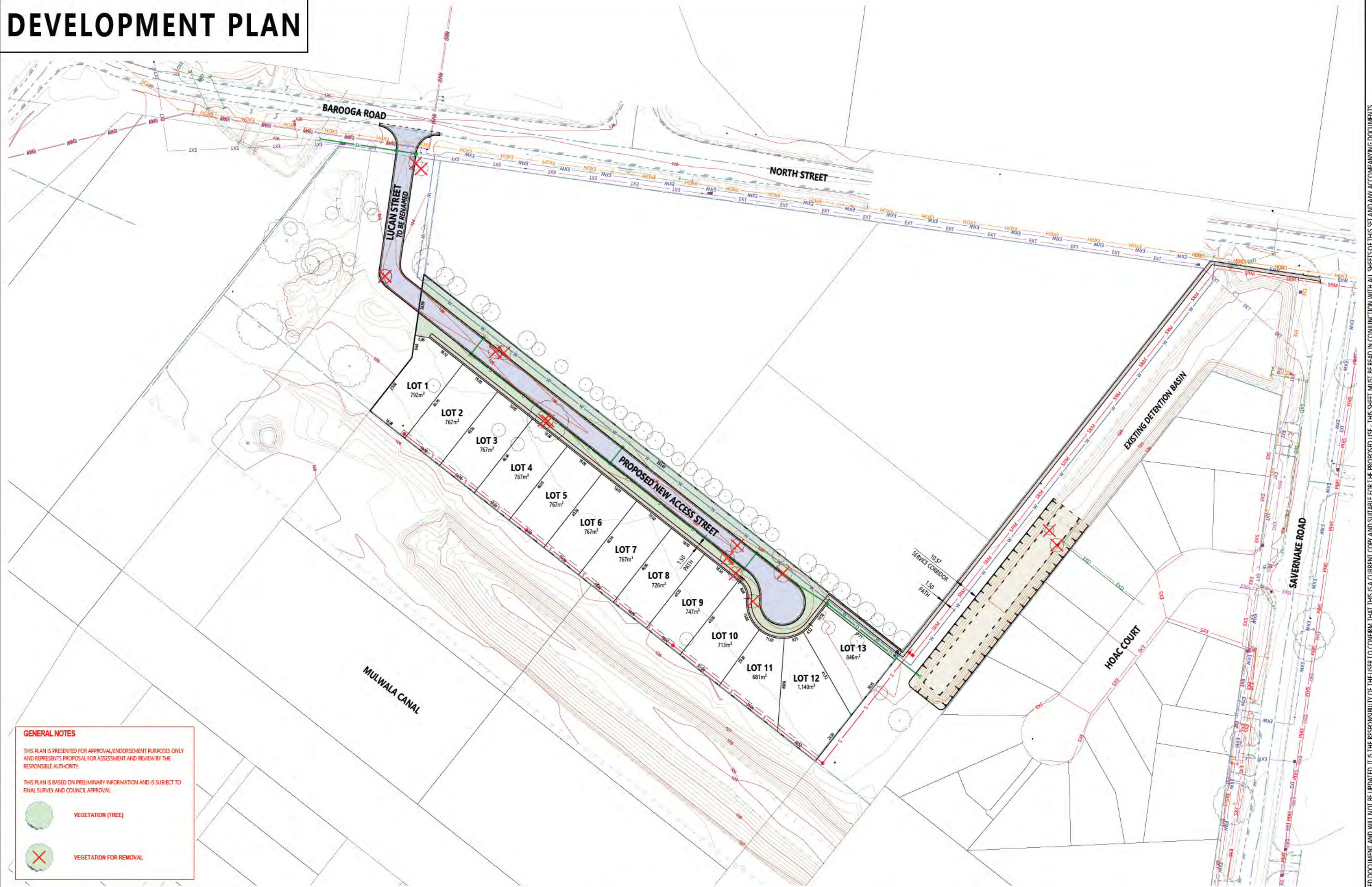


MUNICIPALITY
FEDERATION COUNCIL

PROJECT & DWG No:
F1328DP02 / 10

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DEVELOPMENT PLAN



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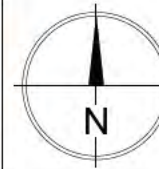
THIS PLAN IS BASED ON PRELIMINARY INFORMATION AND IS SUBJECT TO FINAL SURVEY AND COUNCIL APPROVAL.

-  VEGETATION (TREE)
-  VEGETATION FOR REMOVAL

REV	DESCRIPTION	DATE
X2	RESPONSE TO COUNCIL RF1	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	

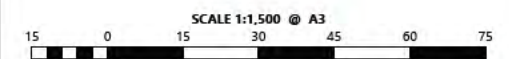


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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726

PROPOSED DEVELOPMENT PLAN



MUNICIPALITY
 FEDERATION COUNCIL

PROJECT & DWG No:
 F1328DP03 / 10

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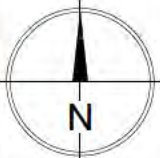
DEVELOPMENT PLAN



REV	DESCRIPTION	DATE
X2	RESPONSE TO COUNCIL RF	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	-

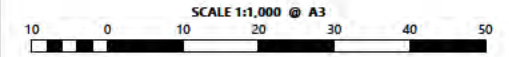


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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726

PROPOSED PLAN OF SUBDIVISION

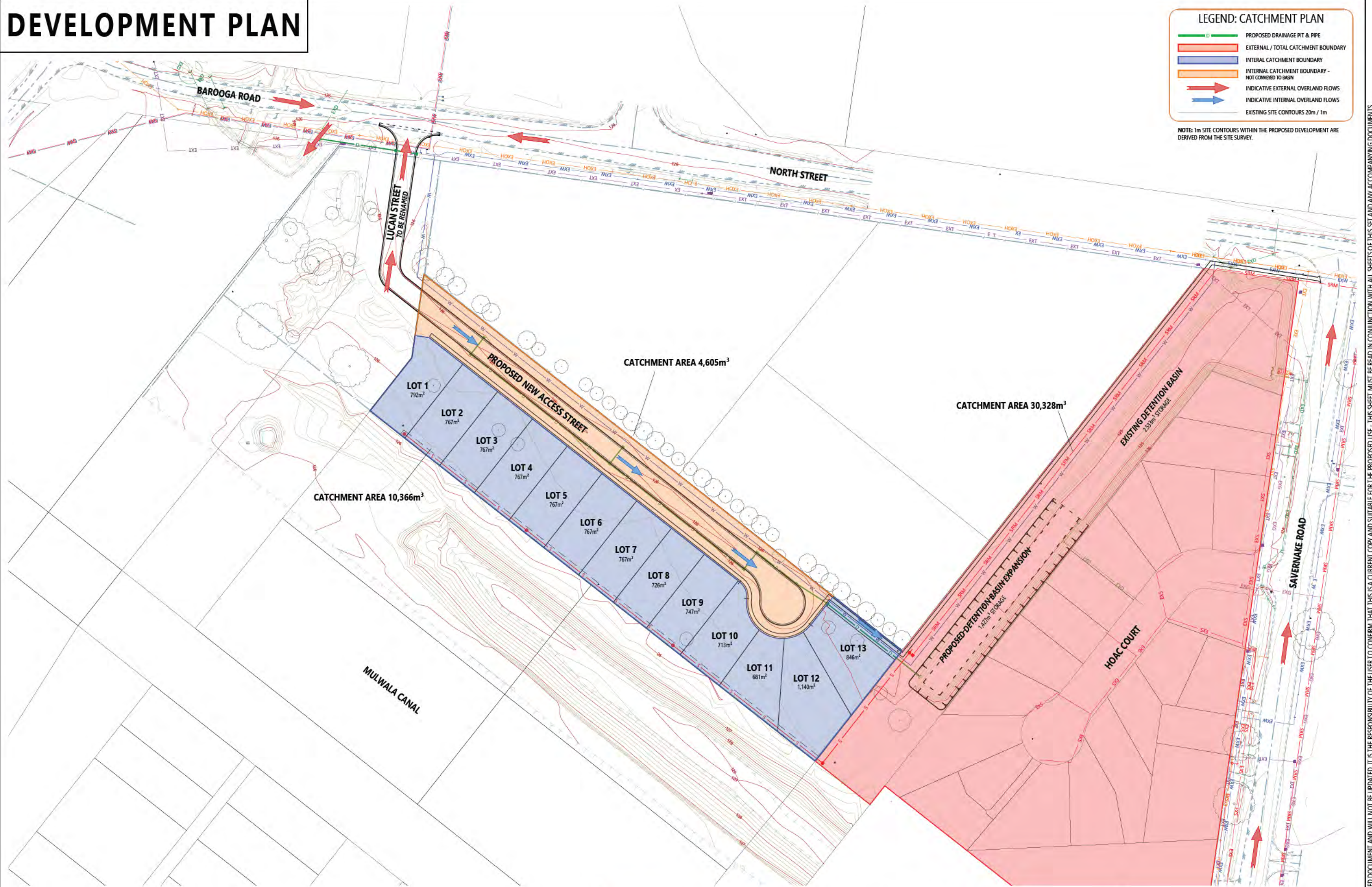


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DEVELOPMENT PLAN



LEGEND: CATCHMENT PLAN

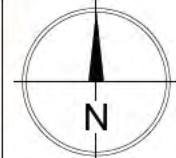
- PROPOSED DRAINAGE PIT & PIPE
- EXTERNAL / TOTAL CATCHMENT BOUNDARY
- INTERNAL CATCHMENT BOUNDARY
- INTERNAL CATCHMENT BOUNDARY - NOT CONVEYED TO BASIN
- INDICATIVE EXTERNAL OVERLAND FLOWS
- INDICATIVE INTERNAL OVERLAND FLOWS
- EXISTING SITE CONTOURS 20m / 1m

NOTE: 1m SITE CONTOURS WITHIN THE PROPOSED DEVELOPMENT ARE DERIVED FROM THE SITE SURVEY.

REV	DESCRIPTION	DATE
X2	RESPONSE TO COUNCIL RF1	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	

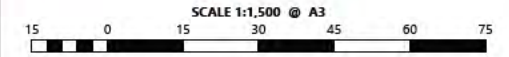


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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726

DRAINAGE CATCHMENT PLAN

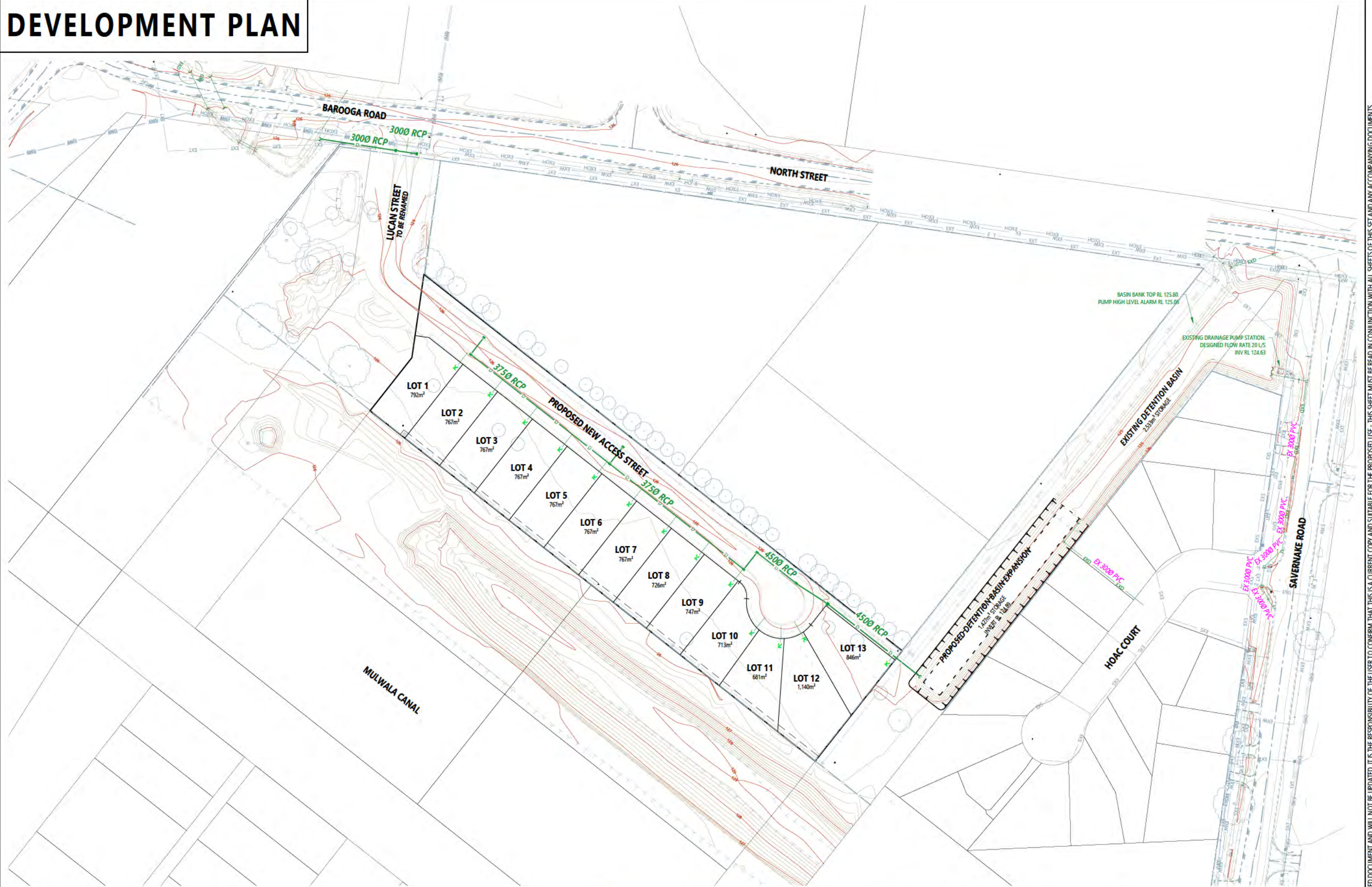


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PROJECT & DWG No:
 F1328DP05 / 10

REV: X2

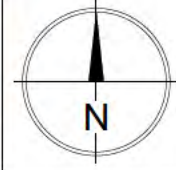
DEVELOPMENT PLAN



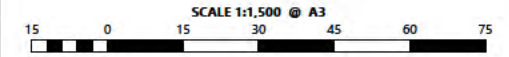
REV	DESCRIPTION	DATE
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X1	PREPARED FOR SERVICING STRATEGY	



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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726
DETAIL PLAN - DRAINAGE

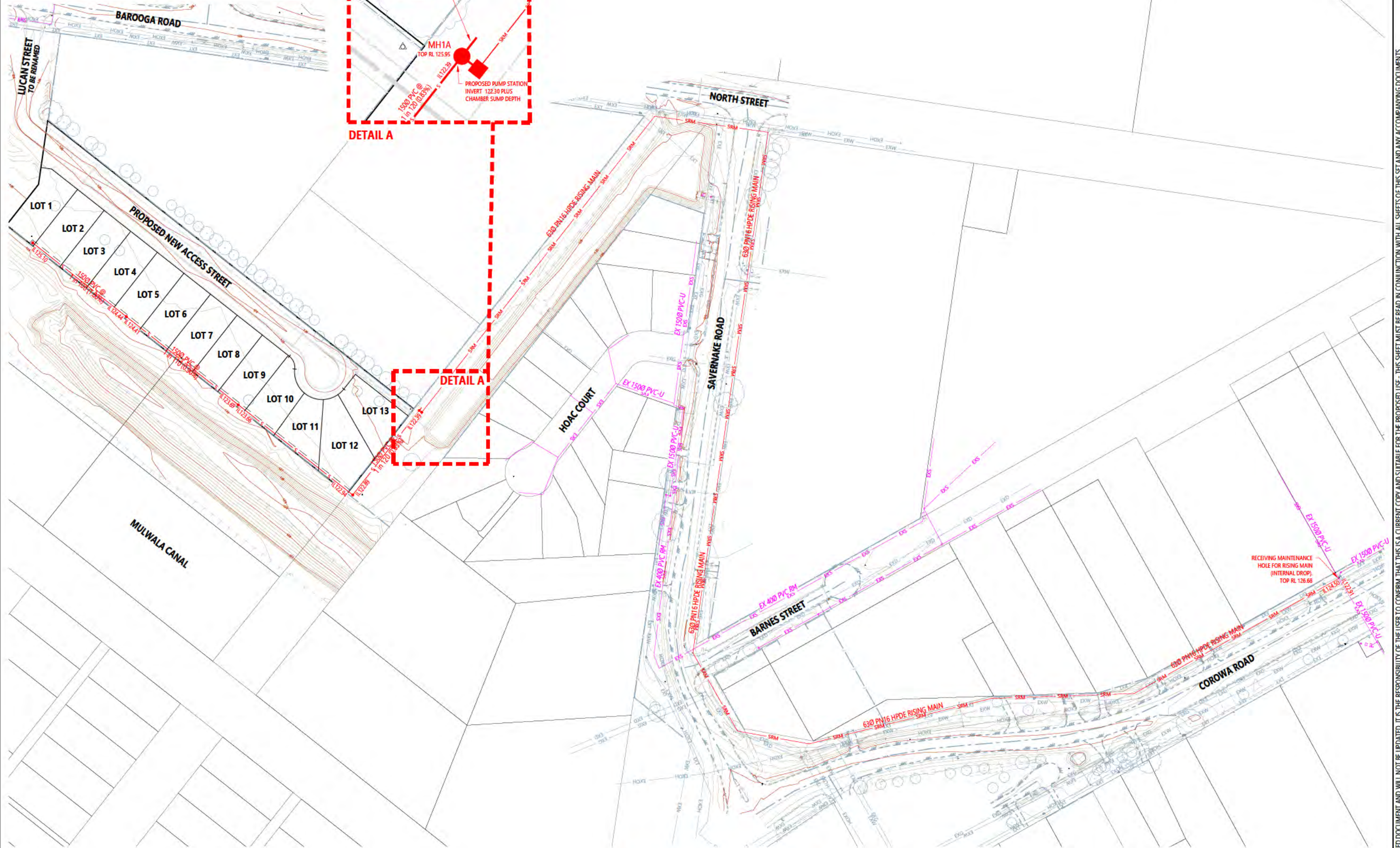


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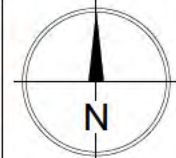
DEVELOPMENT PLAN



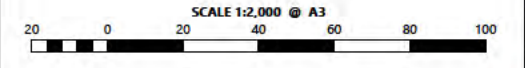
REV	DESCRIPTION	DATE
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X1	PREPARED FOR SERVICING STRATEGY	



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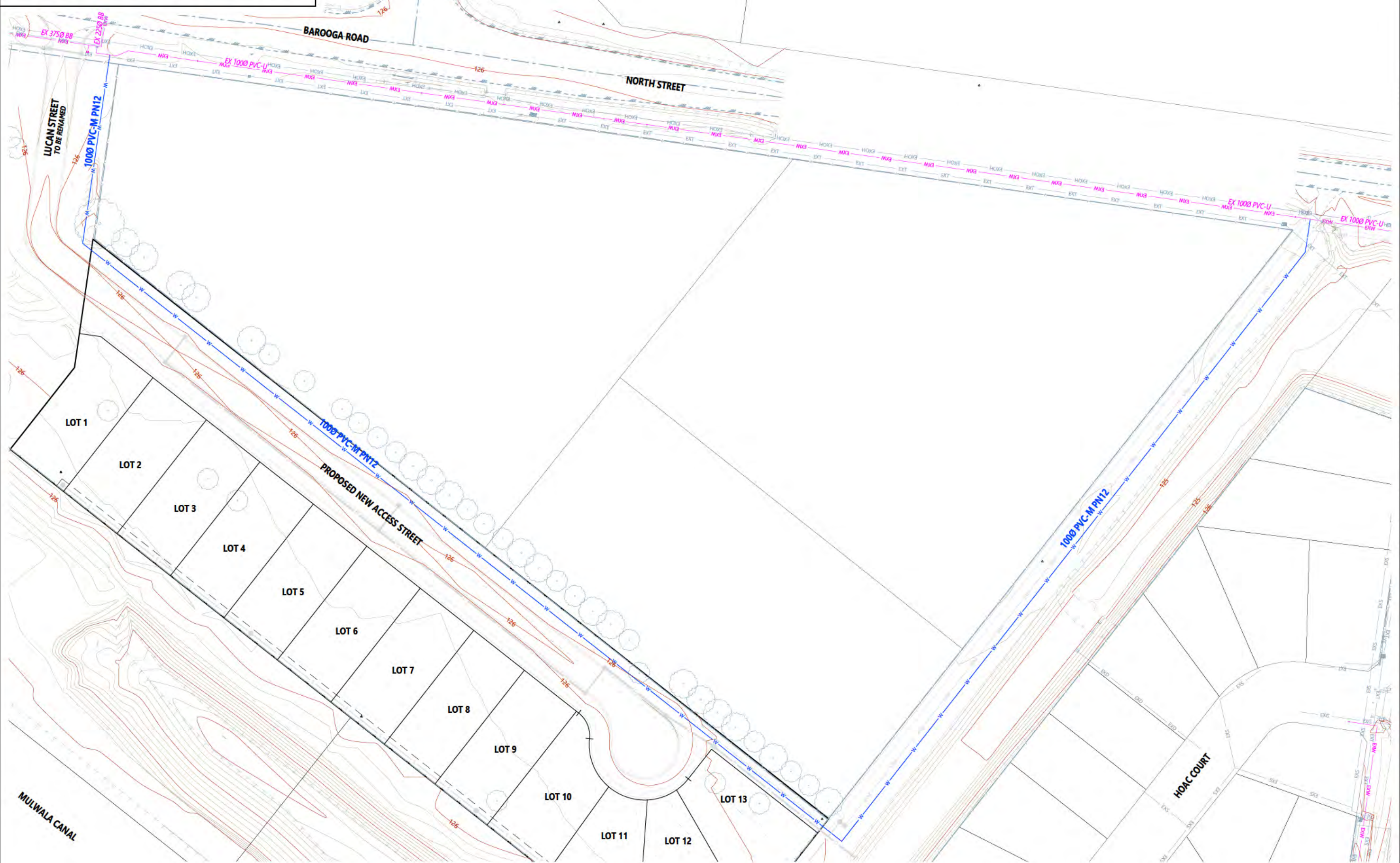
RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726
DETAIL PLAN - SEWER



MUNICIPALITY
 FEDERATION COUNCIL

PROJECT & DWG No:
 F1328DP07 / 10
 REV: X2

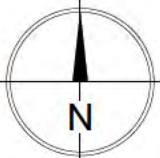
DEVELOPMENT PLAN



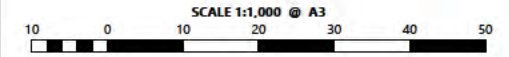
REV	DESCRIPTION	DATE
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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726
DETAIL PLAN - WATER



MUNICIPALITY
 FEDERATION COUNCIL

PROJECT & DWG No:
 F1328DP08 / 10

REV:
 X2

DEVELOPMENT PLAN



CUT/FILL TABLE

No.	MIN LEVEL	MAX LEVEL	COLOUR
1	-1.50	-1.00	Orange
2	-1.00	-0.60	Orange
3	-0.60	-0.30	Orange
4	-0.30	-0.02	Orange
5	0.02	0.30	Blue
6	0.30	0.60	Blue
7	0.60	1.00	Blue
8	1.00	1.50	Blue

NOTES: LEVELS ARE A COMPARISON BETWEEN EXISTING SURFACE & DESIGN SURFACE. BOXING OF ROAD PAVEMENT IS NOT CONSIDERED IN THIS COMPARISON.
NS LEVELS ARE ORIGINAL AS-SURVEYED EXISTING SURFACE LEVELS & FS LEVELS ARE FINAL FINISHED SURFACE

BULK EARTHWORKS VOLUMES:

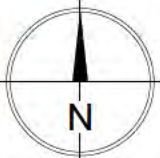
CUT = 2,505.57m³
FILL = 2,599.51m³
BALANCE = -93.94m³

BULK EARTHWORKS VOLUMES ARE APPROXIMATE ONLY AND SUBJECT TO THE ASSUMPTIONS OUTLINED BELOW. ANY DEVIATION FROM THESE ASSUMPTIONS MAY EFFECT THE EARTHWORKS VOLUMES:
- MODEL IS A COMPARISON BETWEEN EXISTING SURFACE AND DESIGN SURFACE ONLY
- VOLUMES DO NOT HAVE ANY BULKING FACTORS APPLIED

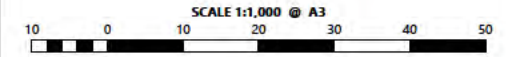
REV	DESCRIPTION	DATE
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RESIDENTIAL SUBDIVISION
LUCAN STREET, MULWALA
8/39/758726 & 3/39/758726
EARTHWORKS PLAN



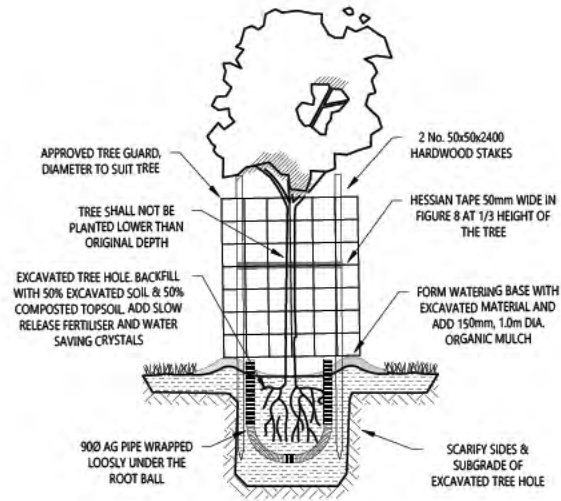
MUNICIPALITY: FEDERATION COUNCIL
PROJECT & DWG No: F1328DP09 / 10
REV: X2

DEVELOPMENT PLAN

LEGEND: LANDSCAPING

- PROPOSED STREET TREE - *Corymbia eximia nana*
- EXISTING TREE - TO BE RETAINED
- ✗ EXISTING TREE - TO BE REMOVED

- NOTE:**
1. ALL TREES WITHIN ROAD RESERVE TO HAVE MINIMUM 1000mm RADIUS MULCH RING SURROUND.
 2. STREET TREES TO HAVE MINIMUM 3.0m CLEARANCE TO DRIVEWAYS.



