REV B - 22 FEBRUARY 2024

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

planning proposal

Bogan Gate Road , Forbes NSW 2871

PPA - FORBES SHIRE COUNCIL

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ACKNOWLEDGMENT OF COUNTRY

In preparing this Planning Proposal to Forbes Shire Council, Currajong and M & N O'Keeffe Constructions Pty Ltd acknowledge the traditional lands of the Wiradjuri people, and pays respect to elders both past, present and emerging.

DOCUMENT CONTROL

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Client	M G O'Keeffe Constructions PL
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EXECUTIVE SUMMARY

Currajong has been engaged by M G O'Keeffe Constructions PL (the Landowners) to prepare information in support of a Planning Proposal relating to the land described as Lots 1046 to 1055 DP 750158 and Lot 796 DP 750158, being land addressed as Bogan Gate Road, Forbes NSW.

The Landowners purchased the property holding with a vision to develop the site for residential and public purposes consistent with the strategic framework established by Council under the Forbes Local Environmental Plan 2013 and Forbes Housing Strategy. As existing urban zoned land, the use of the land for urban purposes is capable of strategic support from Council.

In February 2023, Currajong Consultants (on behalf of the landowners) submitted a Pre-DA to Forbes Shire Council seeking feedback in relation to a draft set of plans showing the vision for the subdivision of the land. The response from Council was favourable and the comments received have been considered and incorporated as necessary into the preparation of this Planning Proposal.

A masterplanning exercise has been completed for the whole site in order to properly understand the likely requirements for lot design and urban infrastructure provision and this work has been used to inform the new zoning (and lot size) framework presented in this Planning Proposal.

The Planning Proposal seeks to amend Forbes Local Environmental Plan 2013 (the Forbes LEP) by rezoning land and changing the minimum lot size provisions to suit a proposed subdivision design for the land.

The Planning Proposal will amend both the written instrument and the mapping relating to the Forbes LEP.

Importantly, the subject land is already largely zoned to enable the subdivision and subsequent development of the land for residential purposes. The Planning Proposal is therefore not seeking to change the primary purpose for which development is permissible on the land. Instead, the proposal is aimed at:

+ Rationalising the location of the RE1 Public Recreation zone to suit a completed engineering design for the management of overland stormwater through the development site.
+ Rationalising the location of the R1 General Residential zone to suit a proposed subdivision design for the land.
+ Remove the C3 Environmental Management zoning on the basis that a suitable framework has been developed to manage a known contamination risk on the land associated with an historic animal burial pit.

The Planning Proposal is supported by a number of special studies and reports which seek to demonstrate that the proposed development scenario for the site is suitable having regard to the need to address overland stormwater drainage, flooding and management of a known location of potential contamination.

The Planning Proposal is presented for assessment by Forbes Shire Council in a form that is consistent with the recommendations of the NSW Department of Planning and Environment's Local Environmental Plan Making Guidelines. It provides the necessary reporting basis for Forbes Shire Council to progress an amendment to Forbes Local Environmental Plan 2013.

A summary of the primary assessment findings is included as follows:

+ The need for the Planning Proposal is a result of the finalisation of detailed designs for the proposed subdivision of the land, having regard to site constraints and opportunities and review of the review of the existing zoning and minimum lot size framework applying to the land.
+ The proposal is not inconsistent with the Central West and Orana Regional Plan 2041 or the Forbes Local Strategic Planning Statement.
+ The proposal is not inconsistent with any provisions of an applicable State Environmental Planning Policy.
+ The proposal is justifiable inconsistent with Ministerial Direction 3.1 - Conservation Zones. The inconsistency is justified on the basis that a study has been submitted with the Planning Proposal which generally concludes that the conservation zoning on the land is no longer required and that the land is suitable for future residential use subject to the implementation of an appropriate environmental management framework.
+ The proposal is justifiably inconsistent with Ministerial Direction 5.2 - Reserving land for public purposes. The inconsistency arises because the proposal involves an alteration to the extent of land that is currently zoned RE1 Public Recreation. The inconsistency is proposed to be justified on the grounds of minor significance. The Planning Proposal adequately demonstrates that sufficient land is retained for public purposes.
+ The likely environmental, social and economic impacts of the proposals are acceptable, and positive in the majority.
+ Adequate arrangements can be made for the provision of public infrastructure.
+ The Planning Proposal is not determined to be of significance to State and Federal governments.
+ The Planning Proposal is supported by a suite of maps that demonstrate the proposed scope of changes to Forbes Local Environmental Plan 2013.

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PROJECT INTRODUCTION

1.1 Project Overview

Currajong has been engaged by M G O'Keeffe Constructions PL to prepare information in support of a Planning Proposal relating to the land described in the Table 1. The land is addressed to Bogan Gate Road, Forbes NSW.

Table 1 - Description of Land Titles

Lot	DP	Area (m2)
1046	750158	7654
1047	750158	6710
1048	750158	5585
1049	750158	6857
1050	750158	5969
796	750158	155
1055	750158	8045
1054	750158	8068
1053	750158	7507
1052	750158	7391
1051	750158	5711

The Planning Proposal seeks to amend Forbes Local Environmental Plan 2013 (the Forbes LEP) by rezoning land and changing the minimum lot size provisions to suit a proposed subdivision design for the land.

The Planning Proposal has been prepared in accordance with the NSW Planning and Environment's Local Environmental Plan Guideline dated August 2023.

Importantly, the subject land is already largely zoned to enable the subdivision and subsequent development of the land for residential purposes. The Planning Proposal is therefore not seeking to change the primary purpose for which development is permissible on the land. Instead, the proposal is aimed at:

+ Rationalising the location of the RE1 Public Recreation zone to suit a completed engineering design for the management of overland stormwater through the development site.
+ Rationalising the location of the R1 General Residential zone to suit a proposed subdivision design for the land.
+ Remove the C3 Environmental Management zoning on the basis that a suitable framework has been developed to manage a known contaminated risk on the land associated with an historic animal burial pit.

1.2 Project Background

The landowners purchased the property holding with a vision to develop the site for residential and public purposes consistent with the strategic framework established by Council under the Forbes Local Environmental Plan 2013 and Forbes Housing Strategy. As existing urban zoned land, the use of the land for urban purposes is capable of strategic support from Council.

In February 2023, Currajong Consultants (on behalf of the landowners submitted a Pre-DA to Forbes Shire Council seeking feedback in relation to a draft set of plans showing the vision for the subdivision of the land. The response from Council was favourable and the comments received have been considered and incorporated as necessary into the preparation of this Planning Proposal.

The land owners have also engaged Currajong and Calare Civil to commence planning and (preliminary) engineering tasks related to the preparation and lodgement of a Development Application to Forbes Shire Council for subdivision works at the subject land. The initial Development Application to Council will focus on Stage 1 works which relate generally to land on Attlee Street and York Street that is outside of the existing RE1 Public Recreation or C3 Environmental Management zones.

A masterplanning exercise has been completed for the whole site in order to properly understand the likely requirements for lot design and urban infrastructure provision and this work has been used to inform the new zoning (and lot size) framework presented in this Planning Proposal.

The DA for Stage 1 subdivision work will be presented to Council concurrently with this Planning Proposal in an effort to demonstrate that the land owners are motivated to progress physical works at the site as matter of priority with resulting benefits for housing supply in Forbes Township.

1.3 Structure and Form

The Planning Proposal has been prepared in accordance with the NSW Planning and Environment's Local Environmental Plan Guideline dated August 2023, hereafter referred to as the Guideline.

Section 2 of the Guideline includes detailed guidance on what content needs to be included in a Planning Proposal. Table 1 includes a checklist of all of the information required by the Guideline and a reference on where the information can be found within this Planning Proposal

The Guideline requires that the Planning Proposal must be prepared to a high standard and complying generally with the requirements detailed in Table 2.