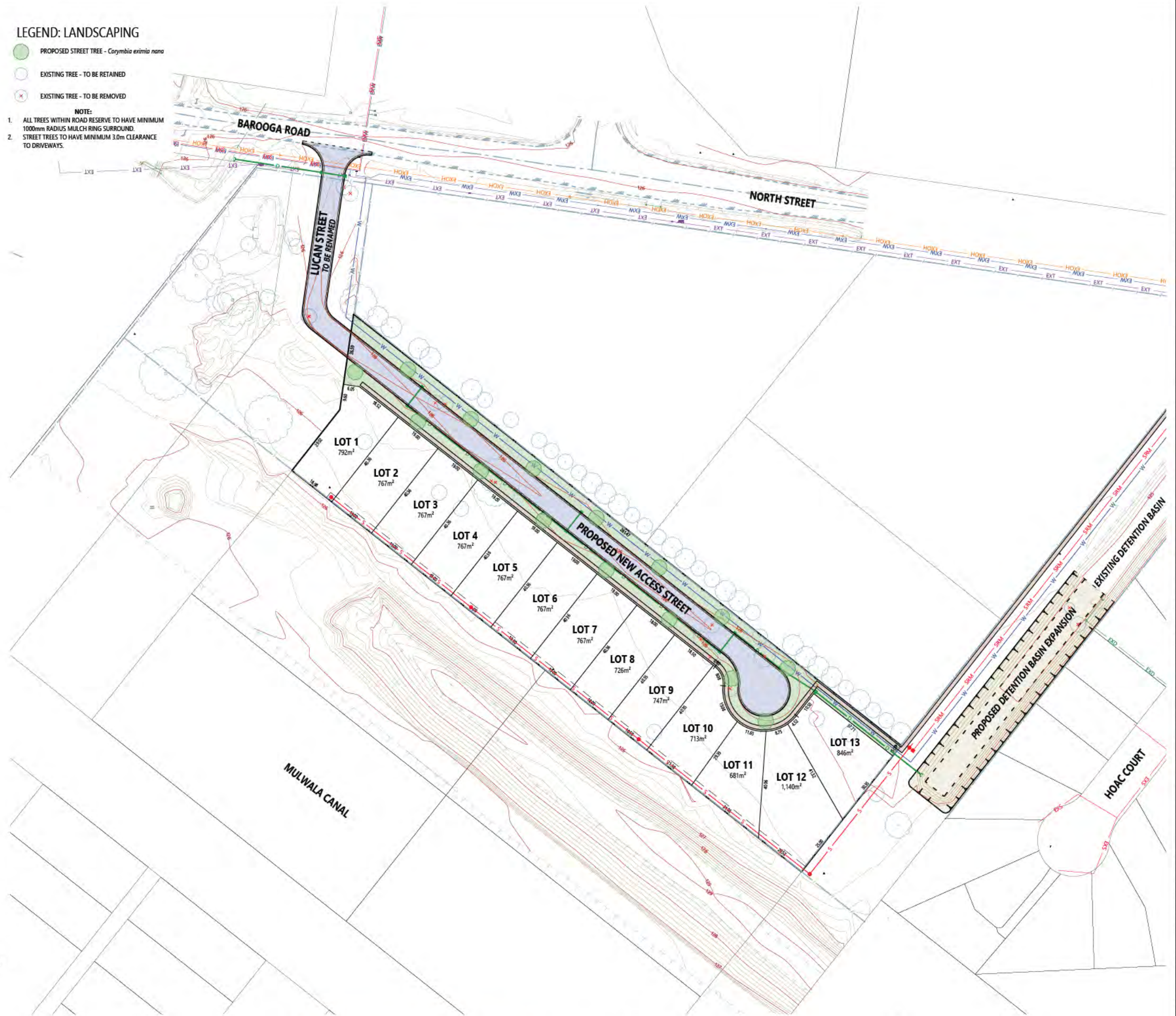
TREE PLANTING DETAIL
SCALE NTS

DWARF YELLOW BLOODWOOD *Corymbia Eximia Nana*

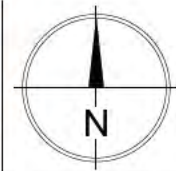


A smaller version of *Corymbia eximia* (syn. *Eucalyptus*), the foliage is broad with a strong green colour and may turn a paler yellow/green in the colder months. The trunk adopts a gnarly, crooked appearance with mottled brown bark and in Spring the tree puts on an eye-catching display covering itself in creamy yellow flowers, attracting nectar loving birds. It is used extensively in streetscapes due to its restricted size.

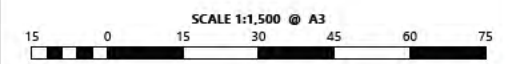
Tree Type: **Evergreen Native** Size: **H: 6-8m, W: 4-6m**
 Soil Type: **Loam, Clay loam, Sand loam (Dry & well-drained)** Drought Tolerant: **Yes**
 Frost Tolerant: **Yes, once established** Sun/Shade: **Full Sun (80-100%)**



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RESIDENTIAL SUBDIVISION
 LUCAN STREET, MULWALA
 8/39/758726 & 3/39/758726
LANDSCAPE PLAN



MUNICIPALITY
 FEDERATION COUNCIL

PROJECT & DWG No:
 F1328DP10 / 10

REV:
X2

REV	DESCRIPTION	DATE
X2	RESPONSE TO COUNCIL RFI	15.07.2024
X1	PREPARED FOR SERVICING STRATEGY	

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Residential Subdivision
Lucan Street, Mulwala

SEPTEMBER 2024

Submitted to Federation Council
Report Version: 02

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1. Introduction

This Statement of Environmental Effects (SEE) has been prepared on behalf of the landowner and is submitted to Federation Council in support of a Development Application (DA) for a thirteen (13) Lot subdivision of land described as Lot 3 and 8, Section 39 in DP758726 and addressed as Lucan Street, Mulwala.

The DA and this report have been prepared in accordance with the *Environmental Planning and Assessment Act 1979* ("EP&A Act") and the *Environmental Planning and Assessment Regulation 2021* ("EP&A Regs"). The Report addresses the relevant heads of consideration listed under *Section 4.15(1)* of the EP&A Act and provides an assessment of the proposed development against the relevant Environmental Planning Instruments (EPIs) and other planning controls applicable to the site and to the proposal. The report also provides a description of the site and its surrounding context and an assessment of the environmental impacts.

The proposal is compliant with applicable provisions of the relevant EPIs and given the absence of any significant adverse environmental impacts, the DA is considered to be in the public interest.

This application is supported by the following documentation:

- Title Details and Plans
- Plan of Subdivision
- Infrastructure Servicing Report
- Stormwater Management Strategy
- DCP Compliance Tables

2. Site Analysis

The subject land to which this application relates is described as Lot 3 and Lot 8, Section 39 in DP758726, and addressed as Lucan Street, Mulwala. The site is approximately 1.2 kilometres northeast of Melbourne Street/Inglis Street intersection in the Mulwala town centre.

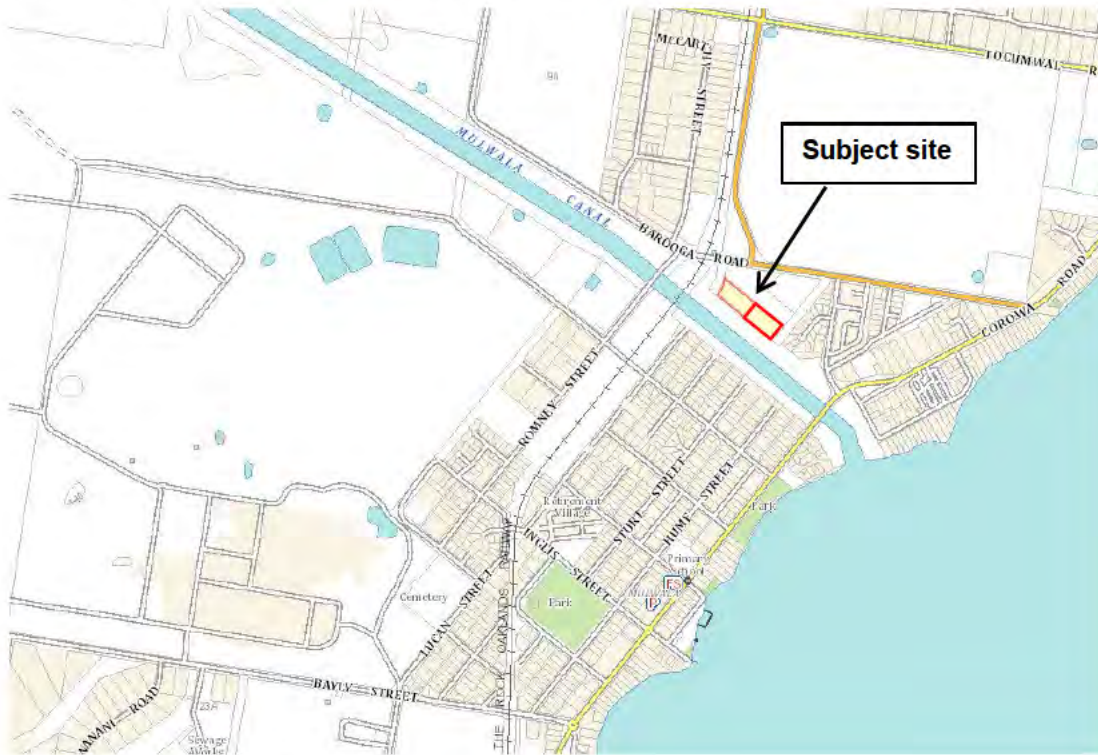


Figure 1 – Site Context Map

Table 1 – Site Description

Legal Description	Lot 3 and 8, Section 39 in DP758726
Address	Subject site is addressed as North Street, Mulwala. It fronts an unmade road reserve known as Lucan Street.
Site Location	The site is situated on the northern bank of the Mulwala Canal, and is bounded by Lucan Street (West), Mulwala Canal and its associated northern open space (South), Drainage Reserve (East) and existing residential land fronting North Street to the North.
Site Description	<p>The site comprises two allotments and has a road frontage to the west of approximately 65 metres to an unformed Lucan Street. The site is polygonal in shape and covers an area of 14,987m² (1,49ha).</p> <p>There appears to be no significant undulations or slopes across the site, with a reasonable flat topography present.</p>
Existing Development	The site is cleared of most of the remnant vegetation. There is no current formal use of the site.
Existing Access	<p>Lucan Street is an unformed council road which connects to North Street/ Barooga Road which is a sealed council collector road/street.</p> <p>No formal road access currently applies; however, the developer will construct the unformed segment of Lucan Street linking the site's internal road to North Street/Barooga Road.</p>
Immediate Interfaces	<p>Surrounding uses include established and establishing residential developments, with a selection of small-scale light industrial and commercial retail operations to the northeast and northwest</p> <p>North – Adjacent to the northern boundary is the large residential parcel of land addressed as 51 Savernake Road, Mulwala. A planting of trees assists with forming a natural boundary between the two sites. There is no development immediately adjoining the site.</p> <p>South – Immediately to the south is Mulwala Canal and its associated open space on the northern bank.</p> <p>East – To the east lies undeveloped cleared land that creates a buffer between the subject site and residential dwellings that front Hoac Court.</p> <p>West – Land to the west consists of a drainage reserve and the unformed Lucan Street.</p>
Natural Hazards	None apply.



Figure 2 – Site Aerial (Nearmap December 2023)

3. Description of Proposal

3.1. Overview

This application seeks approval for a thirteen (13) lot Torrens Title subdivision of land, construction of a new road and associated earthworks. The proposed subdivision plan is included **attached** and is reproduced below.

A detailed description of the proposal is provided in the following sections.



Figure 3 – Plan of subdivision

3.2. Residential Subdivision

Approval is sought for a single-stage creation of thirteen (13) Torrens title residential lots from Lot 3 and Lot 8, section 39 in DP758726. Construction of a new internal roadway which will terminate in a cul-de-sac is also proposed. The average size of the lots is 788m², with total area of the lots ranging from 726m² to 1140m².

All thirteen lots will front the constructed internal access road which will be extended from Lucan Street. Lots 1 – 10 will be rectangular in shape and will have approximate lot widths of 19 metres, and a depth of 40 metres. Lots 11 – 13 will front the court bowl of the constructed cul-de-sac. As a result, the irregular polygon shape of these lots is wide enough to allow vehicle access from the internal road, before widening to allow provisions for a dwelling and private open space requirements.

Table 2 below details the summary of the proposed lot areas. **Figure 4** above shows the proposed lot layout of the residential subdivision.

3.3. Proposed Roads

This application seeks approval to construct a new road within the Lucan Street road reserve which is presently vacant. This includes earthworks to establish an internal road to Council's standards.

Access to the development is to be made via the construction of an internal access cul-de-sac street along the north eastern boundary of the proposed lots within the subject site. The new internal road will be constructed to Federation Council's Engineering Guidelines standard with kerb and channel and the appropriate underground drainage infrastructure. Some trees will be removed to accommodate this construction.

3.4. Utilities and Infrastructure

Communications, electricity, and gas is available at or near the subject site. Stormwater, sewer, and water infrastructure is subject to external works. Civil works will be required to extend these services to the proposed lots.

An Infrastructure Servicing Report and Stormwater Management Strategy has been prepared and is attached to this report, detailing the proposed works to be carried out. Further information regarding infrastructure servicing is detailed **attached**.

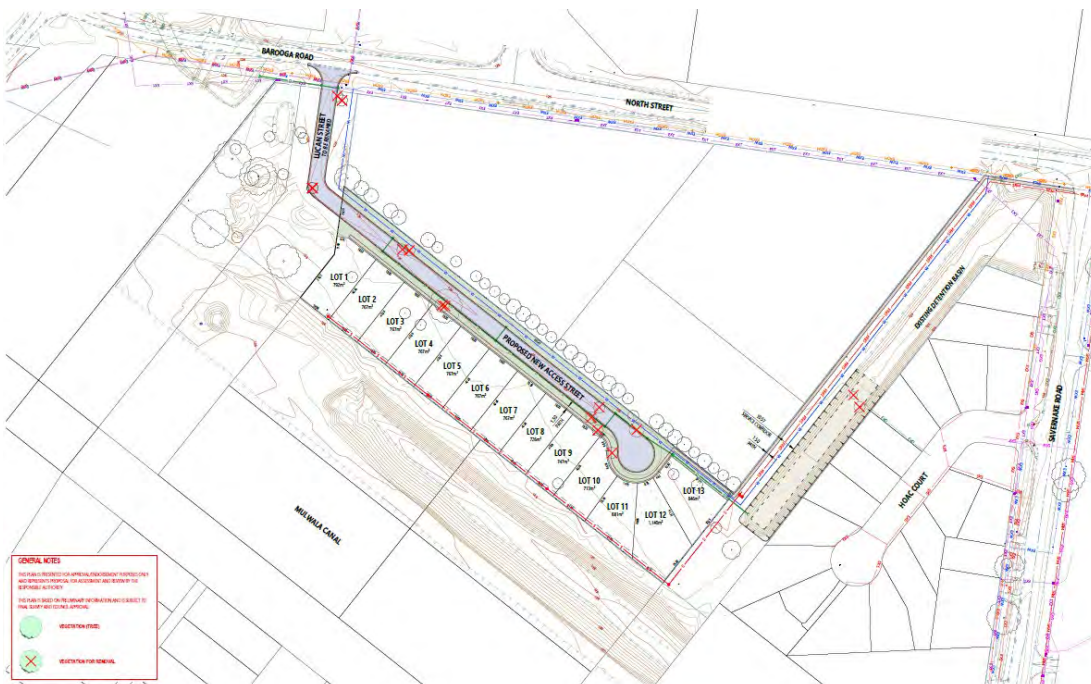


Figure 4 - Proposed roads and infrastructure arrangement plan

4. Planning Assessment

This section considers the planning issues relevant to the proposed development and provides an assessment of the relevant matters prescribed in Section 4.15(1) of the Environmental Planning and Assessment Act 1979 (EP&A Act).

4.1. Applicable Environmental Planning Policies, Instruments and Controls

- Environmental Planning and Assessment Act 1979
- State Environmental Planning Policies
- Corowa Local Environmental Plan 2012
- Corowa Development Control Plan 2013

Compliance with the applicable legislation and policies is discussed below.

4.2. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (“the EP&A Act”) is the principal piece of legislation governing the use and development of land in NSW. Section 4.15 of the Act lists matters for consideration when assessing and determining a development application.

4.2.1. Evaluation

Section 4.15 of the EP&A Act 1979 sets out the statutory matters for consideration against which the proposed development is to be evaluated. The matters for consideration under Section 4.15 are as follows:

(1) Matters for consideration—general

In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:

(a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) any coastal zone management plan (within the meaning of the Coastal Protection Act 1979),

that apply to the land to which the development application relates,

(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

(c) the suitability of the site for the development,

(d) any submissions made in accordance with this Act or the regulations,

(e) the public interest.”

The matters for consideration identified in Section 4.15(1) of the EP&A Act 1979 are addressed by the details provided within this report and technical documents attached.

4.1. State Environmental Planning Policies

An assessment of the proposed development against the relevant State Environmental Planning Policies (SEPPs) is summarised below.

Table 2 – Relevant SEPPs applicable to the development

SEPP	Compliance
<p>State Environmental Planning Policy (Resilience & Hazards) 2021</p>	<p>Chapter 4: Remediation of land</p> <ul style="list-style-type: none"> • The subject land has no known instance of contamination, however some contamination may have occurred over the years due to illegal dumping on the site. If required, a preliminary site investigation will be undertaken to determine if contamination is present, and the recommendations will be suitably implemented. • A review of historical aerial photographs did not reveal any previously contaminating uses. • Consequently, the land is considered fit for use for its intended purposes (residential) and therefore the relevant considerations of SEPP are satisfied by the current proposal.
<p>State Environmental Planning Policy (Transport & Infrastructure) 2021</p>	<p>Chapter 2: Infrastructure</p> <ul style="list-style-type: none"> • Referral under Clause 2.48 will be required to the relevant electricity supply authority due to the proximity of the exposed overhead powerline located on North Street. • The proposed extension of Lucan Street will involve the penetration of ground within 2 metres of the overhead span on North Street.
<p>State Environmental Planning Policy (Biodiversity and Conservation)</p>	<p>Chapter 4: Koala Habitat Protection</p> <ul style="list-style-type: none"> • The provisions of this SEPP apply as the Federation LGA is listed under Schedule 2 of this SEPP. • The land is not considered to represent core koala habitat. The development does not involve the removal of any koala habitat trees, the land is located in in-fill

	<p>development and within a highly urbanised part of Mulwala and adjoins residential development.</p> <p>Chapter 5: River Murray Lands</p> <ul style="list-style-type: none"> • The subject land falls within the area to which Chapter 5 River Murray Lands applies. Part 5.1 aims are to conserve and enhance the riverine environment of the River Murray for the benefit of all users. • Whilst it is acknowledged that the subject land falls within the area of River Murray lands, given the location of the subject in an established residential area of Mulwala, its distance from the Murray River (774m), its separation distance from the Mulwala Canal (70m) and the in-fill location of the subdivision.
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4.2. Corowa Local Environmental Plan 2012

The *Corowa Local Environmental Plan 2012* (“the LEP”) is the principal planning instrument that guides development within the LGA. The subject land and surrounds are zoned R1 General Residential under this Plan.

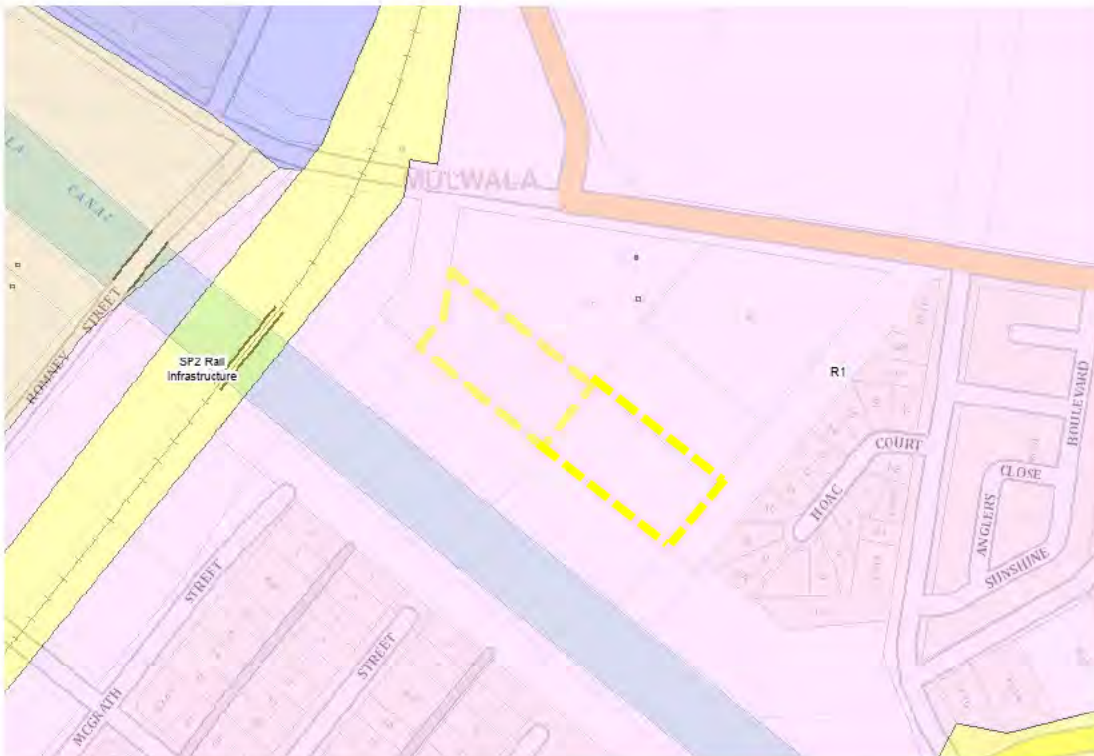


Figure 5 – Extract of Land Zoning Map

The table below provides an overview of consistency and compliance of the proposal against the relevant provisions.

Table 3 – Relevant LEP clauses applicable to the development

LEP Clause	Response
Clause 2.3: Zone objectives and land use table	<ul style="list-style-type: none"> • The subject land is zoned R1 General Residential as per the requirements of the LEP. • Subdivision of the land for residential purposes is considered to be an appropriate activity that meets and complies with the relevant zone objectives for the R1 zone.
Clause 2.6: Subdivision – Consent Requirements	<ul style="list-style-type: none"> • The proposed works are not classified as exempt or complying, and therefore the proposal requires development consent.
Clause 4.1: Minimum Subdivision Lot Size	<ul style="list-style-type: none"> • A 550m² minimum lot size applies to the land. All proposed lots exceed the minimum lot size.
Clause 7.1: Earthworks	<ul style="list-style-type: none"> • The development is seeking to undertake earthworks to provide for new urban services and to provide finished surface conditions for future residential development of the site. • The proposed earthworks will not adversely affect existing drainage conditions or soil stability in the area as it does not involve works to an existing drainage line. • The proposed development will be connected to Council's established drainage network and the land will be stabilised post works.
Clause 7.3: Stormwater Management	<p>This clause applies to all land within a residential zone.</p> <p>The subdivision will achieve the required objectives for stormwater management by:</p> <ul style="list-style-type: none"> • Underground drainage to convey minor storm flows to the proposed stormwater detention basin facility and conveyance to the outfall location via a pump and rising main. • Construction of an overland flow path provided via the subdivision road network.
Clause 7.6: Essential Services	<ul style="list-style-type: none"> • The site appears to have nearby infrastructure providing the site to all required services. • The site will be serviced by the creation of Lucan Street and a new internal road for the site, linking with North Street in the north. • The development will include new sewer provisions to each lot and a new internal sewer pump station. The provision of these services

	<p>has been developed in consultation with Council and have demonstrated to be suitable by the information submitted.</p> <ul style="list-style-type: none"> • Water supply will be provided by way of an extension from the existing watermain on the south side of North Street, along Lucan Street to the development site to service the proposed lots. • Telecommunications services have been identified in North Street on the southern side of the road. • There are electricity services located in North Street which have been deemed suitable for extension to service the proposed lots. • Please refer to the Infrastructure Servicing Strategy attached for further details.
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4.3. Corowa Development Control Plan 2010

The Albury Development Control Plan 2013 (“the DCP”) provides specific requirements for development within the LGA, including the subject site.