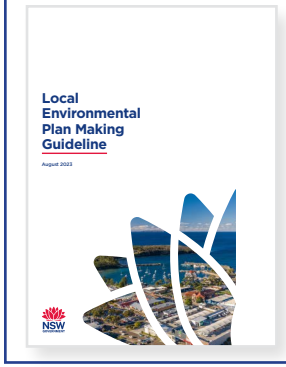


Table 2 - Format of the document

Section No	Section Heading	Description
Section 1	Project Introduction	Section 1 includes introductory information relating to the project including a project overview and relevant background information.
Section 2	The Existing Environment	Section 2 includes a detailed description of the project including location and title, land-use descriptions, and an assessment of the existing environmental conditions applying to the land.
Section 3	Existing Planning Framework	Section 4 includes a description of the existing planning framework applying to the subject land including provisions under Forbes Local Environmental Plan 2013.
Section 4	Description of the Proposal	Section 4 includes a detailed description of the subdivision development which is proposed by M G O'Keeffe Constructions PL for the land at Bogan Gate Road, Forbes. This section also describes the scope of the proposed zoning and minimum lot size changes to Forbes Local Environmental Plan 2013.
Section 5	Strategic Alignment	Section 5 includes detailed information describing how the proposed development aligns with the strategic planning framework applying to the subject land.
Section 6	Planning Proposal - Part 1	Section 6 addresses the Part 1 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.
Section 7	Planning Proposal - Part 2	Section 7 addresses the Part 2 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.
Section 8	Planning Proposal - Part 3	Section 8 addresses the Part 3 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.
Section 9	Planning Proposal - Part 4	Section 9 addresses the Part 4 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.
Section 10	Planning Proposal - Part 5	Section 10 addresses the Part 5 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.
Section 11	Planning Proposal - Part 6	Section 10 addresses the Part 6 matters for consideration under the NSW DPE Local Environmental Plan Making Guidelines.

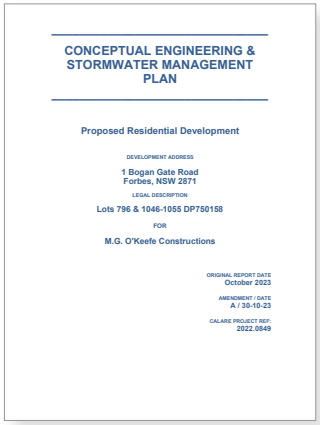
1.4 Supporting Documentation

The Planning Proposal is supported by a number of specialist reports, studies and design details that seek to address specific planning issues that have either been raised by Council or which are deemed to be necessary in order to demonstrate to the Forbes Shire Council (as the relevant Planning Proposal Authority) that the project is capable of being supported. A description of these documents is included as follows.

Appendix A

Conceptual Engineering & Stormwater Management Plan

The Conceptual Engineering and Stormwater Management Plan has been prepared by Calare Civil. The Plan summarises the various findings relating to engineering opportunities and constraints for the development, along with the control of external stormwater runoff traversing the site. The Plan seeks to demonstrate that the residential use of the site is suitable having regard to the flood planning framework in the Forbes LEP 2013 and relevant studies adopted by Forbes Council relating to flooding and stormwater management.


CONCEPTUAL ENGINEERING & STORMWATER MANAGEMENT PLAN

Proposed Residential Development

DEVELOPMENT ADDRESS
1 Bogan Gate Road
Forbes, NSW 2871

LEGAL DESCRIPTION
Lots 796 & 1046-1055 DP750158

FOR
M.G. O'Keefe Constructions

ORIGINAL REPORT DATE
October 2023

AMENDMENT / DATE
A / 30-10-23

CALARE PROJECT REF:
2022.0849

Appendix B

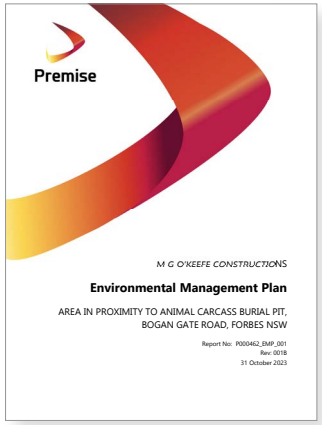
Draft Subdivision Plans

Draft subdivision plans have been prepared for the whole of the subject land by Calare Civil including preliminary engineering details. The draft subdivision plans seek to demonstrate that the proposed zoning and lot size framework align with a holistic plan for development of the land.

Appendix C

Premise Reports (Site Microbial Investigation Anthrax and Environmental Management Plan)

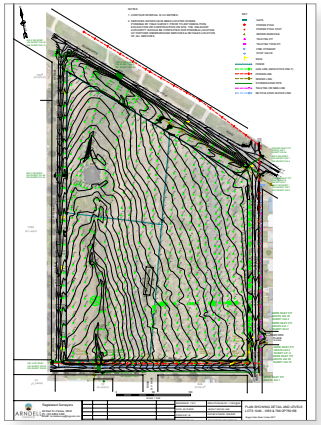
The Environmental Management Plan provides an environmental assessment and technical recommendations for managing a known source of potential contamination on the land.



Appendix D

Site Detail and Contour Survey

A Site Detail and Contour Survey has been completed by Arndell Surveyors and shows the location of existing features of the natural and built environment.



02

THE EXISTING ENVIRONMENT

2.1 Location and title

The land which is the subject of this Planning Proposal is addressed to Bogan Gate Road, Forbes NSW and is comprised of a number of existing land titles . Table 3 includes a description of the numerous land titles comprised within the property holding.

Table 3 - Description of Land Titles

Lot	DP	Area (m2)
1046	750158	7654
1047	750158	6710
1048	750158	5585
1049	750158	6857
1050	750158	5969
796	750158	8155
1055	750158	8045
1054	750158	8068
1053	750158	7507
1052	750158	7391
1051	750158	5711

The total area of the property holding is calculated to be 77,652m2 or 7.76ha. Figure 1 shows the existing configuration of the property holding and it's location within the surrounding locality.

Figure 1 - Site Location Map

2.2 Land-use

2.2.1 The subject land

The subject land is currently being maintained as vacant land. There are no existing buildings or structures located on the land, and the only improvements relate to perimeter fencing and a number of informal site accesses.

There are no other notable land-use activities being carried out on the land under present conditions.

Figure 2 includes an aerial photograph of the subject land.