The following parts of the DCP set out in the table below are applicable to the proposed works:

Table 4 – DCP Summary Table

DCP Chapters	Response
<p>Chapter 2: Residential Development</p>	<p>Chapter 2 of the DCP refers to development in the residential zones. The proposal is for a subdivision of residential zoned land and therefore, the provisions of Chapter 2 are applicable.</p> <p>The subdivision is consistent with the objectives of the DCP and is compatible with the prevailing subdivision form of the neighbourhood.</p>
<p>Chapter 6: Strategic Land Use Plan</p>	<p>Chapter 6 of the DCP applies to Council’s Strategic Land Use Plan (SLUP), which was prepared to guide the future development and use of land within the Shire for the next 20 years and beyond.</p> <ul style="list-style-type: none"> • The proposed development is generally consistent with the following ‘town development principles’ as it seeks to develop land close to existing development for a residential subdivision. • The proposal maintains separation buffers between industrial and residential areas. • The proposal will limit access points to main roads. • The development could be classed as ‘in-fill’ development within an established residential area.

	<ul style="list-style-type: none"> The proposed lots will be provided with appropriate infrastructure.
<p>Chapter 12: Notification Policy</p>	<ul style="list-style-type: none"> The subject land is zoned R1 General Residential under the LEP and therefore the provisions of Part 12 are applicable. A compliance table assessing the proposal against the provisions of Part 12 is provided attached. In summary, the proposed works comply with the relevant requirements of this part.

5. Assessment of Environmental Impacts

This section of the SEE identifies potential impacts which may occur as a result of the proposed development and are relevant matters for the consideration of the DA under Section 4.15(1)(b) to (e) of the EP&A Act 1979.

These impacts and mitigating measures have been identified following comprehensive analysis of the site and the proposed plans.

The analysis and impact identification under this section is informed by:

- Site analysis and visual inspection of the subject land and surrounding properties.
- Analysis of the proposed plans for development (provided attached for reference)
- Desktop review of applicable Environmental Planning Instruments
- Consideration of the Councils Development Plans and Policies including the DCP
- Assessment of relevant strategic planning documents.
- Consultation with Council and other authorities

5.1. Context and Setting

The proposed development seeks to subdivide two parcels of underutilised residentially zoned land into thirteen Torrens title lots.

The proposed subdivision is located within the urban footprint of the township of Mulwala and is not constrained by natural hazards, it presents as an opportunity to increase the housing supply in central Mulwala.

The proposed lot configuration and density could be classed as infill development, and the development responds to the surrounding subdivision character of the area and is generally in compliance with the Corowa DCP, and LEP; specifically, the objectives of the R1 zone. The site is near to infrastructure, and the retail and health services expected of a regional town.

No perceived land use conflicts are expected as a result of the subdivision. The site is setback 90m from the adjoining rail line to the west, 190m from land zoned E4 General Industrial to the northwest, and 550m from Mulwala Foreshore Land to the east.

The outcome of the proposed subdivision is the provision of thirteen large residential lots for the sites future development of detached residential dwellings. This is considered orderly planning for a regional town and will assist in supplying additional residential land for future dwelling options.

5.2. Access & Traffic

The subject site has no formal road access arrangements in place at the time of writing. As part of the subdivision works it is expected that the developer will construct the unformed segment of Lucan Street linking the site's internal road to North Street/Barooga Road. This will be built to Federation Council Standards for an Access Street from North Street for the full development frontage (Infrastructure Servicing Report, p. 2).

An internal access road with a cul-de-sac termination will provide vehicle access to the proposed lots, and all lots will front, and get access to the new internal road.

The existing roads, with appropriate upgrade works, will be sufficient to accommodate the additional traffic from the proposed lots.

5.3. Infrastructure & Servicing

Existing urban infrastructure, including reticulated water, sewer, electricity, and communications is available in the surrounding area and is capable of being extended to service the proposed lots.

Sewer

Sewerage infrastructure will be extended to the site as part of the subdivision works. The site proposes a new internal reticulated gravity sewer network with a newly proposed sewer pump station. The pump station capacity will be 3.1L/s. The sewer pump station will discharge via a rising main from the site to Savernake Road and will traverse to Corowa Road to an existing manhole at the Frontage of 36-40 Corowa Road Infrastructure Servicing Strategy, p. 8). Pump capacity will be limited to 3.1L/s for the manhole.

Stormwater

Stormwater detention for the subdivision will be provided to the east of the development in the adjoining buffer zone between the subject site and Hoac Court. This will be in the form of a constructed wetland facility to mitigate effects of increased runoff on the downstream network. The detention basin will store a maximum of 1,427m³ of stormwater.

In a weather event, stormwater will be directed from the lots to drainage infrastructure constructed under the proposed internal road. Stormwater will then flow via newly constructed pits and pipes to the proposed detention basin.

Storage will be provided to detain a minor 20% AEP storm event, and a major 1% AEP storm event with restricted outfall (pump capacity). Further detail is provided in the attached Stormwater Management Strategy.

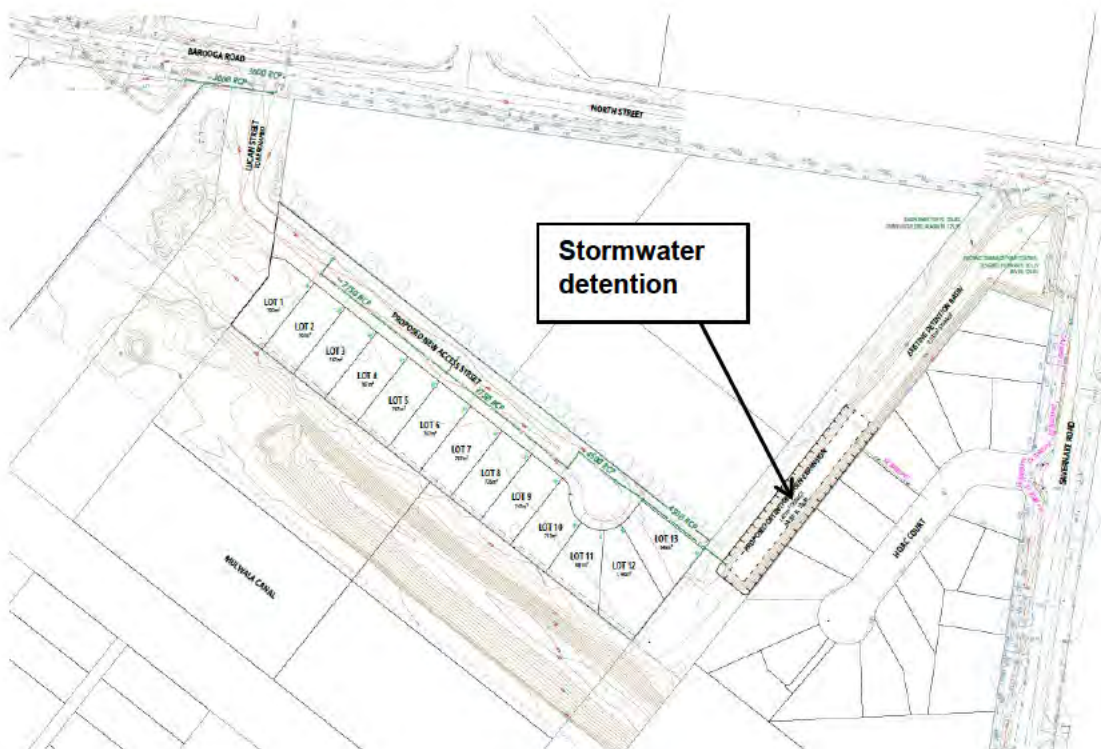


Figure 6 – Proposed drainage servicing

Water

An existing DN100 watermain is located on the south side of North Street and is available to the subject site. To service the thirteen lots, a connection will be made to this main to extend along Lucan Street to the internal access road.

All reticulated water supply mains, including any upgraded mains, will be subject to BSC & WSA standards and requirements. Installation of hydrant fittings will be spaced and signposted/marked as per the relevant guidelines to residential subdivisions. A nominal 60m interval will be adopted for the hydrant fittings.

Electricity

Preliminary designs for the purposes of this application were not available at the time of planning for the development. Essential Energy could not provide a Design Information Pack without a copy of the site's determination.

The Infrastructure Servicing Strategy determines that:

Based on information from the site survey, inspection and BYDA search there appear to be adequate infrastructure located in all the roads bounding the subject site. Overhead lines in North Street will be available to the subject site via an OH/UG cable route. It is unknown until consent is received whether a substation will be required for the development.

Under Essential Energy's supply policy guidelines, the Developer will be required to pay for the cost of extending/upgrading the power supply if required. Design and construction of the mains extension and supply will be subject to Level 3 ASP design works with HV works to be installed by Level 1 ASP. Essential Energy standards and regulations will need to be complied with for these works (p.10).

Gas

Gas infrastructure is present within the Barooga Road/North Street Road reservation area. The developer is responsible to bring Gas infrastructure to the entrance of the subject site, with APA Group indicating that they will finance internal reticulation.

Telecommunications

As of March 2024, Telstra coverage for the subject site includes 5G, 4G and 3G cellular networks. Optus and Vodafone coverage includes 4G and 3G coverage. National 3G coverage is being decommissioned in late 2024.

The National Broadband Network (NBN) has infrastructure in place on North Street, that will require extending to service the subdivision.

5.4. Heritage

The site is not identified as being a heritage item or within a Heritage Conservation Area.

5.5. Cultural Heritage

The subject land is a highly modified site and has been previously subdivided and developed and has very little likelihood of containing any items of cultural heritage. There are also no significant landscape features that would indicate an increased likelihood.

A review of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken on 25th March 2024, and it is confirmed that there are no recorded items or places of Aboriginal cultural significance within 200 metres of the subject site.

Notwithstanding, in the event that the applicant does identify or uncover archaeological items during works, the items will be left in place and appropriate protocols for dealing with such instances will be observed ('unexpected finds protocol').

5.6. Soils & Erosion

Disturbance of the site for civil works for the establishment of lots and services is required. The works will disturb and expose soils on the site. This has the potential to cause erosion and/or transfer of sediment.

During the establishment phase, controls relating to soil and water management, sediment fencing, drainage lines, and stabilised access areas will be implemented to prevent sediment loss.

Stabilisation will be carried out on the disturbed areas of the site following the completion of the works. It is expected that this will reduce the likelihood of erosion occurring.

Sediment fencing and other treatments will remain in place until all suitable treatments have been undertaken and the site is stable.

5.7. Social & Economic Impacts

The subdivision will have a positive social and economic impact to Mulwala by increasing the supply of residential lots, that are serviced with essential infrastructure and close to the services and amenity of the Mulwala township.

The ongoing activation of the site will see the utilisation of trades and an increase demand for construction materials, with direct and indirect flow on effects to the local economy.

5.8. Suitability of the Site for Development

The proposed subdivision represents infill development on a previously cleared and subdivided site. The site is located within the urban area of Mulwala and will have access to all reticulated services and an internal road reserve, to be provided as part of this proposed development. The land is appropriately zoned as R1 General Residential and is not affected by any natural hazards.

The proposed lots are of a generous size and reflect the prevailing subdivision form of the surrounding area. All lots will be able to provide a future dwelling that generally complies with the Corowa LEP and DCP controls.

The preferred residential character of Mulwala will be upheld by the proposed subdivision, there are no perceived land-use conflicts. Therefore, the site is suitable for a residential subdivision and subsequent development.

5.9. The Public Interest

The proposal will deliver additional residential lots within an area of zoned R1 land, delivering additional housing opportunities within Mulwala.

The development of land in an orderly and economic way is in the public interest.

6. Conclusion

This DA seeks consent for a 13 Lot residential subdivision of land described as Lot 3 and Lot 8, Section 39 in DP758726 and addressed as Lucan Street, Mulwala.

As demonstrated by the assessment within this submission, the proposal satisfies the intent of the provisions of the applicable EPIs and will result in a positive development outcome in terms of social, environmental, and economic impacts.

Having regard for the content of this report, the proposal deserves the support of Council because it is consistent with the relevant environmental planning instruments and development control plan, will provide for a development which is responsive to its context and setting, being a growing low-density residential area set within the Mulwala urban footprint and will not have any adverse environmental or social impacts.

Appendix A: Plan of Subdivision

Appendix B: Infrastructure Servicing Strategy

Appendix C: Stormwater Management Strategy

Appendix D: DCP Compliance Tables

Table 5 – Compliance table for Residential Development– Chapter 2

Controls	Complies	Comment
2.1 Neighbourhood Character		
Proposals are to be designed to suit the existing scale, density, setbacks and character of the neighbourhood.	Complies	<p>The proposal is for a thirteen (13) lot Torrens title subdivision.</p> <p>The subdivision has been designed to suit the existing scale, density, and prevailing subdivision character of the area, especially the adjoining residential development 50m to the east at Hoac Court.</p> <p>No additional development beyond subdivision and infrastructure servicing is proposed at this stage. All lots are designed to be large enough to accommodate a single residential dwelling which can comply with scale and setback requirements of the Corowa DCP.</p>
No more than two dwellings should be provided within any one building (unless proposed as a residential flat building).	Not Applicable	Not applicable as the development does not propose a new dwelling.
The density of proposals in the R1 and/or RU5 zones at the interface with the R2 and/or R5 zones shall be varied to provide a transition from higher to lower residential density.	Not Applicable	The subject land does not adjoin an R2 or R5 zone.

Controls	Complies	Comment
2.2 Streetscape		
Dwellings are to 'face' street frontages	Not Applicable	At this stage, no dwellings are proposed. All future dwellings can be appropriately designed to face the internal access road.
The rear or service areas of a dwelling (bathrooms, laundry, etc) shall not face a primary street frontage or be visible from a secondary street frontage.	Not Applicable	None proposed.
<p>Fences on street frontages and side boundaries forward of the front building line are to be a maximum height of 900mm except for properties on:</p> <ul style="list-style-type: none"> • eastern side of River Street, South Corowa • eastern side of Thomas Avenue, Corowa • eastern side of Talbot Crescent, Corowa • eastern side of Banksia Drive, Corowa • Redlands Road, Corowa • Honour Avenue, Corowa • Federation Drive, Corowa • Spring Drive, Corowa 	Not Applicable	The development does not address any of these road frontages and does not propose any new fence.

Controls	Complies	Comment
<ul style="list-style-type: none"> • Melbourne Street, Mulwala • Corowa Road, Mulwala • eastern side of Lang Street, Mulwala <p>for which masonry fences up to 1.8m in height are permitted.</p>		
<p>All fences forward of the front building line are to be designed to make a positive contribution to the streetscape.</p>	Not Applicable	As above, no fencing is proposed.
<p>High quality materials and finishes should be used for residential building exteriors as well as any fences constructed as part of the development.</p>	Not Applicable	Not Applicable as no new dwelling is proposed.
<p>Double garages must not extend across more than 50% of the lot frontage.</p>	Not Applicable	The development does not propose any double garages.
<p>2.3 Site requirements</p>		
<p>As per General Housing Code in Subdivision 2, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.</p>	Noted	The proposal is for subdivision only.
<p>2.4 Building heights</p>		

Controls	Complies	Comment
As per General Housing Code in Clause 3.13, Subdivision 3, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	No building is proposed as part of this application.
2.5 Building setbacks		
A 1m wide articulation zone for no more than 25% of the frontage of the building is permitted within the front building setback.	Not Applicable	No building is proposed as part of this application.
A garage must be setback a minimum 1m behind the front building line if the building is at the minimum setback distance.	Not Applicable	None proposed.
As per General Housing Code in Subdivision 3, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	As above.
2.6 Privacy & amenity		
Balconies that permit overlooking in to a neighbouring property's living areas or private open space areas will be considered inconsistent with the objective of this control.	Not Applicable	No balcony is proposed.

Controls	Complies	Comment
Noise transmission between attached dwellings is to comply with the Building Code of Australia. Swimming pools and other recreational areas are not encouraged close to neighbour's living areas and bedrooms.	Not Applicable	No attached dwelling, swimming pools or recreational area is proposed.
External lighting shall be baffled so there is no light spillage onto adjoining properties.	Not Applicable	Not applicable as no dwelling is proposed.
As per General Housing Code in Subdivision 3, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	As above.
2.7 Landscaping		
A minimum of 15% of a lot area should have a surface permeable to water.	Complies	All proposed lots will have the capacity to accommodate a residential dwelling, with a minimum of 15% of the lot area's surface permeable to water.
Existing mature trees should be incorporated in the development wherever possible. Selection of species should have regard to the surrounding context and Council's preferred species list.	Complies	The proposed subdivision will incorporate mature trees where possible.

Controls	Complies	Comment
Wherever possible native plant species are to be utilised in landscaping with preference given to drought tolerant species.	Not Applicable	Not applicable as no additional landscaping is proposed.
Deciduous species of trees to be used in open space located on the northern side of living areas.	Not Applicable	Not Applicable
Landscaping must comply with that shown on the approved BASIX certificate for the dwelling.	Not Applicable	Not Applicable
As per General Housing Code in Clause 3.24, Subdivision 4, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	Not Applicable
2.8 Private open space		
<p>Private open space (i.e. space that is not visible at ground level from a public place or adjoining property) is to be provided at the rate of:</p> <p>30m² for a one bedroom dwelling.</p> <p>50m² per two or more bedroom dwelling.</p>	Not Applicable	No dwelling is proposed at this stage. All lots will have the capacity to provide at least 50m ² of private open space at future dwelling construction stages.

Controls	Complies	Comment
The principal private open space is to be in close proximity to the main living area of the dwelling.	Not Applicable	No dwellings are proposed at the subdivision stage. Any future design can comply with this control.
As per General Housing Code in Clause 3.25, Subdivision 4, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	As above.
2.9 Car parking & access		
As per General Housing Code in Subdivision 5, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	Not applicable as the proposal is for subdivision only.
2.10 Earthworks & drainage		
As per General Housing Code in Subdivision 6, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Complies	<p>The proposed subdivision will include earthworks to establish the new internal access road which will terminate in a cul-de-sac. Minor fill will be required so drainage can convey flows to the extended infrastructure.</p> <p>The scale of the proposed earthworks is minor and can readily comply with this provision. See attached earthworks plan for further detail.</p>

Controls	Complies	Comment
2.11 Ancillary development		
As per General Housing Code in Subdivision 7, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	Not applicable as the proposal is for subdivision only.
2.12 Outbuildings		
Outbuildings will be subject to notification in accordance with Council's Notification Policy to all potentially affected neighbours.	Not Applicable	Not applicable as no outbuildings are proposed by this application.
Where valid objections are received to an application for an outbuilding, it will be deemed to be inconsistent with the objectives for this section.	Not Applicable	As above.
Outbuildings must be necessary and ancillary to the residential use of the land.	Not Applicable	As above.
Outbuildings must not be used for or associated with commercial or industrial purposes, unless permissible and approved by Council.	Not Applicable	As above.

Controls	Complies	Comment
Outbuildings must be constructed of material matching the colour of the associated residence or be generally compatible with other development in the neighbourhood.	Not Applicable	As above.
Outbuildings shall be located behind the dwelling.	Not Applicable	As above.
Outbuildings shall not detrimentally impact on the amenity of the surrounding area.	Not Applicable	As above.
Outbuildings shall be set back at least 1m from the side and rear boundaries or with consideration to any other relevant constraints.	Not Applicable	As above.
<p>The maximum wall height for outbuildings shall be:</p> <ul style="list-style-type: none"> • 2.7m for floor area less than 60m² • 3m for floor area 60m² or more. 	Not Applicable	As above.
The maximum roof height for outbuildings shall be 3.9m above natural ground level.	Not Applicable	As above.

Controls	Complies	Comment
Outbuildings shall be constructed of material that is deemed to have a low reflective surface by the Council's Director Environmental Services.	Not Applicable	As above.
Outbuildings shall not be erected on vacant land unless consent for a dwelling has been approved.	Not Applicable	As above.
2.13 Development standards for particular land		
As per General Housing Code in Subdivision 9, Division 2, Part 3 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.	Not Applicable	Not applicable as no dwelling is proposed for the newly created lots. Notwithstanding, the site is not flood prone or bushfire prone.
2.14 Site facilities		
Service metres shall not be placed on the street frontage of the building	Noted	Noted.
Clothes drying facilities are to be provided within the private open space of each dwelling.	Noted	Noted.

Controls	Complies	Comment
The mail box design and location should be complementary to the front setback landscaping and the dwelling design.	Noted	Noted.
Garbage bins for each unit are to be stored within the building or private open space. If a common bin storage area is proposed, it shall be located in a screened enclosure central to the development.	Not Applicable	No dwellings are proposed.
2.15 Security		
The site layout is to be designed to enhance personal safety and minimise the potential for fear, crime and vandalism.	Not Applicable	Not applicable as the proposal is for subdivision only. The proposed lots will be oriented towards the internal access road. This will allow future dwellings to address the street, and to provide passive surveillance. Passive surveillance will assist in mitigating potential crime, vandalism, and for the enhancement of personal safety.
The design of dwellings enables residents to survey streets, public areas and dwelling entries to enable surveillance of the neighbourhood to take place.	Not Applicable	As above.
Adequate lighting must be provided for all paths, access ways, parking areas and building entries.	Not Applicable	As above.

Controls	Complies	Comment
Private open space should only be accessed from within the site i.e. not accessible directly from the street or other public space.	Not Applicable	As above.
2.16 Energy efficiency		
Buildings should be oriented in accordance with the diagram below to make appropriate use of solar energy, be sited and designed to ensure energy efficiency of existing dwellings is not unreasonably reduced.	Not Applicable	Not applicable as the proposal is for subdivision only. Notwithstanding, the proposed lots have been orientated and designed to allow for passive solar energy efficiency.
Living areas and private open space should be located on the north side of development where practicable.	Not Applicable	As above.
Developments should be designed so that solar access to north facing windows is maximised.	Not Applicable	As above.
Buildings should be articulated with appropriate vertical and horizontal variations to ensure an appropriate year-round variation of shade and sunlight according to the heating/cooling needs and shadow patterns across glazed surfaces during seasonal changes through the year.	Not Applicable	As above.

Controls	Complies	Comment
Buildings should be constructed of materials and using designs which improve thermal mass.	Not Applicable	As above.
Buildings should provide for natural cross-ventilation.	Not Applicable	As above.
Buildings shall be designed to ensure living areas and private open space of adjoining residences maintain at least three hours direct sunlight between 9am and 3pm at the Winter Solstice. An overshadowing diagram may need to be provided to demonstrate this development standard can be achieved.	Not Applicable	As above.

2.17 Subdivision

<p>Compliance with Council's Design Manual for the Subdivision of Land in regards to:</p> <ul style="list-style-type: none"> Road layout 	Complies	The proposal is for the subdivision of two existing residential lots into 13 residential lots. As a result of the design phase of the subdivision, all lots will have access to the relevant essential services.
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Controls	Complies	Comment										
<ul style="list-style-type: none"> • Road pavement • Sub-surface drainage • Stormwater drainage • Site works (e.g. cut & fill) • Soil & water management (e.g. erosion) • Waterfront development • Cycleway & pedestrian paths • Bushfire protection • Water reticulation • Sewerage system 		<p>Civil works will be required to extend these services as detailed in the attached Infrastructure Servicing Strategy and the Stormwater Management Strategy. Servicing will be undertaken in accordance with Council's design manual.</p> <p>Additionally, earthworks and road construction works will be undertaken. These works will similarly be undertaken in accordance with Council's design manual.</p>										
<p>Minimum lot widths should be provided in accordance with the following table.</p> <table border="1" data-bbox="170 884 750 1099"> <thead> <tr> <th>Allotment Type</th> <th>Minimum Width (at the building line)</th> </tr> </thead> <tbody> <tr> <td>Non-corner lot*</td> <td>15m</td> </tr> <tr> <td>Corner lot*</td> <td>15m</td> </tr> <tr> <td>Battle-axe lot*</td> <td>15m (within the allotment – not including the access handle)</td> </tr> <tr> <td>Lots where the slope exceeds 12%*</td> <td>25m</td> </tr> </tbody> </table>	Allotment Type	Minimum Width (at the building line)	Non-corner lot*	15m	Corner lot*	15m	Battle-axe lot*	15m (within the allotment – not including the access handle)	Lots where the slope exceeds 12%*	25m	<p>Complies – Lots 1 - 10 & 13</p> <p>Variation sought for Lots 11 & 12</p>	<p>The proposal has been designed to achieve a minimum width of 15m for lots 1 – 10 and 13.</p> <p>Lots 11 – 12 do not comply due to the court bowl of the internal access cul-de-sac road limiting the frontage of these lots. The irregular polygon shape of Lots 11 – 12 widens towards the rear and will have ample space for vehicle access from the internal road, and to accommodate a dwelling. These lots will achieve solar access and private open space requirements.</p> <p>Similar lots which front the cul-de-sac bowl at Hoac Court have widths <15m. These lots are an example on the end design the proposal is trying to achieve for Lots 11 – 13.</p>
Allotment Type	Minimum Width (at the building line)											
Non-corner lot*	15m											
Corner lot*	15m											
Battle-axe lot*	15m (within the allotment – not including the access handle)											
Lots where the slope exceeds 12%*	25m											

Controls	Complies	Comment
A minimum of 70% of allotments in a subdivision are to have favourable northern orientation as per the figure opposite.	Complies	All lots (except Lot 13) are oriented north/south and within 30° true north and designed to maximise solar access. Adequate depth is achieved on all lots to allow for good solar access to yards and living areas. The proposal complies with this control.
Allotments orientated in a north-south direction can be longer and narrower than required to allow good solar access to yards and living areas.	Complies	The proposal accommodates mostly north-south lots which are deeper to allow for appropriate similar access. The proposal complies with this control.
Allotments orientated in east-west direction need to be wider than required to provide greater opportunity for solar access to yards and living areas.	Complies	Proposed Lot 13 is the only east-west lot, which is suitably wider at the rear to accommodate solar access and private open space and living areas. Lot 13's long axis is oriented within 30° of west. DCP compliance is achieved.
Battle-axe allotments are not encouraged. However, where they are necessary the minimum access handle within is to be 5m and the maximum length to the land is to be 30m. Shared access handles may be a minimum of 5m in width.	Not Applicable	None proposed
No more than two battle-axe allotments should adjoin on another or share an access handle.	Not Applicable	As above



FISCHER
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INFRASTRUCTURE SERVICING REPORT

LUCAN STREET, MULWALA
Lot 3 & 8, SEC 39 DP758726

PREPARED FOR

OVENS & MURRAY LAND SURVEY

FISCHER DEVELOPMENT SOLUTIONS

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EXECUTIVE SUMMARY

This report discusses the availability of services to the proposed residential development of a 79.9-hectare property at Lucan Street, Mulwala. The Site is bounded by Lucan Street, Unformed Council Road Reserve (Drainage Basin) & Private Land.

Stormwater	Available – Subject to External Works	<p>The subject site will have internal underground drainage infrastructure to convey flows to the existing drainage detention basin in the council road reserve to the east.</p> <p>The development will expand this basin's footprint to cater to the existing flows, increased flows all restricted to the existing pump station flow capacity.</p> <p>The detention rates are calculated for a 1% AEP flow volume. The internal road network is designed to ensure overland flow paths on the subject site traverse and ultimately discharge to the proposed basin system.</p>
Roads & Access	Available	<p>Lucan Street is an unformed council road which connects to North Street/ Barooga Road which is a sealed council collector road/street.</p> <p>It is expected that the developer will build the unformed segment of Lucan Street linking the site's internal road to North Street/Barooga Road. This will be built to Federation Council Standards for an Access Street from North Street for the full development frontage.</p> <p>The development site proposes an internal access street with a cul-de-sac.</p>
Sewer	Available – Subject to External Works	<p>There is no direct nearby Sewer infrastructure adequate for connection from the subject site. The site proposes a new internal reticulated gravity sewer network with a newly proposed sewer pump station. The pump station capacity will be 3.1L/s.</p> <p>The sewer pump station will discharge via a rising main from the site to Savernake Road and will traverse to Corowa Road to an existing manhole at the Frontage of 36-40 Corowa Road.</p>
Water	Available – Subject to External Works	<p>There is an existing DN100 Watermain in North Street (south side). It is proposed to connect to this main and feed to the subject site via Lucan Street. Hydrants, Stop Valves, and other appurtenances will be designed and installed per Federation Council Engineering Standards.</p>
Electricity	Available	<p>There is an existing Overhead LV & HV electricity supply in North Street at the Lucan Street intersections. It is expected that an O/H to U/G feed will be designed to provide underground supply to the subject site. Any substation requirements will not be able to be confirmed until Development Consent is granted, and Design Information Pack is received from Essential Energy.</p>
Gas	Available	<p>The subject site is within the APA Group footprint with gas supply available to this area. The developer will be required to enter an agreement with APA Group to ensure gas infrastructure is installed during subdivisional works.</p>
Telecommunications	Available	<p>The subject site is within the NBN Co footprint</p>



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1. INTRODUCTION

Fischer Development Solutions has been commissioned by Ovens & Murray Land Survey (the Consultant on behalf of the Developer) to review, investigate, and prepare a servicing report in relation to the necessary infrastructure required to service a development proposal for a Multi-Lot Residential subdivision development located at Lucan Street, Mulwala (Lot 3 & 8, Section 39 DP758726).

This report has been prepared following a desktop review, site survey and site inspection.

1.1. SITE LOCATION

The subject site is bounded by Lucan Street (West), Mulwala Canal (South), Drainage Reserve (West) and existing residential land fronting North Street to the North. The subject site has a road frontage of approximately 65m on Lucan Street. The site is polygonal in shape and covers an area of approximately 1.5ha. The site is approximately 1.2kms North-East of the Mulwala Township Centre (Melbourne Street/Inglis Street), refer to below figure for context.



Figure 1. Savernake Road, Mulwala - Township Context

There is no current formal use of the site, and it is fenced as a grassland paddock. The site appears to currently have access to Stormwater Drainage, Water, Sewer, Electrical and Telecommunications services.

There appears to be no significant undulations or slopes across the site, with a reasonable flat topography present. The site does appear to have a very ridge at the Lucan Street frontage. There are slight depressions either side of this depression (<0.3m in height) which, from studying the survey data, define the ridge.

The parcel is situated approximately 1.2km North-East of the Mulwala Township Centre. The township of Mulwala contains two main roads: Tocumwal Road and Corowa Road/Melbourne Street.

Melbourne Street runs through the Township Centre and crosses the Mulwala Bridge into the Victorian township of Yarrowonga.

The site is situated on the Northern bank of the Mulwala Canal surrounded by existing township R1 – General Residential Zone, at the time of writing this report, the land is designated for Residential Purposes as outlined in the Corowa LEP. There appears to be no other overlay or zoning requirement that affects the assessment and conclusions within this report.



Figure 2. Savernake Road, Mulwala - Zoning Context

1.2. INFORMATION SOURCES

Our investigation into the availability of services included sourcing written and verbal information from service authorities, site feature survey and a site investigation.

The source of information relating to the Drainage, Water & Sewer infrastructure in the area is Federation Council (FC) as the municipal authority to which these infrastructure assets are owned and maintained. The supplied information included information supplied from the client (OMLS) as a result of a meeting with council offices, pre-application meeting with Council Officers, review of previous reports relating to adjoining sites and review of Federation Council's 'Intramaps' system. The supplied Asset plans are included as an appendix to this report.

Electricity, Telecommunications and Gas infrastructure was sourced from a 'Before You Dig Australia (BYDA) search with cross-referencing to ground surface indicators collected during the feature survey. These BYDA plans are also included in the appendix of this report.

1.3. ASSUMPTIONS & LIMITATIONS

This project has been scoped and undertaken as a desktop study, with an initial site visit to provide preliminary advice on the servicing works required for the vicinity of this property. There are limitations to the level of detail provided given the nature of this review. Desktop studies are reliant upon information made available from service authorities; with assumptions of the accuracy and completeness of the information provided. Further assessment and confirmation of details provided will be necessary during the detailed design stage.

The information supplied regarding servicing constraints and/or limitations of existing infrastructure was considered during the data collection process. Certain assumptions have been made regarding network capacity and infrastructure required to service the subject development site.



2. SERVICING STRATEGY

2.1. STORMWATER

2.1.1. Methodology

The hydrological assessment for the proposed development site has been undertaken using the Rational Method to estimate the peak runoff generated from the site for multiple storm events, under pre-developed and post developed conditions. The full Stormwater Management Strategy Report and Calculations is included in Appendix A of this report.

The Rational Method is a simple statistical method to estimate the peak discharge from a catchment for a given storm intensity. This method is widely accepted to estimate runoff from small simple rural and urban catchments for up to 25 km² and 1 km² respectively. The overall catchment included in this assessment is comprised of the subject site only (0.79km²).

Calculation of stormwater runoff using the rational method uses the inputs of the site area, coefficient of runoff and the design storm peak intensity, sourced from the Bureau of Meteorology (see below table).

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	91.6	105	148	177	205	243	273
2 min	76.7	87.6	123	147	172	203	227
3 min	69.6	79.6	112	134	156	184	206
4 min	64.4	73.7	103	124	144	170	190
5 min	60.0	68.8	96.5	116	134	159	178
10 min	45.5	52.3	73.5	87.9	102	121	135
15 min	37.0	42.6	60.0	71.8	83.3	98.9	111
20 min	31.5	36.2	51.0	61.0	70.9	84.1	94.3
25 min	27.5	31.6	44.5	53.3	61.9	73.5	82.4
30 min	24.6	28.2	39.6	47.5	55.2	65.5	73.5
45 min	18.8	21.6	30.2	36.2	42.1	49.9	56.0
1 hour	15.5	17.7	24.7	29.6	34.4	40.8	45.8
1.5 hour	11.7	13.3	18.5	22.1	25.7	30.4	34.1
2 hour	9.56	10.9	15.0	18.0	20.8	24.7	27.7
3 hour	7.21	8.18	11.3	13.4	15.5	18.3	20.6
4.5 hour	5.45	6.17	8.44	10.0	11.6	13.7	15.3
6 hour	4.48	5.06	6.91	8.18	9.44	11.2	12.5

Figure 3. Rainfall Intensity - Frequency - Duration (IFD) data (Mulwala, NSW, 2647)

Under the current best practice for stormwater management in urban development, detention of peak flows to 'pre-Development' rates allows for the development to proceed without causing nuisance or exceeding capacity of receiving drainage infrastructure.

Determination of the required detention rates and storage volumes utilises the 'Boyd's Method' of calculating the maximum storage required.

2.1.2. Findings

The site is an existing medium sized (1.497ha) site that is currently undeveloped grassland. Whilst this development is contained within the South-Eastern portion of the site for the purpose of stormwater management, the entire 1.479 ha has been considered for peak volumetric runoff calculations, both for pre-development, post the subject development. However, post-development are the most critical with the site restricted for discharge by the capacity of the existing pump station in the detention drainage reserve. The detention basin is proposed to be expanded to provide the extra storage required. Below Fig 4 shows the context for the site calculations.

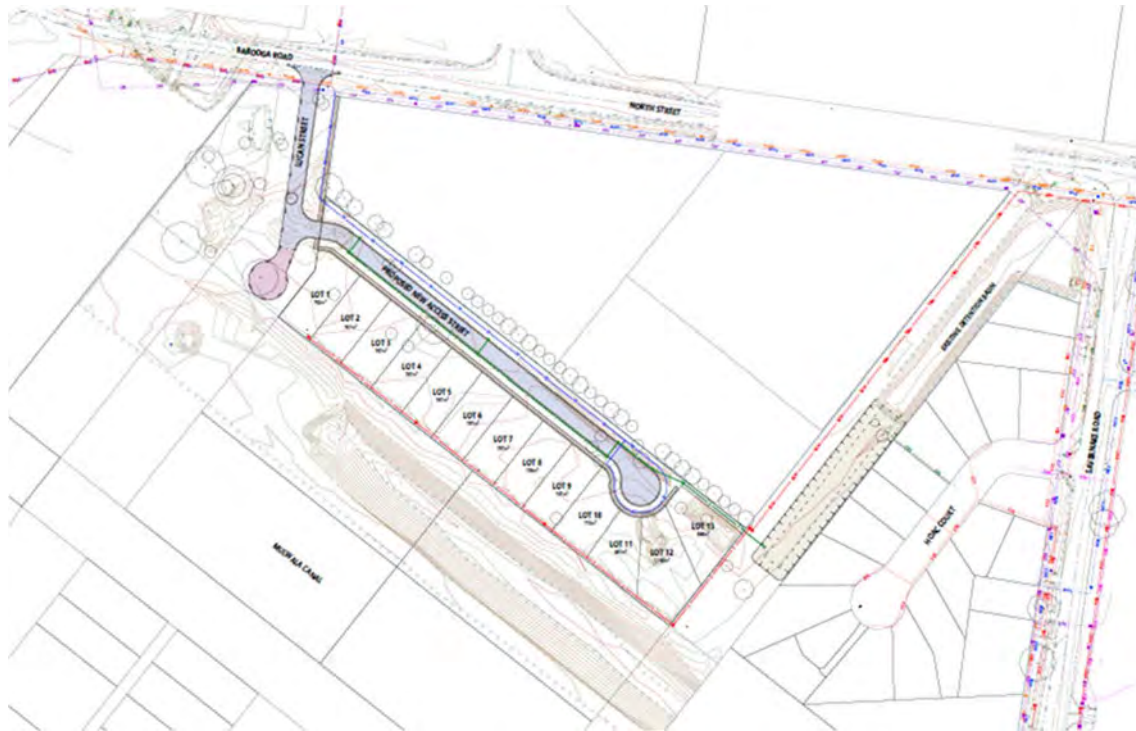


Figure 4. Site Development Plan

The proposed detention basin expansion will be a crucial element in the stormwater management for this site. The wetland will provide stormwater detention capacity for the minor (20% AEP) and major (1% AEP) stormwater runoff generated from the site and discharge at the existing pump stations flow rate capacity (20L/s).

Sub catchments	Area (ha)	C _{20%}	C _{1%}	T _c (min)	I _{20%} (mm/hr)	I _{1%} (mm/hr)	Q _{20%} (m ³ /s)	Q _{1%} (m ³ /s)
External Catchment (Hoac Court)	3.033	0.75	0.85	12.0	74.4	129.8	0.470	0.929
Catchment 1A (Road)	0.461	0.85	0.96	6.0	99.9	172.0	0.109	0.211
Catchment 1B (Lots)	1.037	0.70	0.80	8.0	89.5	155.0	0.181	0.357
Total	17.080	0.749	0.85	14.0	68.8	120.2	0.648	1.285

Figure 5. Table of Discharge & Detention Rates

2.1.3. Conclusion

This Stormwater Management Strategy in Appendix A demonstrates that the proposed subdivision can meet the required objectives for stormwater management. The quantity targets outlined in this report will be achieved by.

- Underground drainage to convey minor storm flows to the proposed stormwater basin facility.
- Conveyance to the outfall (Corowa Road) via a pump and rising main.
- Overland flow path provided via the subdivision road network.

2.2. ROADS & ACCESS

Lucan Street is an unformed road that connects back to North Street. Lucan street is proposed to be constructed to an Access Street standard per the Federation Council Engineering Standards.

North Street is a council collector street/road with the pavement appearing to be in reasonable condition considering the vehicle use and lack of kerb and channel to define the carriageway.

Internal to this site will be the construction of a new local access streets with a cul-de-sac termination,.

All roads will be constructed to Federation Council's Engineering Guidelines standard with kerb and channel and appropriate underground drainage infrastructure. The preliminary Civil Design Plans show the design of the roadways to meet council gradient requirements and ensure conveyance of overland flows are to the proposed drainage basin infrastructure.

2.3. SEWER

Federation Council (FC) is the municipal authority responsible for sewer infrastructure and service supply in this area. FC Intramaps provides existing infrastructure maps (Appendix C) showing the location of and size of existing sewer gravity mains and the existing pump station situated in Barnes Street.

The sewer design flows have been calculated for development proposed (13 equiv. ET). The calculations are provided in the below figure 6.

Classification	Single Occupancy Lots		
Unit	Lot		
EP per Unit	3.5		

Development Summary			Equivalent Population		
Area (a)	1.4971	ha	EP	45.5	No.
Lot Yield	13	No.			

ADWF (EP)	180	L/d/EP	Average Dry Weather Flow per EP
ADWF	0.09479167	L/s	Average Dry Weather Flow for development
d' Factor	6.7953	.	d' Factor from WSA 02-2014 Figure C.1
PDWF	0.6441	L/s	Peak Dry Weather Flow

Ground water Infiltration (GWI)			
Portion _{WET}	50.0%	%	estimated portion network groundwater table in excess of pipe
GWI	0.1871	L/s	groundwater ingress in L/s.

Rainwater dependent inflow and infiltration (RDI)					
C	0.8	Refer to Table C.1 to estimate			
$I_{1,2}$	21.26	mm/hr	I	31.5347	mm/hr
Factor _{SIZE}	1.48	.	A _{EFF}	0.6739	ha
Factor _{CONTAINMENT}	1.00	.	RDI	0.4760	L/s

Design Flow			
Design Flow	1.3073	L/s	(PDWF + GWI + RDI)

Figure 6. Sewer Flow Calculations

Advice provided by Federation Council determined that the existing gravity mains and pump station in Hoac Court will not be adequate to service the subject development site. As such, the site will contain a Sewer Pump Station and associated Gravity mains network.

The pump station will discharge via a rising main traversing the basin reserve to the east, Savernake Road and Corowa road to a receiving manhole at the frontage of 36-40 Corowa Road.

Council advice received during pre-application discussion notes this pump capacity is to be limited to 3.1L/s for the receiving manhole. The above calculations demonstrate the site flows (1.31L/s) is acceptable for the receiving manhole.

Further council advice received instructed that a stub is to be provided in the gravity network for the adjoining northern residential site to connect to once further development occurs.

Head loss calculations have been conducted based on the rising main from the subject site to the existing line, with further checks conducted to determine the losses for the full length to the receiving manhole. (Council Intramaps, Manhole ID CG0, frontage of 36-40 Corowa Road). These values are presented in Figure 7 below.

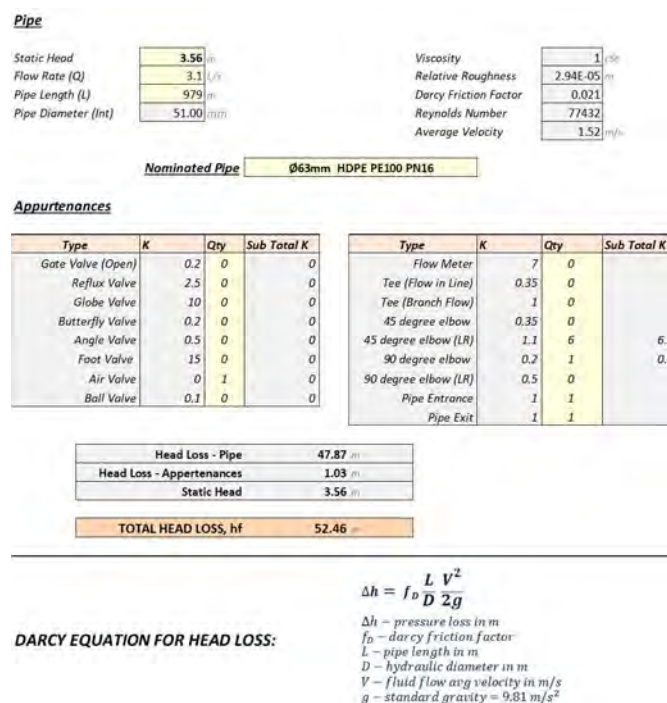


Figure 7. Head Loss Calculations for Site and Main

Based on the above calculations, the discharge line to Manhole CG0 can support a further 1.8L/s before the council nominated capacity flow (3.1L/s) is reached. The pump selection for the site sewer discharge will be subject to detailed analysis and selection during detailed design in conjunction with council liaison to determine the pump selection and function is appropriate for council long term management. It is noted that the pump well will be required to cater for a 6-hour detention capacity per council guidelines.

The functional sewer design plans (Appendix B) further demonstrate that adopting WSAA compliant self-cleansing grades for the sewer main entering the proposed pump station provides adequate service coverage for the entire proposed development site including future development of the resulting land surrounding should it be developed further in future.

2.4. WATER

The Federation Council (FC) is the municipal authority responsible for water supply services in this area. FC Intramaps provides existing infrastructure maps (Appendix C) showing the location of and size of existing water supply mains in the vicinity. Advice was sought regarding any known constraints or limitations of this infrastructure.

There is an existing DN100 watermain on the south side of North Street available to the subject site. A connection will be made to this main to extend a main along Lucan Street to the development site to service the proposed allotments.



The proposed development will create an additional 13 equivalent tenements demand in Mulwala, requiring supply from the existing Mulwala reticulated water supply network. The demand increases this development creates for the existing supply network is summarised below:

Lot Size	ET	Demand per ET* (annual)	Ave Day Demand (L/ET/day)	Peak Day Factor	Peak Day Demand (L/day)
Std Residential	13	230 kL	630	2.28	1,436.40

*Sourced from Water Directorate Section 64 Determination of ET's guidelines.

^In absence of Council Local ET calculation, the above estimation contains high potential for variability.

Lot Size	ET	Ave Hour Demand (L/ET/hr)	Ave Hour Demand (L/hr)	Peak Hour Factor	Peak Hour Demand (L/hr)	Peak Hour Demand (L/s)
Std Residential	13	59.85	778.05	3.69	2,871	0.79

The mains extension along Lucan Street and within the subject site will make provision for fire plugs/hydrants in accordance with RFS/CFA requirements, a 60m nominal interval will be adopted for all external and internal hydrant spacings.

2.5. ELECTRICITY

Based on information from the site survey, inspection and BYDA search there appear to be adequate infrastructure located in all the roads bounding the subject site. Overhead lines in North Street will be available to the subject site via and OH/UG cable route. It is unknown until consent is received whether a substation will be required for the development.

Under Essential Energy's supply policy guidelines, the Developer will be required to pay for the cost of extending/upgrading the power supply if required. Design and construction of the mains extension and supply will be subject to Level 3 ASP design works with HV works to be installed by Level 1 ASP. Essential Energy standards and regulations will need to be complied with for these works.

Unfortunately for the purpose of the Development Application, we are not able to have preliminary designs completed as the DIP (Design Information Pack) is not able to be supplied by Essential Energy without a copy of a Development Consent. This is part of Essential Energy's policies and procedures.

2.6. GAS

The BYDA search completed for this site received a response from APA Group indicating that there is gas network infrastructure present in the vicinity of this subject site. Site survey and inspection was able to locate marker posts to confirm the presence of infrastructure. The existing infrastructure is located within the Baroo Road/North Street Road reservation area.

Whilst Gas is not deemed an essential service, this development will likely install Gas infrastructure for the future dwellings to utilise if they choose. At the time of writing this report, the APA policy for new developments is that the developer is responsible for the costs to bring Gas infrastructure to the subject site entrance with internal reticulation to be at no cost for materials.

The supply of network infrastructure at the site's entrance on North Street will allow the developer to take advantage of this incentive from APA and supply the infrastructure at reduced cost.

2.7. TELECOMMUNICATIONS

BYDA search and site feature survey located Telecommunications infrastructure in North Street on the southern side of the road reserve across the Lucan Street intersection. The site will be provided with telecommunications with standard agreements to be entered into with NBNetCo. The design and construction of this infrastructure will be subject to NBNetCo regulations and standards.





3. CONCLUSION

The subject site is located within the R1 – General Residential Zone of Mulwala as off time of writing. The site appears to have nearby infrastructure providing the site to all required services. The site has been zoned residential for many years and as such, it should be anticipated by service authorities that the site would be subject to development at some time.

There has been incremental development along North Street, with a recent development creating Jade Street & Hemphill Close and the development of Hoac Court occurring in 2004. It is understood that any servicing constraints should have been identified during or post that development being completed. The extension of all services can be achieved through known and proven techniques. The area is suitable for development as proposed.

Through traditional delivery models, developers are required to fund the infrastructure required to provide services to the development site proposed. Although where known limitations are identified, wider catchment infrastructure upgrades can be proposed using a reimbursement or proportionate cost model to ensure transparency and fairness for infrastructure costs to benefiting parties.

It is not expected that any wider infrastructure or servicing provisions are required for this development to proceed although Federation Council have noted that the supply of water to this catchment of the township (northern side of canal) may in future require trunk infrastructure upgrades. Thus, this development would be expected to have most infrastructure contained to servicing the subject site only and being at the full cost of the developer.

Fischer Development Solutions confirms that the extension of all services for development of the site at Lucan Street, Mulwala can be achieved through known and proven techniques and standard agreements with service providers. It is recommended that the site is suitable for the Residential Development of 13 ET (equiv. tenements) as proposed from a servicing perspective.



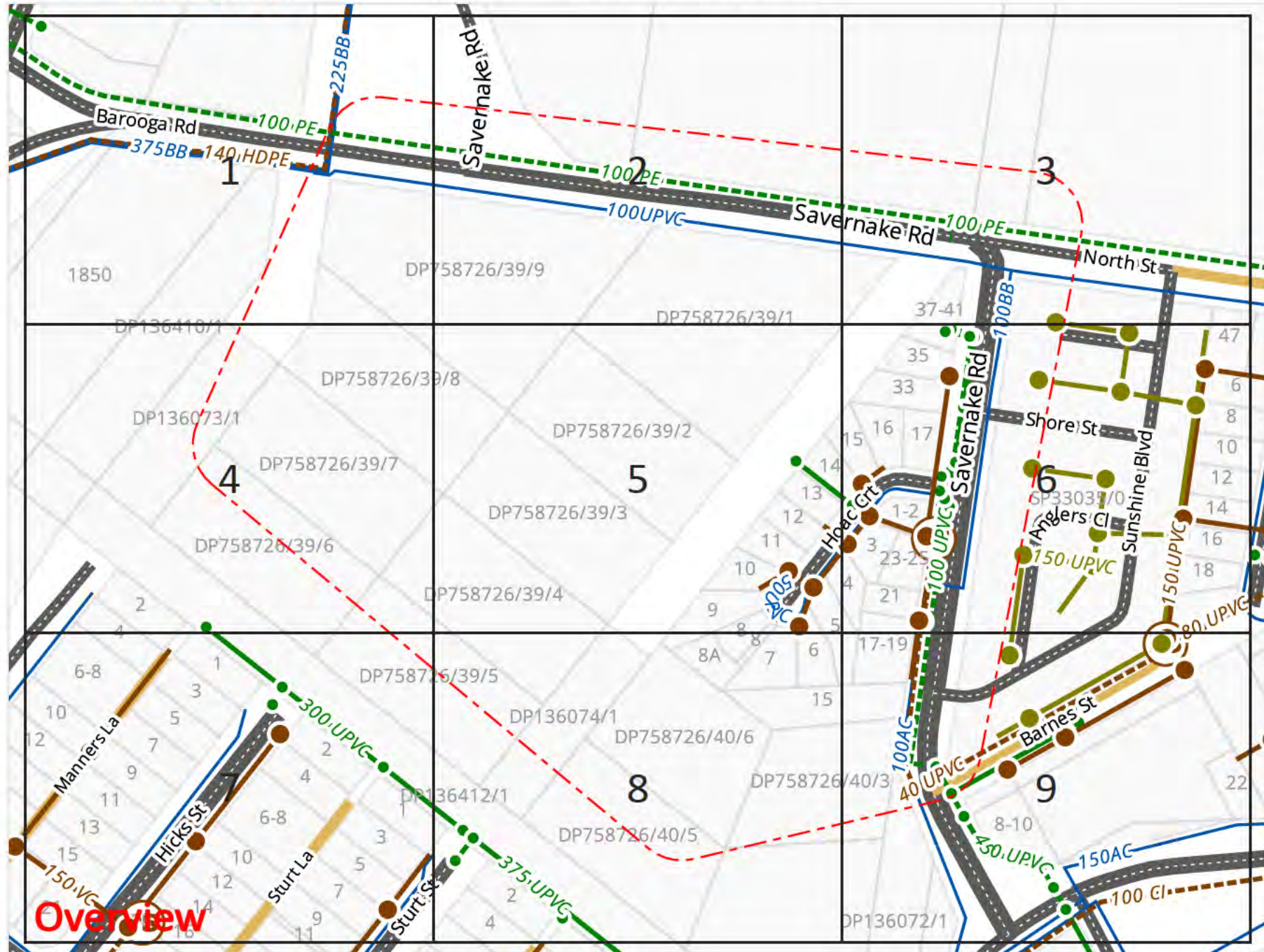
APPENDIX A: STORMWATER MANAGEMENT STRATEGY



APPENDIX B: DEVELOPMENT & SERVICING PLANS

APPENDIX C: BEFORE YOU DIG AUSTRALIA ASSET MAPS





Legend

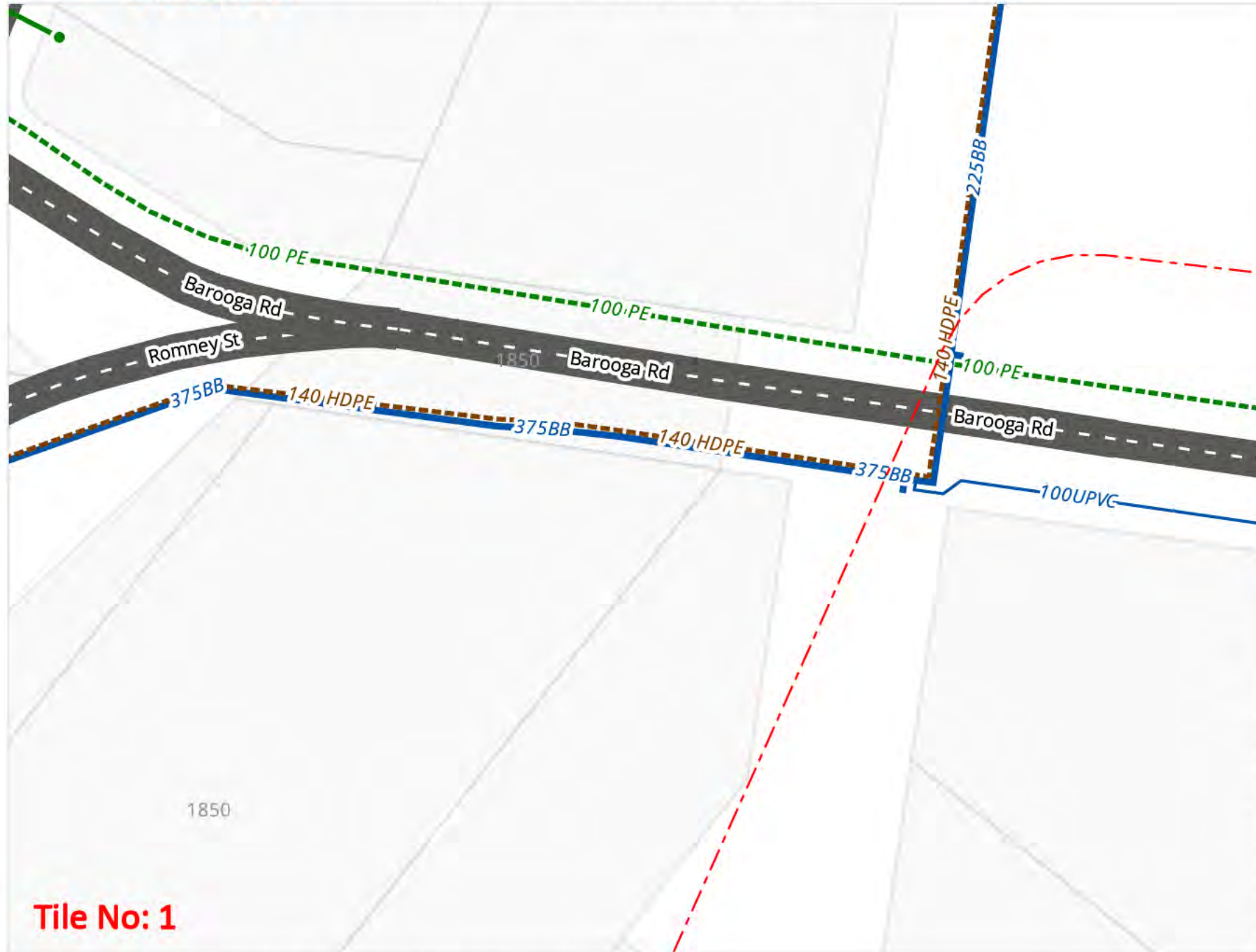
- Water Reticulation Main
- Water Trunk Main
- Water Rising Main
- Private Water Reticulation Main
- Private Water Trunk Main
- Private Water Rising Main
- Stormwater Main
- Stormwater Box Culvert
- Stormwater Rising Main
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- Rising Sewer Main
- Private Gravity Sewer Main
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- Stormwater Surface Inlet Pit
- Stormwater Side Entry Pit
- Stormwater Junction Pit
- Sewer Manhole
- Sewer Pump Station
- Private Sewer Manhole
- Private Sewer Pump Station



Scale: 1:3075
 Expires: 26/03/2024

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Overview



Legend

-  Water Reticulation Main
-  Water Trunk Main
-  Water Rising Main
-  Private Water Reticulation Main
-  Private Water Trunk Main
-  Private Water Rising Main
-  Stormwater Main
-  Stormwater Box Culvert
-  Stormwater Rising Main
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 1



Legend

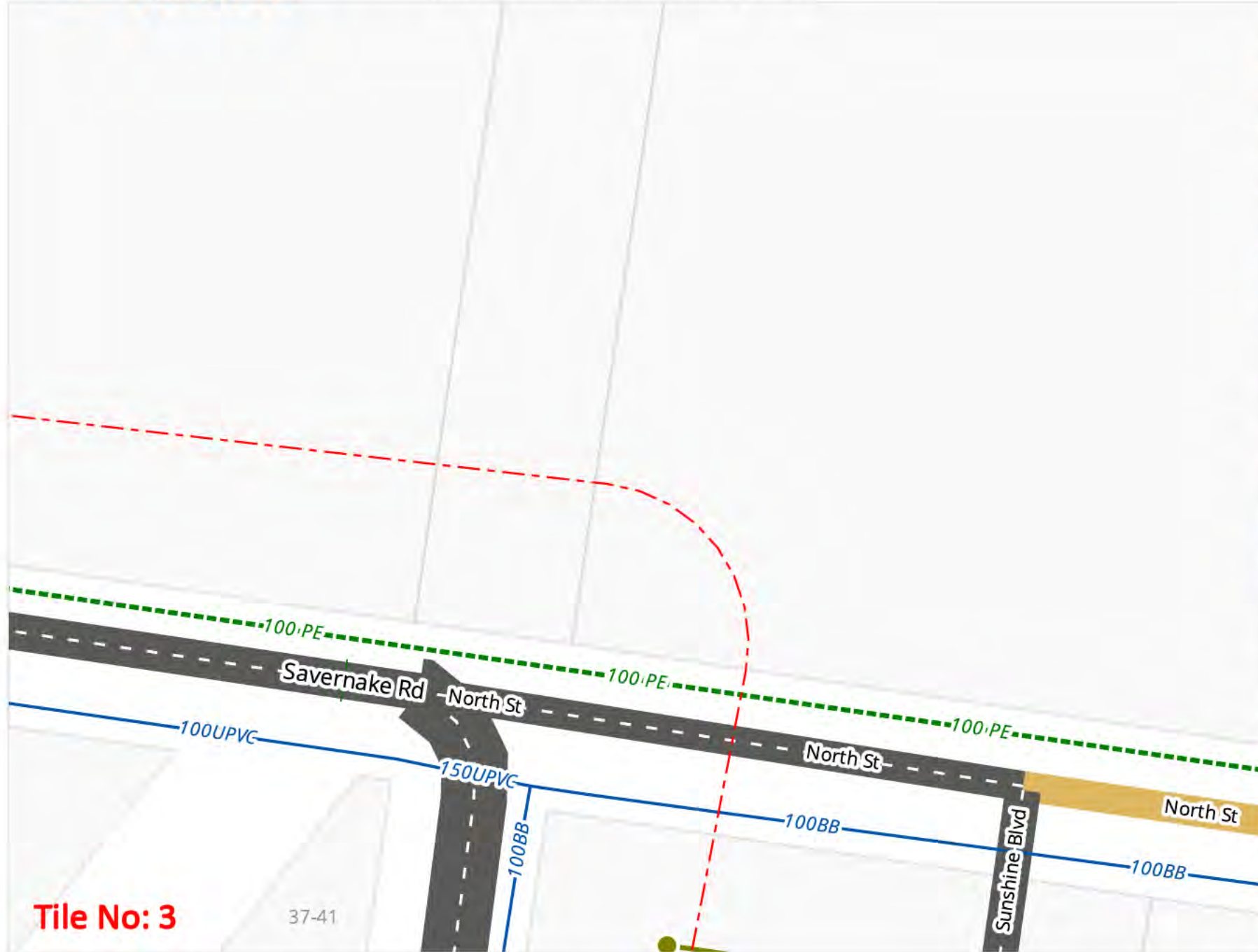
-  Water Reticulation Main
-  Water Trunk Main
-  Water Rising Main
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 2



Legend

-  Water Reticulation Main
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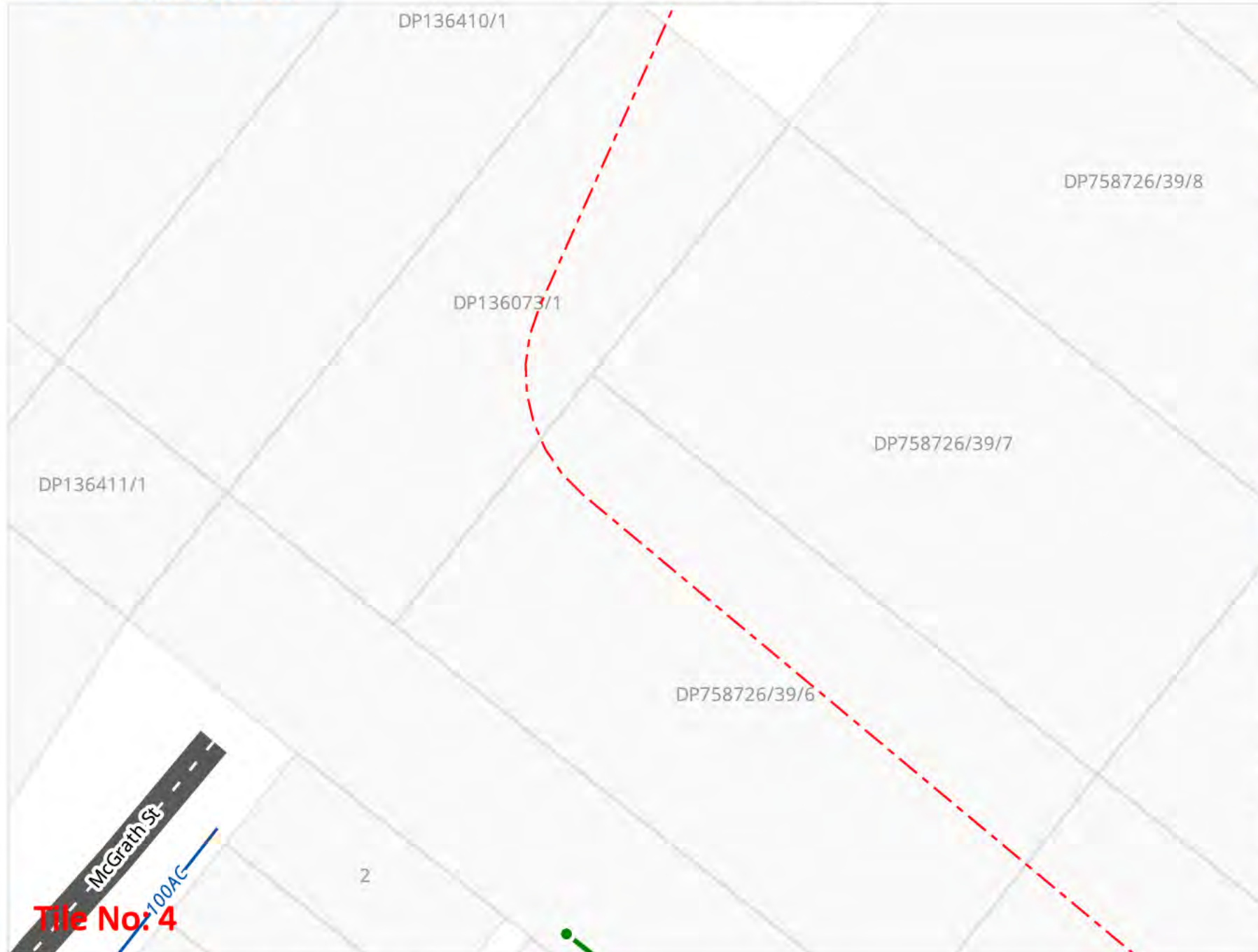


Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 3

37-41



Legend

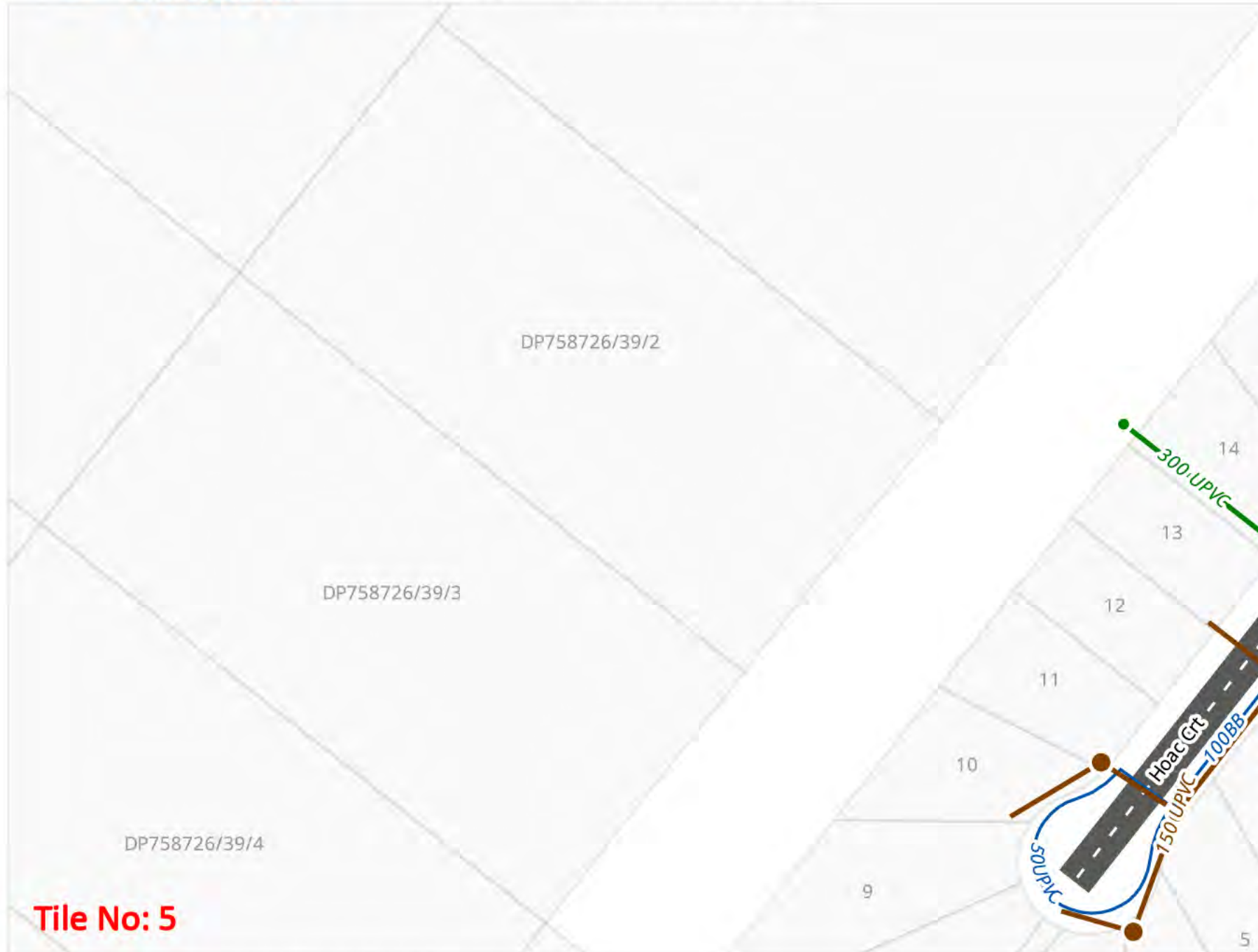
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 4



Legend

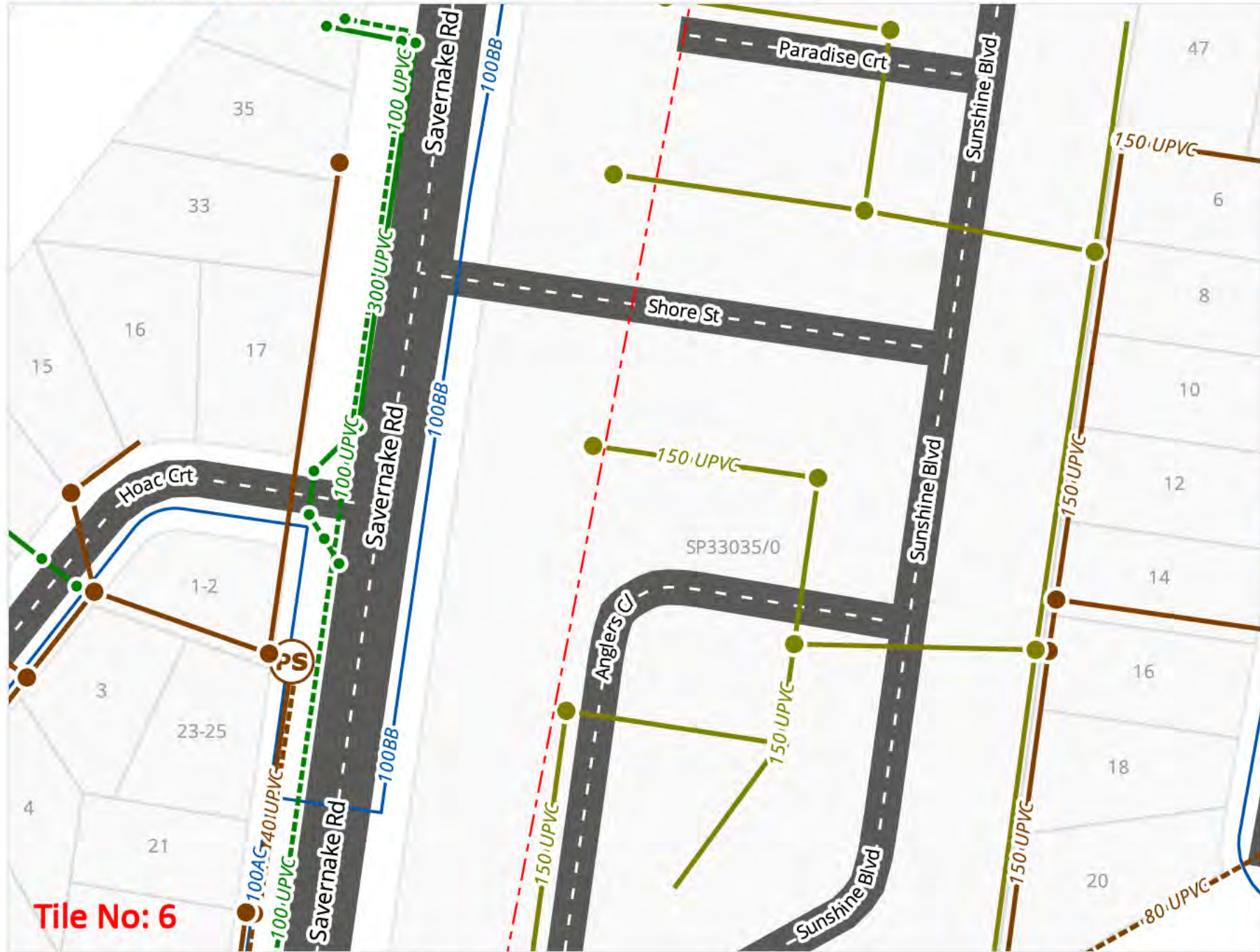
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 5

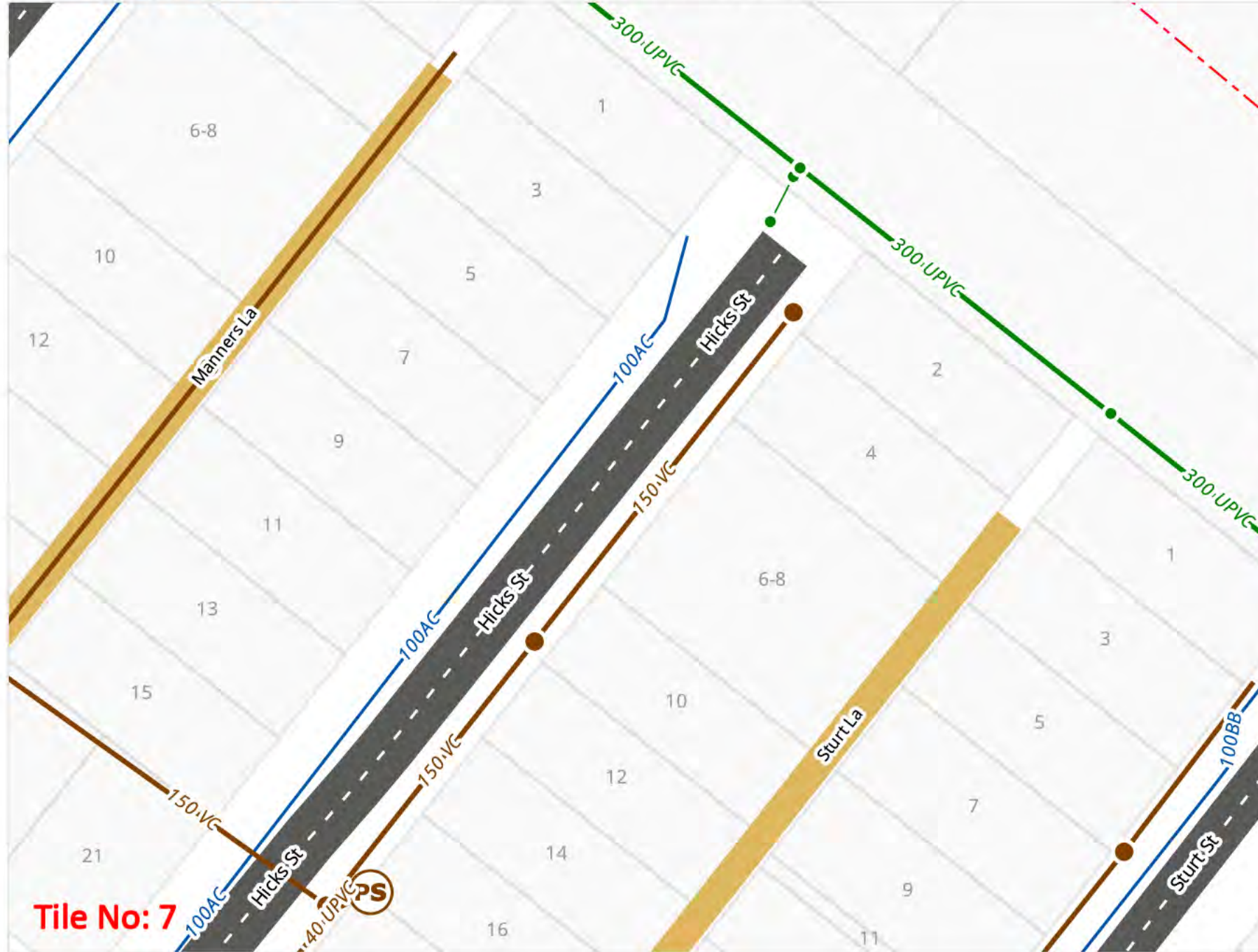


- ### Legend
- Water Reticulation Main
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 6



Legend

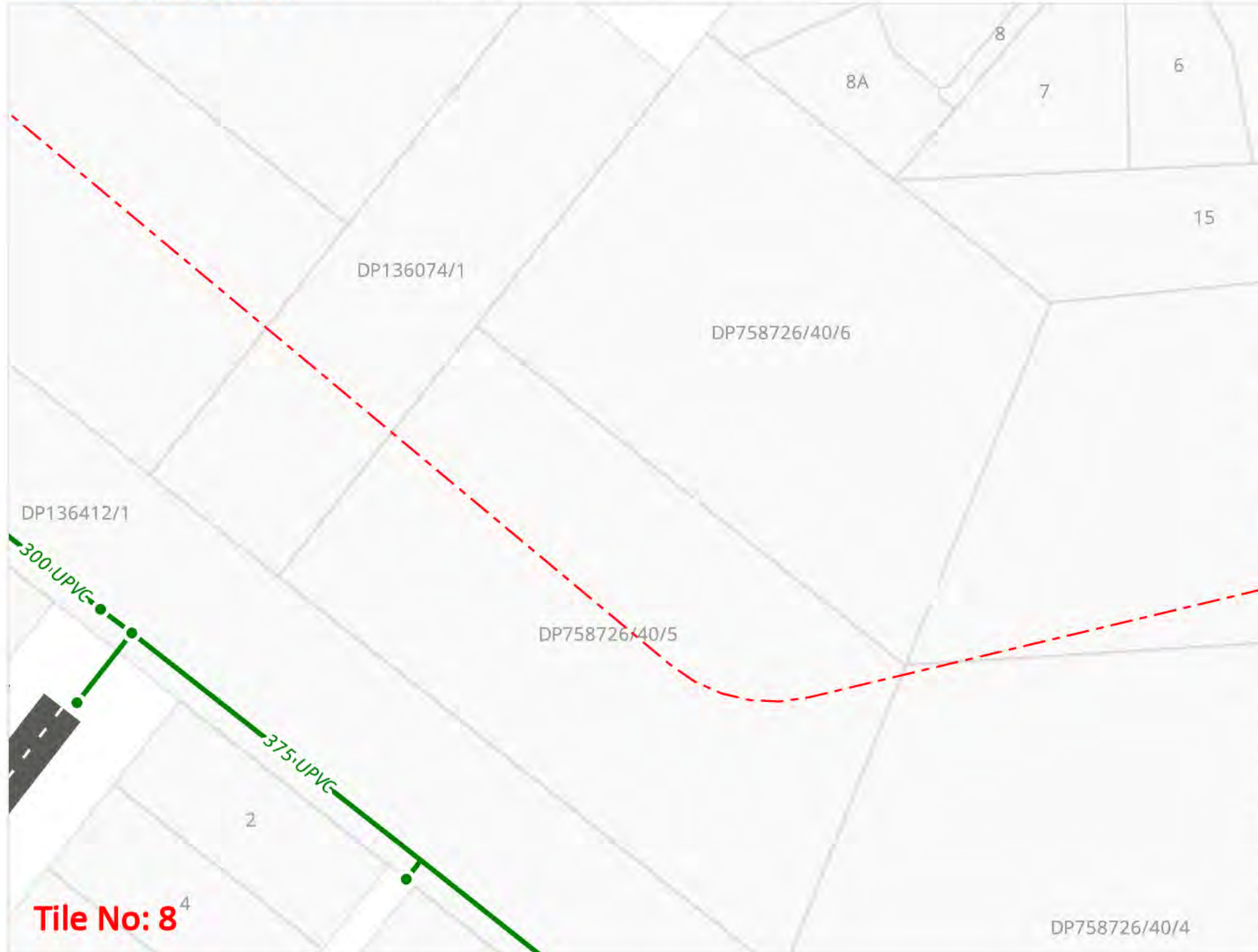
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 7



Legend

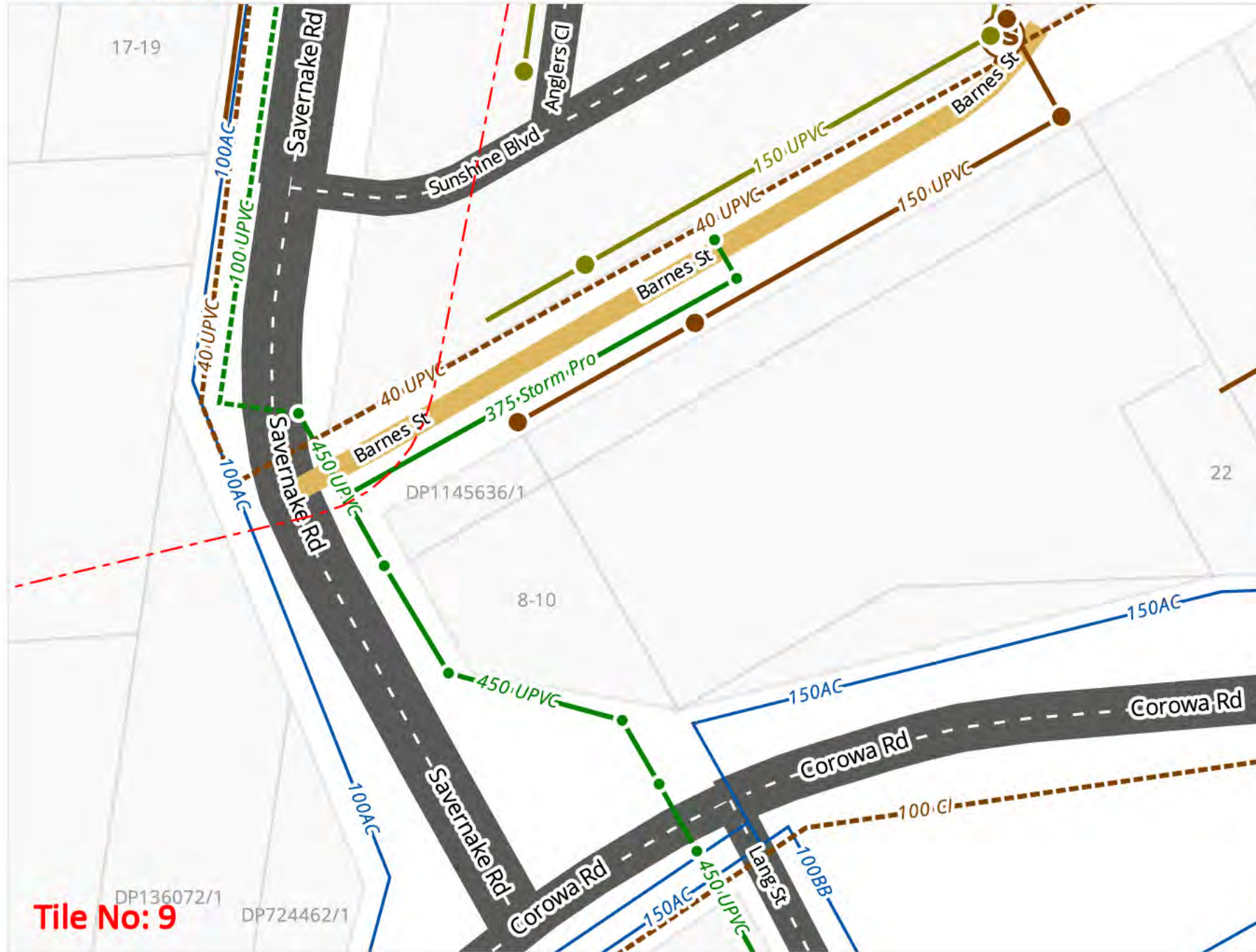
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 8⁴



Legend

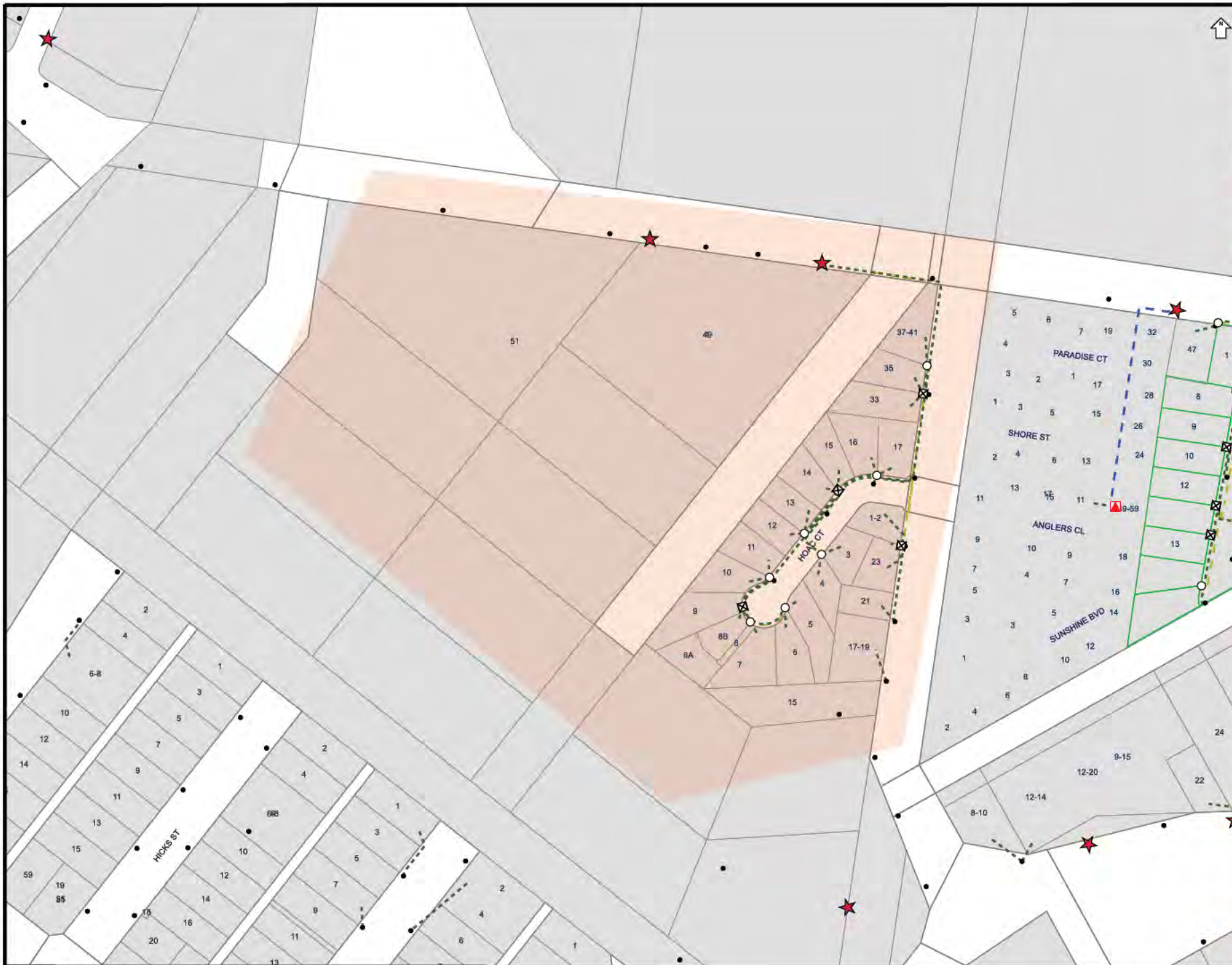
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Scale: 1:1000
 Expires: 26/03/2024

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Tile No: 9



Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- LV Underground Cable
- HV Underground Cable
- Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊠ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- Underground Cable
- Underground Fibre

Proposed Works

- Area of proposed works
- Proposed assets are shown as orange symbols

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.
If details are incorrect, please notify
Essential Energy on 13 23 91
(or fax 1800 354 636)

ISSUE DATE: 27/02/2024

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 SCALE: 1:3069



Cable Plan



Report Damage: <https://service.telstra.com.au/customer/general/forms/report-damage-to-telstra-equipment>
 Ph - 13 22 03
 Email - Telstra.Plans@team.telstra.com
 Planned Services - ph 1800 653 935 (AEST bus hrs only) General Enquiries

Sequence Number: 235987554

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

TELSTRA LIMITED A.C.N. 086 174 781

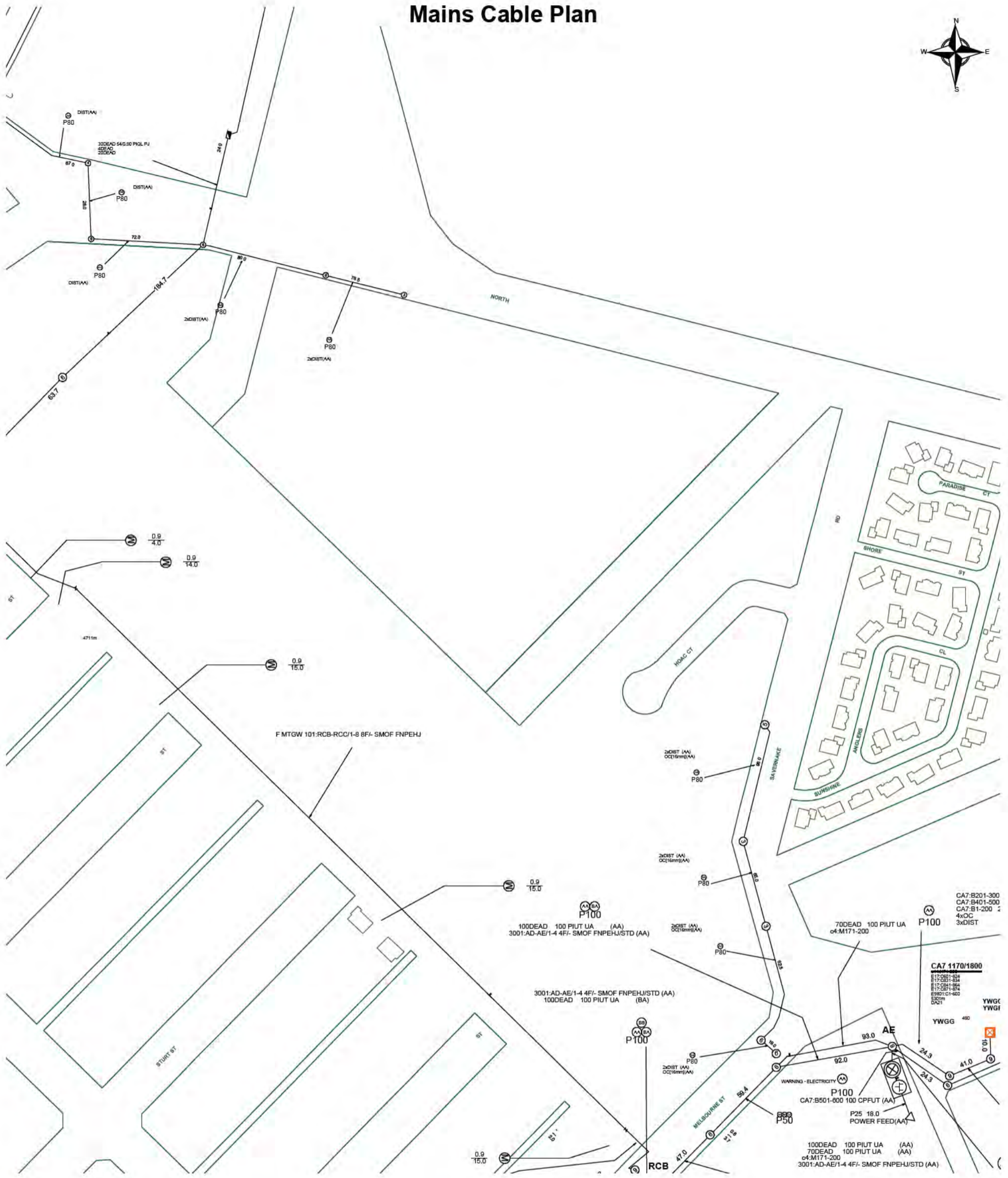
Generated On 27/02/2024 21:23:44

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

WARNING
 Telstra plans and location information conform to Quality Level "D" of the Australian Standard AS 5488-Classification of Subsurface Utility Information. As such, Telstra supplied location information is indicative only. Spatial accuracy is not applicable to Quality Level D. Refer to AS 5488 for further details. The exact position of Telstra assets can only be validated by physically exposing it. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy. Further on site investigation is required to validate the exact location of Telstra plant prior to commencing construction work. A Certified Locating Organisation is an essential part of the process to validate the exact location of Telstra assets and to ensure the asset is protected during construction works.

See the Steps- Telstra Duty of Care that was provided in the email response.

Mains Cable Plan



Report Damage: <https://service.telstra.com.au/customer/general/forms/report-damage-to-telstra-equipment>
 Ph - 13 22 03
 Email - Telstra.Plans@team.telstra.com
 Planned Services - ph 1800 653 935 (AEST bus hrs only) General Enquiries

Sequence Number: 235987554

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

TELSTRA LIMITED A.C.N. 086 174 781

Generated On 27/02/2024 21:23:46

WARNING
 Telstra plans and location information conform to Quality Level "D" of the Australian Standard AS 5488-Classification of Subsurface Utility Information. As such, Telstra supplied location information is indicative only. Spatial accuracy is not applicable to Quality Level D. Refer to AS 5488 for further details. The exact position of Telstra assets can only be validated by physically exposing it. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy. Further on site investigation is required to validate the exact location of Telstra plant prior to commencing construction work. A Certified Locating Organisation is an essential part of the process to validate the exact location of Telstra assets and to ensure the asset is protected during construction works.
 See the Steps- Telstra Duty of Care that was provided in the email response.



APA Group
 PO Box 6014 Halifax
 Street,
 South Australia 5000



For your immediate information THERE IS A GAS PIPELINE OR INFRASTRUCTURE (Gas Assets) located in close vicinity to your works.

27/02/2024

Company:
 Matthew Fischer
 16 Laidler Close
 Wangaratta
 VIC 3677

matt@fischerdevelopment.com.au

Dear Matthew Fischer

Sequence Number: 235987552
Worksite Address: 1 North Street
 Mulwala
 NSW 2647

Thank you for your Before You Dig enquiry regarding the location of Gas Assets.

We confirm there are Gas Assets located in close vicinity of the above location. Damage to gas assets may result in explosion, fire and personal injury.

Please ensure you read and comply with all the relevant requirements contained in this response to your enquiry.

Contacts – APA Group

Enquiry	Contact Numbers
<p>General enquiries or feedback regarding this information or gas assets.</p> <p style="text-align: right;">QLD Only</p> <p style="text-align: right;">All other States</p>	<p>APA - Before You Dig Officer</p> <p>Phone: 1800 085 628 Email: PermitsQld@apa.com.au</p> <p>Phone: 1800 085 628 Email: DBYDNetworksAPA@apa.com.au</p>
<p>Gas Emergencies</p>	<p>Phone: 1800 GAS LEAK (1800 427 532)</p>

Please find below the following information:

- Duty of Care** - If you are unclear of your obligations under these requirements please contact the Before You Dig officer for clarification.
- An overview map** highlighting the area of your intended works.
- Map(s) showing APA operated Gas Assets** within the area of your intended works.



Important Information:

- This information is valid for 30 days from the date of this response.
- This information shall be available on site whilst conducting works.
- This information has been generated by an automated system based on the area highlighted in your BYDA request and has not been independently verified. Please check the maps represent the area you requested. If they do not, please contact the APA - Before You Dig officer.
- For some BYDA enquiries, you may receive two (2) responses from APA. Please read both responses carefully as they relate to different assets.

Yours Faithfully,

APA Group



Duty of Care - Working Around Gas Assets

General Conditions

- BYDA enquiries are valid for 30 days. If your works commence after 30 days from the date of this response a new enquiry is required to validate location information.
- The location information supplied in this document shall be used as a guide only. APA does not guarantee the accuracy or completeness of the map and does not make any warranty about the data. APA is not under any liability to the user for any loss or damage (including consequential loss or damage) which the user may suffer resulting from the use of this information or maps.
- It is the responsibility of the excavator to expose all Gas Assets by hand digging. Gas Asset depths may vary according to ground conditions.
- Gas (inlet) Services connecting Gas Assets in the street to the gas meter on the property are not marked on the map. South Australia Only - If a meter box is installed on the property, a sketch of the gas service location may be found inside the gas meter box. APA does not guarantee the accuracy or completeness of these sketches.
- Road authorities, council's, and their authorised contractors and agents are responsible to pot-hole or use other suitable methods to verify the location and depth of all gas assets, including Gas (inlet) Services, prior to commencing any works.
- The location and depth of underground mains & services, including those in the road corridor and footpath, may vary in alignment and depth of cover, as a result of changes to road, footpath or surface levels subsequent to installation.
- Some Gas Assets may be installed inside a casing. Locations where a Gas Asset changes from being located within, to being located outside a casing may not be marked on the maps provided.
- The use of hydro-vacuum excavation in vicinity to Gas Assets is permitted under the following conditions:
 - Maximum water pressure of 1000psi unless otherwise advised.
 - A minimum distance of 100mm shall be maintained between the end of the pressure wand nozzle and gas assets.
 - Vertical movements of the pressure wand nozzle or inserting the nozzle in vicinity of the gas asset prohibited
 - The use of root cutting heads is prohibited.

Where a gas asset has been exposed via hydro-vacuum excavation a visual check must be undertaken to ensure no damage has occurred to the pipe or it's coating. If any damage has occurred notify the APA Before You Dig Officer.

Site Watch / Locate Services

Site Watch - A condition of an APA Authority To Work permit is for an APA Site Watch representative be present on site whilst conducting works. The purpose is to monitor works and protect gas assets in the vicinity from potential damage by the works.

Locate – This service is available on request, where an APA representative will visit your work site before work commencement to electronically locate and mark on the ground surface all gas assets in vicinity of the work site.

These services are provided under the following conditions:

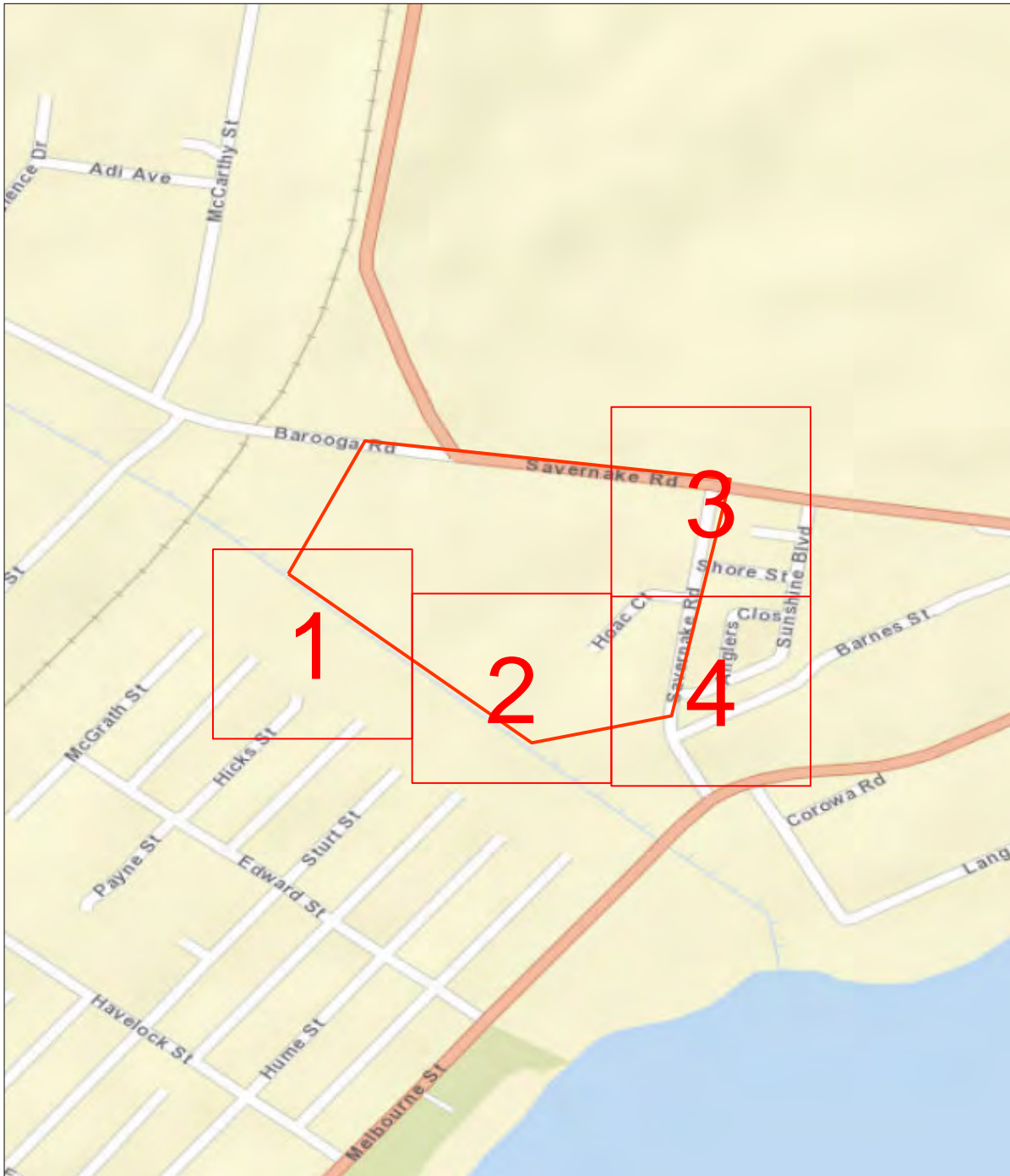
- Contact APA - Before You Dig officer to make a booking. Contact details in the table above.
- The following rates are chargeable for these services:

Item	Rate (excl. gst)
Site Watch – Business Hours	\$143.42 per hour
Site Watch - After Hours	\$175.06 per hour
Electronic Locate – Business Hours	\$143.42 per hour
Electronic Locate – After Hours	\$175.06 per hour
Cancellation Fee	2 hrs Business Hours rate (where cancellations received <u>after</u> 12pm (midday) 1 business day prior to the booking)
Mains Proving	Quoted on request




Notes:

- 1hr minimum charge applies.
- A Cancellation Fee applies where cancellations are received after 12pm (midday) one(1) business day prior to the booked Site Watch / Locate service
- Contact APA - Before You Dig officer for state specific hours of business.

Site Address	1 North Street Mulwala 2647	Sequence No	235987552
Name	Matthew Fischer		
Email	matt@fischerdevelopment.com.au		



Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community Community

Scale 1: 6000		Enquiry Area 	Map Key Area 
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Site Address	1 North Street Mulwala 2647	Sequence No	235987552
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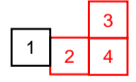
LEGEND

PIPE AND BOUNDARIES	PIPE CODE / MATERIALS	OBJECTS or TERMS
LOW PRESSURES	C# (e.g. C2) Cast Iron	VALVES
MEDIUM PRESSURES	CU Copper	BURIED VALVES
HIGH PRESSURES	N2 Nylon	REGULATORS
TRANSMISSION PRESSURES	P# (e.g. P6) Polyethylene (PE)	GAS SUPPLIED = YES
PRIORITY MAIN (BEHIND PIPE)	P6,P7,P9-P12 Medium Density PE	CP RECTIFIER UNIT
PROPOSED (COLOUR BY PRESSURE)	P2,P4,P8 High Density PE	CP TEST POINT/ ANODE
LPG (COLOUR BY PRESSURE)	S# (e.g. S8) Steel	SYPHON
ABANDONED	W2 Wrought Galv. Iron	TRACE WIRE POINT
IDLE	W3 Poly Coat Wrought Galv. Iron	PIPELINE MARKER
SLEEVE	Pipe diameter in millimetres is shown before pipe code	NOT TIED IN
CASING / SPLIT (BEHIND PIPE)	e.g. 40P6 = 40mm nominal diameter	DEPTH OF COVER
EASEMENT/ JURISDICTION		BACK / FRONT OF KERB
EXAMPLES		
40P6 in 80C2	40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing	
63S8	63mm Medium Pressure Steel	

This map is created in colour and shall be printed in colour

Line / Polygon Request

Map Key

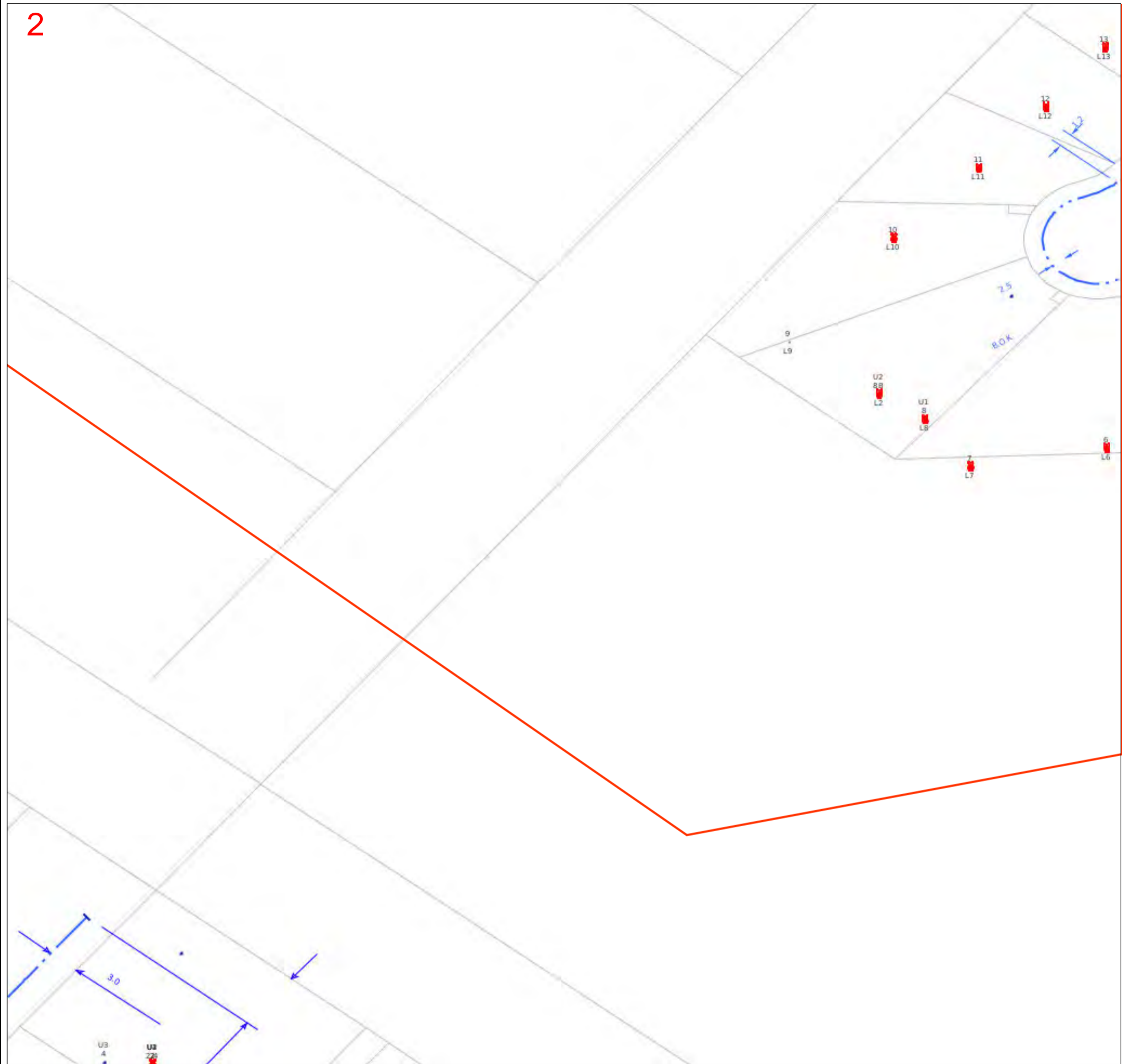


Scale 1:700

0 0.008km



Site Address	1 North Street Mulwala 2647	Sequence No	235987552
--------------	--------------------------------	-------------	-----------



LEGEND		PIPE CODE / MATERIALS		OBJECTS or TERMS	
LOW PRESSURES		C# (e.g. C2)	Cast Iron	VALVES	
MEDIUM PRESSURES		CU	Copper	BURIED VALVES	
HIGH PRESSURES		N2	Nylon	REGULATORS	
TRANSMISSION PRESSURES		P# (e.g. P6)	Polyethylene (PE)	GAS SUPPLIED = YES	
PRIORITY MAIN (BEHIND PIPE)		P6,P7,P9-P12	Medium Density PE	CP RECTIFIER UNIT	
PROPOSED (COLOUR BY PRESSURE)		P2,P4,P8	High Density PE	CP TEST POINT/ ANODE	
LPG (COLOUR BY PRESSURE)		S# (e.g. S8)	Steel	SYPHON	
ABANDONED		W2	Wrought Galv. Iron	TRACE WIRE POINT	
IDLE		W3	Poly Coat Wrought Galv. Iron	PIPELINE MARKER	
SLEEVE		<i>Pipe diameter in millimetres is shown before pipe code</i> e.g. 40P6 = 40mm nominal diameter		NOT TIED IN	N.T.I.
CASING / SPLIT (BEHIND PIPE)				DEPTH OF COVER	C
EASEMENT/ JURISDICTION				BACK / FRONT OF KERB	Bak Fok
EXAMPLES		40P6 in 80C2	40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing		
		63S8	63mm Medium Pressure Steel		
This map is created in colour and shall be printed in colour					
Line / Polygon Request					

Map Key

Scale 1:700

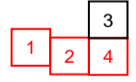
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Site Address	1 North Street Mulwala 2647	Sequence No	235987552
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LEGEND		PIPE CODE / MATERIALS		OBJECTS or TERMS	
LOW PRESSURES		C# (e.g. C2)	Cast Iron	VALVES	
MEDIUM PRESSURES		CU	Copper	BURIED VALVES	
HIGH PRESSURES		N2	Nylon	REGULATORS	
TRANSMISSION PRESSURES		P# (e.g. P6)	Polyethylene (PE)	GAS SUPPLIED = YES	
PRIORITY MAIN (BEHIND PIPE)		P6,P7,P9-P12	Medium Density PE	CP RECTIFIER UNIT	
PROPOSED (COLOUR BY PRESSURE)		P2,P4,P8	High Density PE	CP TEST POINT/ ANODE	
LPG (COLOUR BY PRESSURE)		S# (e.g. S8)	Steel	SYPHON	
ABANDONED		W2	Wrought Galv. Iron	TRACE WIRE POINT	
IDLE		W3	Poly Coat Wrought Galv. Iron	PIPELINE MARKER	
SLEEVE		Pipe diameter in millimetres is shown before pipe code e.g. 40P6 = 40mm nominal diameter		NOT TIED IN	N.T.I.
CASING / SPLIT (BEHIND PIPE)				DEPTH OF COVER	C
EASEMENT/ JURISDICTION				BACK / FRONT OF KERB	Bok Fok
EXAMPLES		40P6 in 80C2	40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing		
		63S8	63mm Medium Pressure Steel		
		Line / Polygon Request			

Map Key

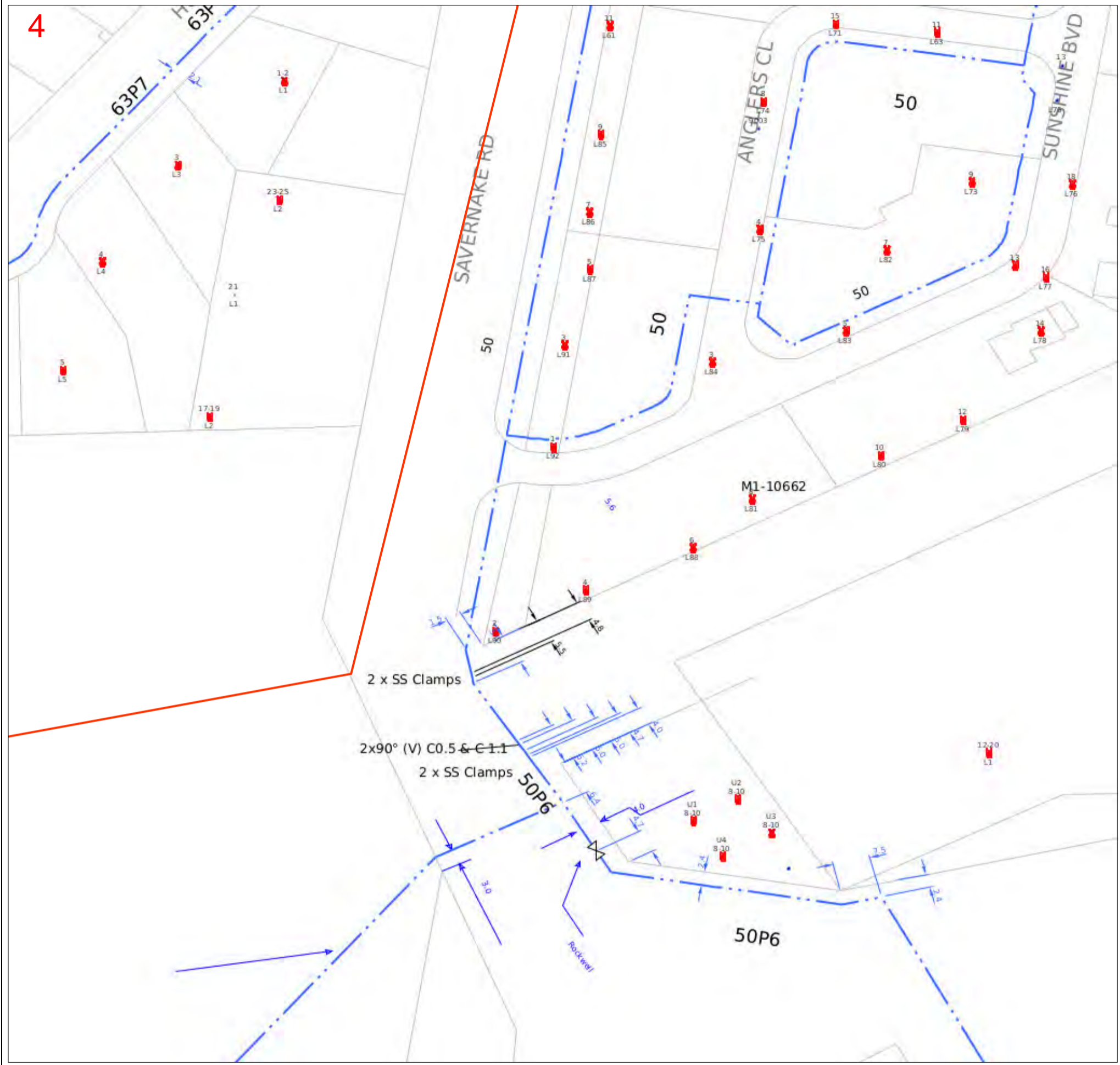


Scale 1:700

0 0.008km



Site Address	1 North Street Mulwala 2647	Sequence No	235987552
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LEGEND		PIPE CODE / MATERIALS	OBJECTS or TERMS
PIPE AND BOUNDARIES			
LOW PRESSURES		C# (e.g. C2) Cast Iron	VALVES
MEDIUM PRESSURES		CU Copper	BURIED VALVES
HIGH PRESSURES		N2 Nylon	REGULATORS
TRANSMISSION PRESSURES		P# (e.g. P6) Polyethylene (PE)	GAS SUPPLIED = YES
PRIORITY MAIN (BEHIND PIPE)		P6,P7,P9-P12 Medium Density PE	CP RECTIFIER UNIT
PROPOSED (COLOUR BY PRESSURE)		P2,P4,P8 High Density PE	CP TEST POINT/ ANODE
LPG (COLOUR BY PRESSURE)		S# (e.g. S8) Steel	SYPHON
ABANDONED		W2 Wrought Galv. Iron	TRACE WIRE POINT
IDLE		W3 Poly Coat Wrought Galv. Iron	PIPELINE MARKER
SLEEVE		<i>Pipe diameter in millimetres is shown before pipe code</i> e.g. 40P6 = 40mm nominal diameter	NOT TIED IN N.T.I.
CASING / SPLIT (BEHIND PIPE)			DEPTH OF COVER C
EASEMENT/ JURISDICTION			BACK / FRONT OF KERB Bak Fok
EXAMPLES	40P6 in 80C2	40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing	
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	Line / Polygon Request		

Map Key

Scale 1:700

0 0.008km





FISCHER
DEVELOPMENT SOLUTIONS

SUBMISSION TO FEDERATION COUNCIL

STORMWATER MANAGEMENT STRATEGY

PROPOSED RESIDENTIAL DEVELOPMENT

LUCAN STREET, MULWALA



CLIENT: OVENS & MURRAY LAND SURVEY

DATE: FEBRUARY 2024

FISCHER REF: F1328

DA REF: TBC



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1 INTRODUCTION

Fischer Development Solutions, on behalf of Ovens & Murray Land Survey has been engaged to prepare the Preliminary Design inclusive of a Stormwater Management Strategy (SWMS) for the proposed 13 lot residential subdivision at Lucan Road, Mulwala as part of the Development Application for this site.

The objective of this SWMS report is to demonstrate that the proposed stormwater infrastructure for this development can meet or exceed the stormwater quantity and quality management objectives set out within the *Federation Council Engineering Development Standards, Australian Rainfall and Runoff: A Guide to Flood Estimation 2019, Urban Stormwater – Best Practice Environmental Management Guidelines (1991)* and other applicable authority standards.

This report aims to investigate and propose an effective and efficient stormwater strategy to manage flows generated from the proposed development. The preliminary design process will incorporate an examination of the existing site and surrounds to ensure the proposed development and stormwater infrastructure is sympathetic to the site topography and surrounding area and can be integrated into the public open space areas allowed to achieve stormwater quantity and quality objectives.

The proposals outlined in this report are preliminary in nature and are subject to a detailed design process following the approval of a Development Application to develop this site. All proposals are subject to review and acceptance by Federation Council during the detailed design phase.



2 SITE & SURROUNDS

2.1 SITE OVERVIEW

The subject site is located approximately 1.2km north-east of the Mulwala CBD (Melbourne Street), refer to Figure 1 below. The site fronts Lucan Street (unmade council road) to the North and the Mulwala canal to the south. To the east of the site is a council road reserve with no formal road infrastructure constructed. There is a detention basin and pump situated in this road reserve that was designed and constructed for the development of HOAC court subdivision in 2004.

North street/Barooga Road to the north of Lucan street is a council collector street/road. With roadside drainage directing partial flows to a culvert crossing the Mulwala-Oaklands Rail line (west) and the detention basin at the corner of Savernake Road and North Street.

Adjacent to the subject site to the north and east are existing residential areas with the development of Hoac court being of a generally standard urban residential development pattern. The residential land to the north is not yet developed but is zoned for future development to occur in future.



Figure 1 - Locality Plan & Site Context



2.2 EXISTING SITE CONDITIONS

The total subject site is approximately 1.49ha in area and is mostly clear with some individual trees scattered across the site. Figure 2 below shows the proposed development plan for the site with existing conditions and contours shown at 0.2m interval. The subject site is typically grassed and slopes generally to the south-east at approximately 0.5-1.0%. A slight ridge is present at the Lucan Street frontage which directs surface flows back to North Street/Barooga Road.

The site post development will have two distinct catchments: the road reserve area and the residential allotment area. The Lucan Street Road reserve is not considered to contribute to the site runoff due to its slope direction to North street.

Both catchments are assessed to be directed to the South-East and into the existing drainage basin in the council road reserve. Due to the minor slope of the land it is expected that significant quantities of runoff from the site will be subject to evapotranspiration.

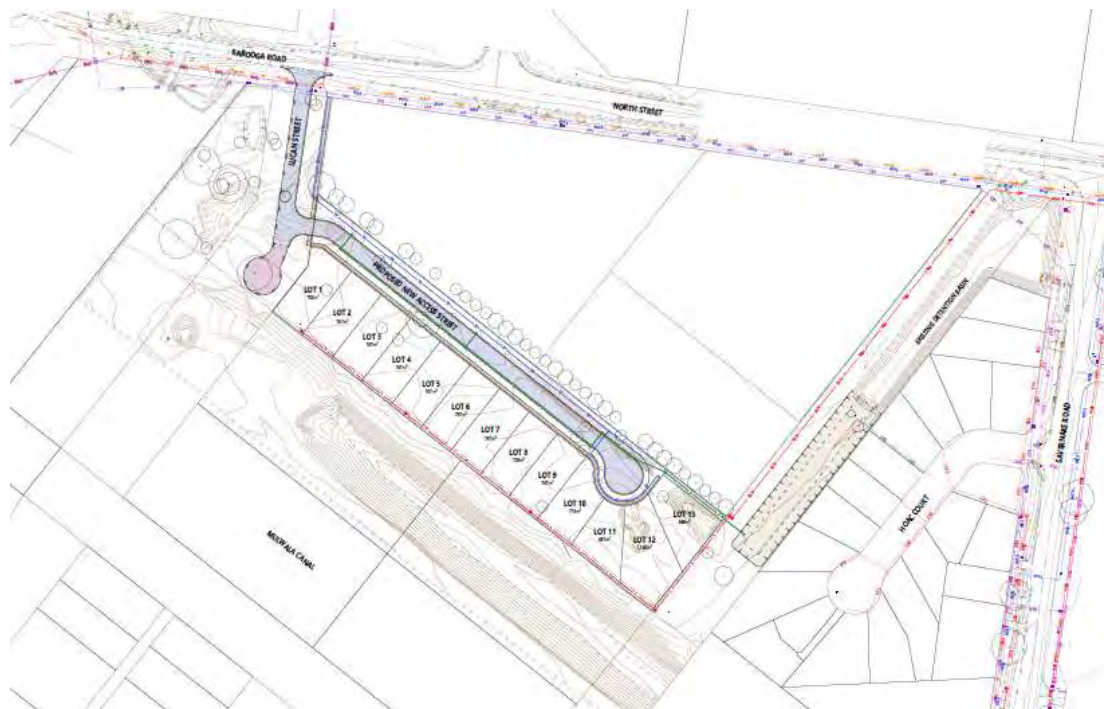


Figure 2 –Site Development Plan



3 DESIGN INTENT

The objective of this report is to investigate and provide an effective and efficient stormwater management strategy for the proposed development site. All development has the potential to adversely impact downstream environments through urbanisation of upstream catchments making it necessary to implement mitigation measures.

Increased impervious areas and changed land use due to development can result in an increase in peak flows and an increase the contaminants within the stormwater runoff generated from a site. The impacts of these changes in runoff can negatively affect the downstream drainage network and waterways where capacity issues may be present and lead to the degradation of a receiving waterways health.

To alleviate the potential impacts of development on the downstream network, a range of stormwater quantity management measures may be required to achieve an acceptable outcome. The proposed mitigation measures for this site are presented in Section 5 below and stormwater management plans are attached in Appendix A.

Expansion of the existing detention basin will be required to provide for the stormwater quantity management of this subject site. Computations and calculations have been conducted and provided as part of this report.

3.1 STORMWATER CONVEYANCE

3.1.1 SUB-SURFACE DRAINAGE

Underground drainage for the development will be designed to cater for the minor storm event, known as the 20% AEP storm event for residential development. The underground drainage network will provide a legal point of discharge for each lot within the development along with capturing surface flows generated from the roads and reserves and convey the minor storm event runoff to the proposed sedimentation basin.

The drainage catchments for this development are separated into two defined networks, as shown in the stormwater management plans within Appendix A.

It is intended that all flows emanating from the sites two catchments will be conveyed to the expanded detention basin for detainment and pumping using the existing pump infrastructure.

3.1.2 SURFACE DRAINAGE & OVERLAND FLOWS

Establishing clear overland flow paths within a development is required to convey excess stormwater flows through the site once the available capacity of the minor drainage system has been fully mobilised. Correctly designed overland flow paths will provide flood protection to private and public property while conveying overland flows to receiving waterways with minimal impact on the adjoining properties.

Roadways within the development will be employed to provide overland flow paths for surface runoff generated from the site. Grading of roads will convey 1% AEP overland flows to the expanded basin area. A reserve corridor from the end of the cul-de-sac to the basin reserve area will be implemented to ensure no future impediment to the sites 1% AEP overland flow path.

As the Lucan Street frontage of the site falls away from the site toward North Street, it is expected that no external catchments are conveyed through the site and thus, no allowance is required to be made for any external flows through the sites network infrastructure.

Roadways will be designed to provide sufficient conveyance capacity to meet safe velocity and depth criteria during a 1% AEP storm event and consideration will be given to impact of rarer storm events and their ability to convey storms larger than the 1% AEP event.

3.1.3 STORMWATER PUMP STATION

Details and computations received from Federation Council regarding the existing pump station as part of the Hoac Court development outline the pump design flow to be 20L/s. Thus the subject site catchments and Hoac Court catchments have been calculated to determine the combined detention requirement for this flowrate.



3.2 STORMWATER QUANTITY REQUIREMENTS

The proposed detention basin expansion will be a crucial element in the stormwater management for this site. The wetland will provide stormwater detention capacity for the minor (20% AEP) and major (1% AEP) stormwater runoff generated from the site and discharge at the existing pump stations flow rate capacity (20L/s).

3.3 FUTURE DEVELOPMENT

The extent of future development on the northern adjacent site is not currently known. No allowances have been made for any future development of this subject site. Thus, any future development of this adjoining site will require its own independent assessment and calculations to determine requirements of flow conveyance and detention volume requirements.



4 HYDROLOGY

The hydrological assessment for the proposed development site has been undertaken using the Rational Method to estimate the peak runoff generated from the site for multiple storm events, under pre-developed and post developed conditions.

4.1 RATIONAL METHOD

The Rational Method is a simple statistical method to estimate the peak discharge from a catchment for a given storm intensity. This method is widely accepted to estimate runoff from small simple rural and urban catchments for up to 25 km² and 1 km² respectively.

The drainage catchments included in this assessment and directed to the stormwater detention basin is comprised of all lots contained within this development and the proposed road reserve, this catchment is made up of road reserve area (4,605m²) and residential allotments (10,366m²). The post developed catchments are shown below in Figure 3 below.

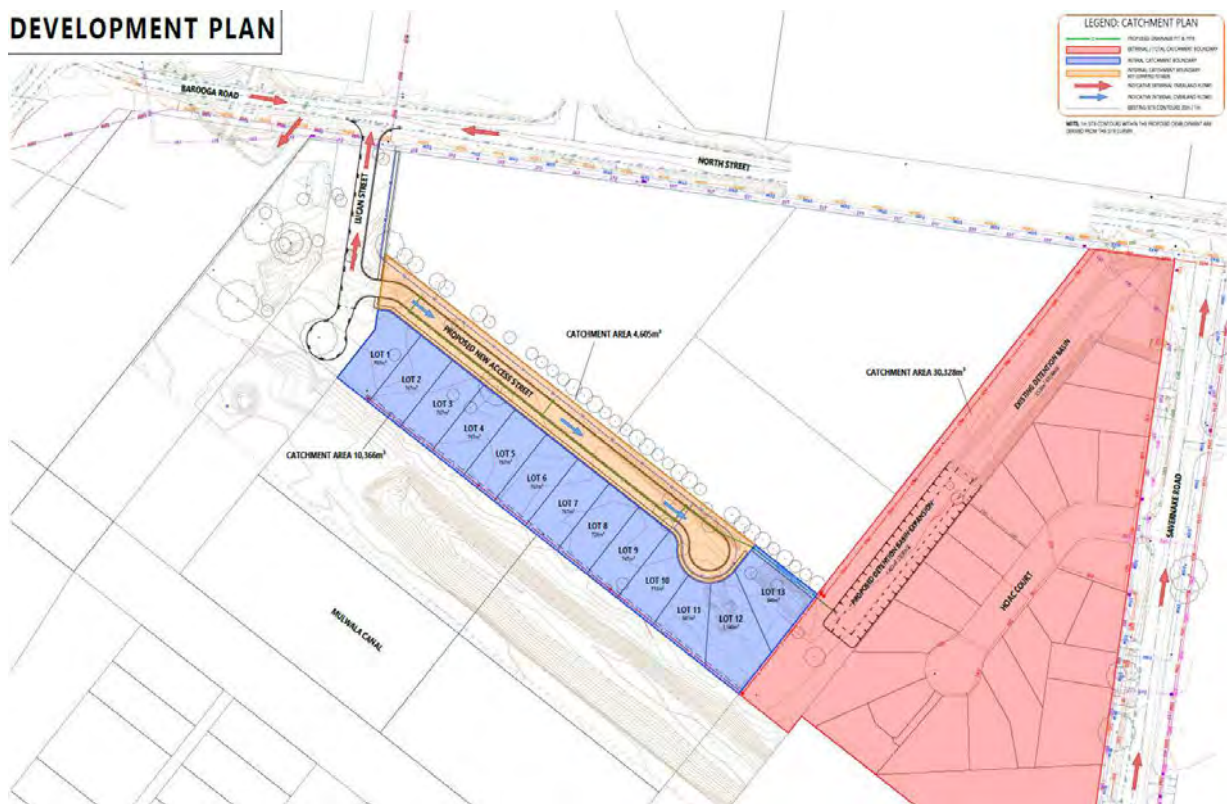


Figure 3 – Post Development Catchment Plan

4.1.1 Time in Concentration

Time in Concentration for the development is determined by the using the Pilgram McDermott formular as recommended in *Austrroads Guide to Road Design – Part 5 Drainage – General and Hydrology Considerations* when using the Rational Method.

$$t_c = 0.76 * A^{0.38}$$

where:

- t_c = time of concentration (hr)
- A = area (km²)

The time in concentration differs for pre-developed and post developed site conditions to account for the urbanisation of the developed site.



Under pre-developed conditions the t_c is estimate using the Pilgram McDermott equation presented above for whole site including external catchments.

When estimating the time in concentration for the developed site, the Pilgram McDermott equation is only used to determine the t_c for the largest external sub-catchment to reach the nearest branch of the proposed stormwater network in the developed site. In this case t_c is selected at *6 minutes*.

A pipe network travel time t_p is estimated to be *4 minutes and 4 minutes* for the proposed network of Catchment 1A and Catchment 1B respectively when taking into consideration the average grade and estimated total length of the proposed underground stormwater network to the furthest reach of the underground drainage network. The total post developed catchment t_c is therefore a summation of t_c and t_p .

4.1.2 Rainfall Intensity

Rainfall Intensity - Frequency - Duration (IFD) data sourced from the Bureau of Meteorology (BoM) Data Hub and is unique to the development site. Figure 4 below shows the IFD data for this site at nominated storm durations.

IFD Coefficients values obtained from the BoM Data Hub are used in the calculation process to accurately determine the rainfall intensity of storm durations other than those nominated on the IFD table.

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	91.6	105	148	177	205	243	273
2 min	76.7	87.6	123	147	172	203	227
3 min	69.6	79.6	112	134	156	184	206
4 min	64.4	73.7	103	124	144	170	190
5 min	60.0	68.8	96.5	116	134	159	178
10 min	45.5	52.3	73.5	87.9	102	121	135
15 min	37.0	42.6	60.0	71.8	83.3	98.9	111
20 min	31.5	36.2	51.0	61.0	70.9	84.1	94.3
25 min	27.5	31.6	44.5	53.3	61.9	73.5	82.4
30 min	24.6	28.2	39.6	47.5	55.2	65.5	73.5
45 min	18.8	21.6	30.2	36.2	42.1	49.9	56.0
1 hour	15.5	17.7	24.7	29.6	34.4	40.8	45.8
1.5 hour	11.7	13.3	18.5	22.1	25.7	30.4	34.1
2 hour	9.56	10.9	15.0	18.0	20.8	24.7	27.7
3 hour	7.21	8.18	11.3	13.4	15.5	18.3	20.6
4.5 hour	5.45	6.17	8.44	10.0	11.6	13.7	15.3
6 hour	4.48	5.06	6.91	8.18	9.44	11.2	12.5

Figure 4 - Rainfall Intensity - Frequency - Duration (IFD) data

4.1.3 Runoff Coefficients

Runoff coefficients for a used within the Rational Method can be a function of the design storm intensity. Frequency Factors are applied to the 10% AEP runoff coefficient (C_{10}) to estimate the runoff coefficient (C_Y) for a storm event of $Y\%$ AEP and are shown in Table 1 below.

$$C_Y = F_Y * C_{10}$$

Y (AEP)	63.2%	50%	20%	10%	5%	2%	1%
F_Y	0.80	0.85	0.95	1	1.05	1.15	1.2

Table 1 - Runoff Coefficient Frequency Factors

The C_{10} runoff coefficient for the site is estimated as follows:

$$C_{10} = 0.9 * f + C'_{10}(1 - f)$$

where:

f = fraction impervious of a catchment
 C'_{10} = 10% AEP pervious area runoff coefficient

And

$$C'_{10} = 0.1 + 0.0133({}^{10}_1I - 25)$$

Where:

${}^{10}_1I$ = 10% AEP, 1 hour rainfall intensity

Using the formula above the 10% AEP pervious area coefficient $C'_{10} = 0.1611$.

With the variability in sub catchment type across the proposed development, fraction impervious values have been estimated for the differing land use types and proposed lot sizes in addition to the frequency factors. Table 2 shows the range of runoff coefficients used in the Rational Method calculations for this site.

Block Size / Land Use	f	63.2%	50%	20%	10%	5%	2%	1%
F_r		0.80	0.85	0.95	1.00	1.05	1.15	1.20
< 450m ²	0.70	0.54	0.58	0.64	0.68	0.71	0.78	0.81
450m ² - 600m ²	0.60	0.48	0.51	0.57	0.60	0.63	0.70	0.73
600m ² - 800m ²	0.50	0.42	0.45	0.50	0.53	0.56	0.61	0.64
800m ² - 1000m ²	0.40	0.37	0.39	0.43	0.46	0.48	0.53	0.55
1000m ² - 2000m ²	0.30	0.31	0.33	0.36	0.38	0.40	0.44	0.46
2000m ² - 4000m ²	0.25	0.28	0.29	0.33	0.35	0.36	0.40	0.41
> 4000m ²	0.20	0.25	0.26	0.29	0.31	0.32	0.36	0.37
Reserve / Landscape	0.10	0.19	0.20	0.22	0.23	0.25	0.27	0.28
Road Reserve	0.60	0.48	0.51	0.57	0.60	0.63	0.70	0.73
Commercial Area	0.80	0.60	0.64	0.71	0.75	0.79	0.87	0.90

Table 2 – Site Runoff Coefficient

Sub catchments have been estimated for the post developed site conditions and an average site runoff coefficient has been calculated for the for the whole site for the use in the Rational Method based on the composition of the proposed developed.

4.1.4 Peak Runoff Estimation

Peak flow estimations for stormwater flows generated from this development have been undertaken for multiple storm events under post developed site conditions only due to the site being limited by the existing pump flows. Table

Sub catchments	Area (ha)	$C_{20\%}$	$C_{1\%}$	T_c (min)	$I_{20\%}$ (mm/hr)	$I_{1\%}$ (mm/hr)	$Q_{20\%}$ (m ³ /s)	$Q_{1\%}$ (m ³ /s)
External Catchment (Hoac Court)	3.033	0.75	0.85	12.0	74.4	129.8	0.470	0.929
Catchment 1A (Road)	0.461	0.85	0.96	6.0	99.9	172.0	0.109	0.211
Catchment 1B (Lots)	1.037	0.70	0.80	8.0	89.5	155.0	0.181	0.357
Total	17.080	0.749	0.85	14.0	68.8	120.2	0.648	1.285

Table 3 – Post-Developed Major / Minor Peak Site Discharge Estimation



5 STORMWATER QUANTITY MANAGEMENT

Stormwater detention is required to be provided on site to mitigate the effects of the proposed development on the downstream stormwater network. Thus, stormwater detention for this development is proposed to be integrated into the wetland facility to cater for stormwater detention and stormwater quality improvement. Refer to the stormwater management plans within Appendix A for the proposed basin arrangement.

Storage will be provided to detain the 20% AEP & 1% AEP with restricted outfall (pump capacity). The Permissible Site Discharge (PSD) rates will be limited by the stormwater pump station discharge rate.

The existing pump flow rate of 20 L/s has been adopted for the storage calculation. The required detention volumes are presented in Table 5 below.

Catchment	Storm Event	Area (ha)	C_{AEP}	T_d (min)	I_p (m ³ /s)	Q_{PSD} (m ³ /s)	S_{MAX} (m ³)
Total Combined Catchment	20%	4.53	0.748	565	0.056	0.020	1,203.63
Total Combined Catchment	1%	4.53	0.853	605	0.101	0.020	2,923.02

Table 5 – Boyds Method Estimate for Stormwater Detention Requirements

Boyd's Method for estimating storage requirements has been employed to calculate the required storage volumes for each storm event. This method is generally seen to be a conservative but reliable estimation of storage volume and is acceptable for a development of this size at the preliminary stage.

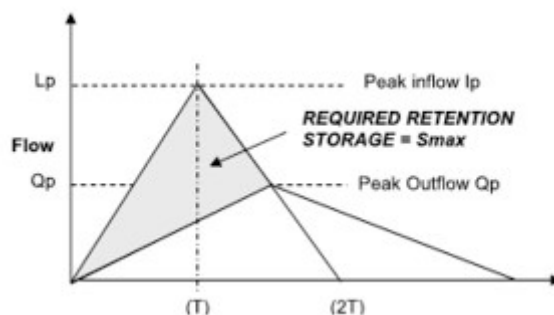


Figure 5 – Boyds Method Estimation for OSD Diagram



6 CONCLUSION

This Stormwater Management Plan demonstrates that the proposed subdivision can meet the required objectives for stormwater management utilising the proposed drainage infrastructure outlined in this report. The quality and quantity targets outlined in this report are achieved by.

- Underground drainage to convey minor storm flows to the proposed stormwater basin facility and conveyance to the outfall location via a pump and rising main
- Overland flow path provided via the subdivision road network

The proposed drainage infrastructure outlined in this report is subject to change based on any Development Application conditions set by council and further detailed design.



7 REFERENCES

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STORMWATER DRAINAGE DESIGN IN SMALL CATCHMENTS, 1986

ROOF DRAINAGE, 1973, by K.G. Martin and CSIRO

AS3500-2003: Plumbing & Drainage

INFRASTRUCTURE DESIGN MANUAL (IDM)

WSUD ENGINEERING PROCEDURES: Stormwater (CSIRO 2005)

CIVIL SITE DESIGN – Hydraulic Calculations

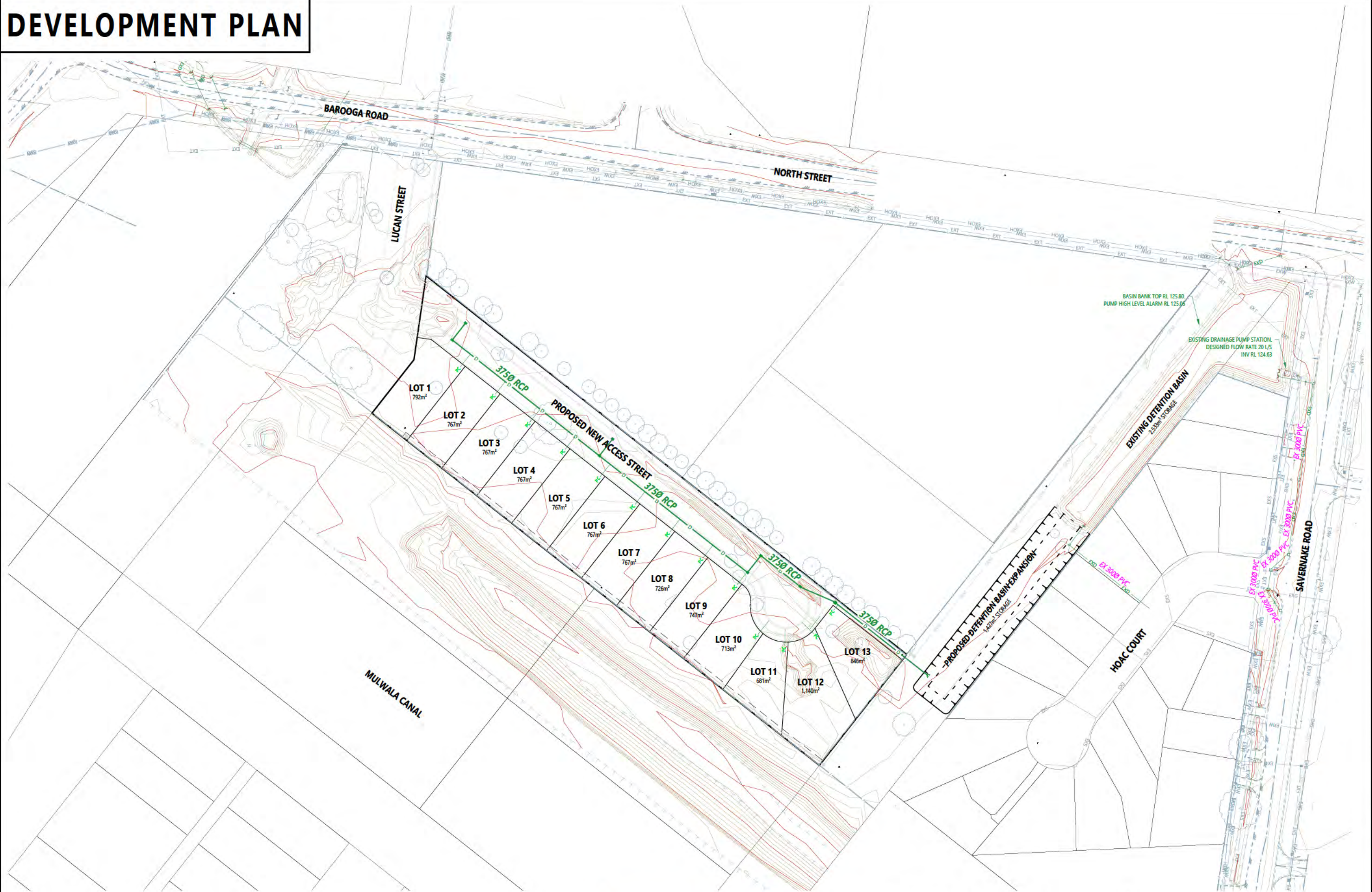
FISCHER DEVELOPMENT SOLUTIONS calculation spreadsheets (incorporating above references)



8 APPENDICIES

APPENDIX A – CONCEPT DESIGN PLANS

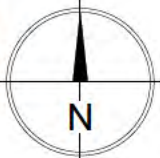
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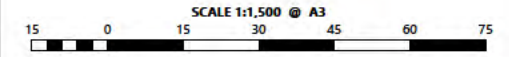


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PROPOSED DRAINAGE SERVICING

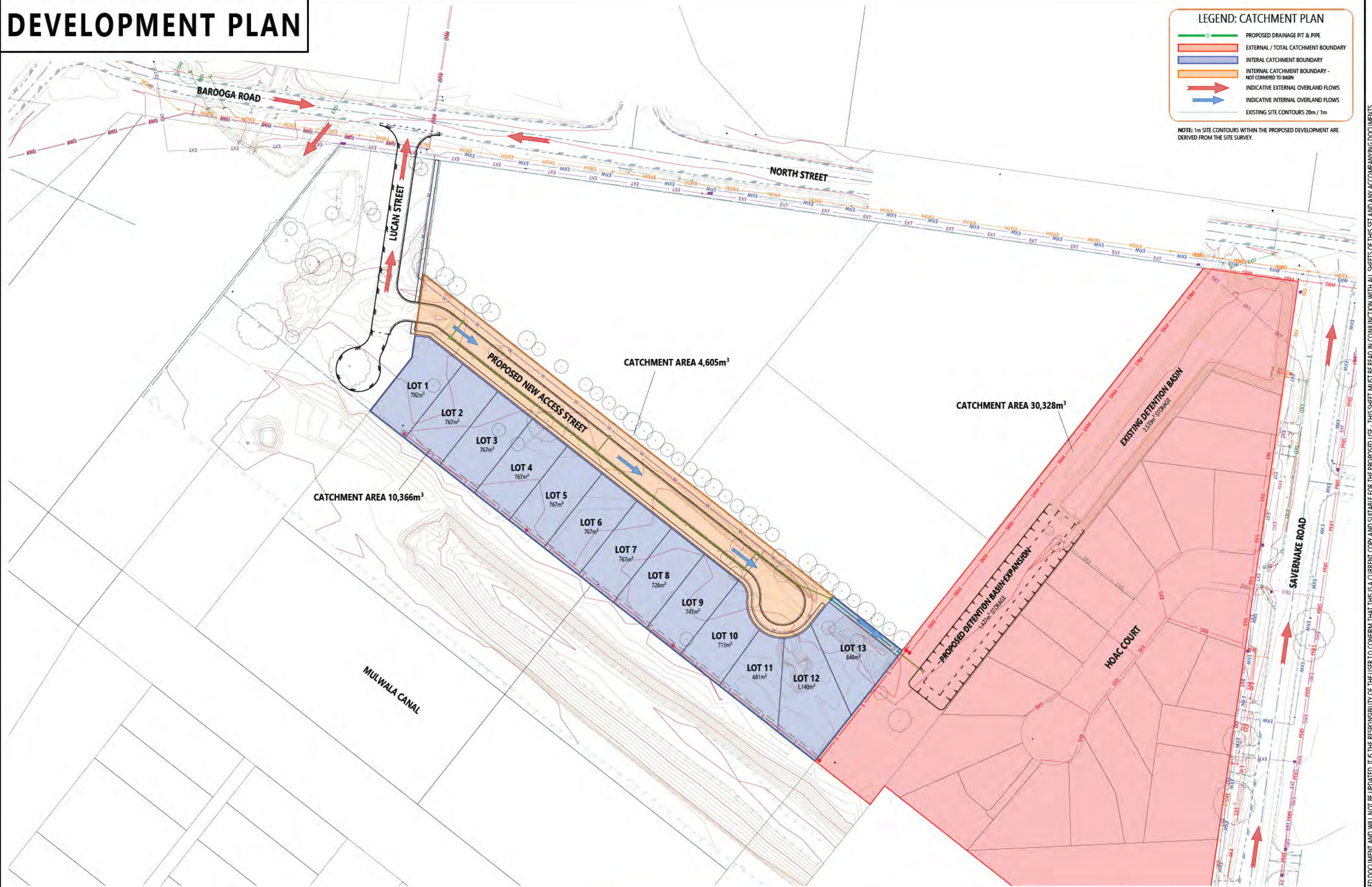


MUNICIPALITY
 FEDERATION COUNCIL

PROJECT & DWG No:
 F1328DRN01/01

REV:
X1

DEVELOPMENT PLAN



LEGEND: CATCHMENT PLAN

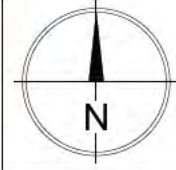
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- EXTERNAL / TOTAL CATCHMENT BOUNDARY
- INTERNAL CATCHMENT BOUNDARY
- INTERNAL CATCHMENT BOUNDARY - NOT CONVEYED TO BASIN
- INDICATIVE EXTERNAL OVERLAND FLOWS
- INDICATIVE INTERNAL OVERLAND FLOWS
- EXISTING SITE CONTOURS 20m / 1m

NOTE: 1m SITE CONTOURS WITHIN THE PROPOSED DEVELOPMENT ARE DERIVED FROM THE SITE SURVEY.

REV	DESCRIPTION	DATE
X1	PREPARED FOR SERVICING STRATEGY	

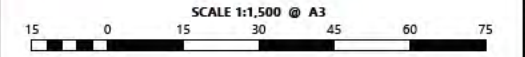


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