Figure 2 - Site Features Map and Aerial Photograph

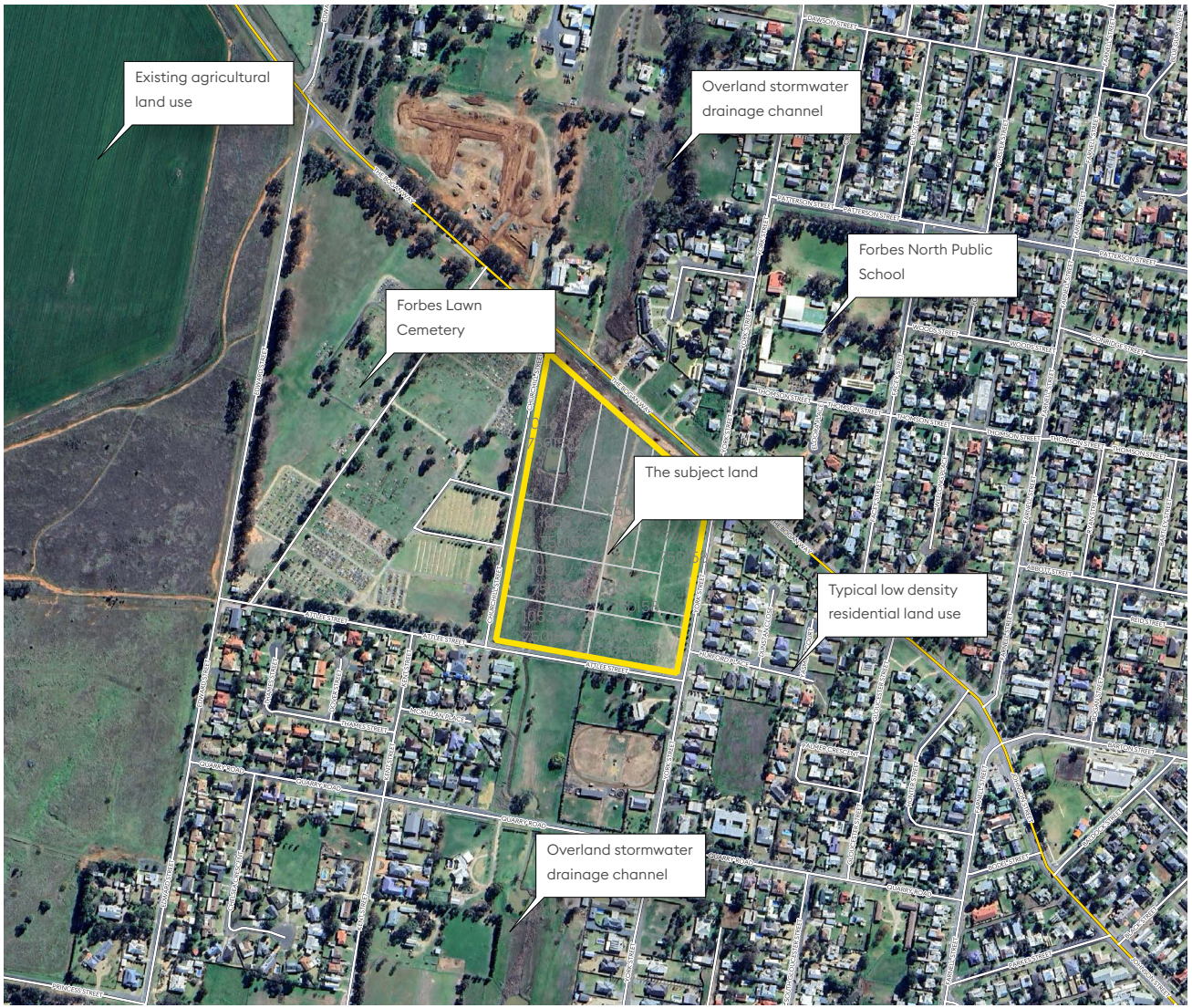
2.2.2 The surrounding environment

An analysis of the surrounding environment has been completed and the following observations are made:

- The site is located on the western edge of the Forbes urban area.
- The Forbes Lawn Cemetery is located immediately west of the site.
- The land located immediately north of the site (on the opposite side of the Bogan Gate Road) is zoned and used for residential purposes. Standard residential densities are observed and single storey built forms predominate.
- The land located immediately east of the site (on the opposite side of York Street) is zoned and used for residential purposes. Standard residential densities are observed and single storey built forms predominate.
- The land located immediately south of the site (on the opposite side of Attlee Street) is zoned and used for residential purposes. Lower residential densities are observed and single storey built forms predominate. This land also contains a continuation of the overland stormwater drainage channel, which crosses Attlee Street and continues south-bound towards Quarry Road.
- Other notable land-use activities being carried out within the immediately surrounding locality include the Forbes North Public School. The Forbes CBD is located approximately 1.5km to the south-east via Bogan Gate Road
- There are no primary production uses being carried out on immediately adjoining lands, which confirms the urban context and setting of the site.

Figure 3 shows the land-use pattern within the surrounding area.

Figure 3 - Land-use Map



2.3 Topography, slope and landform

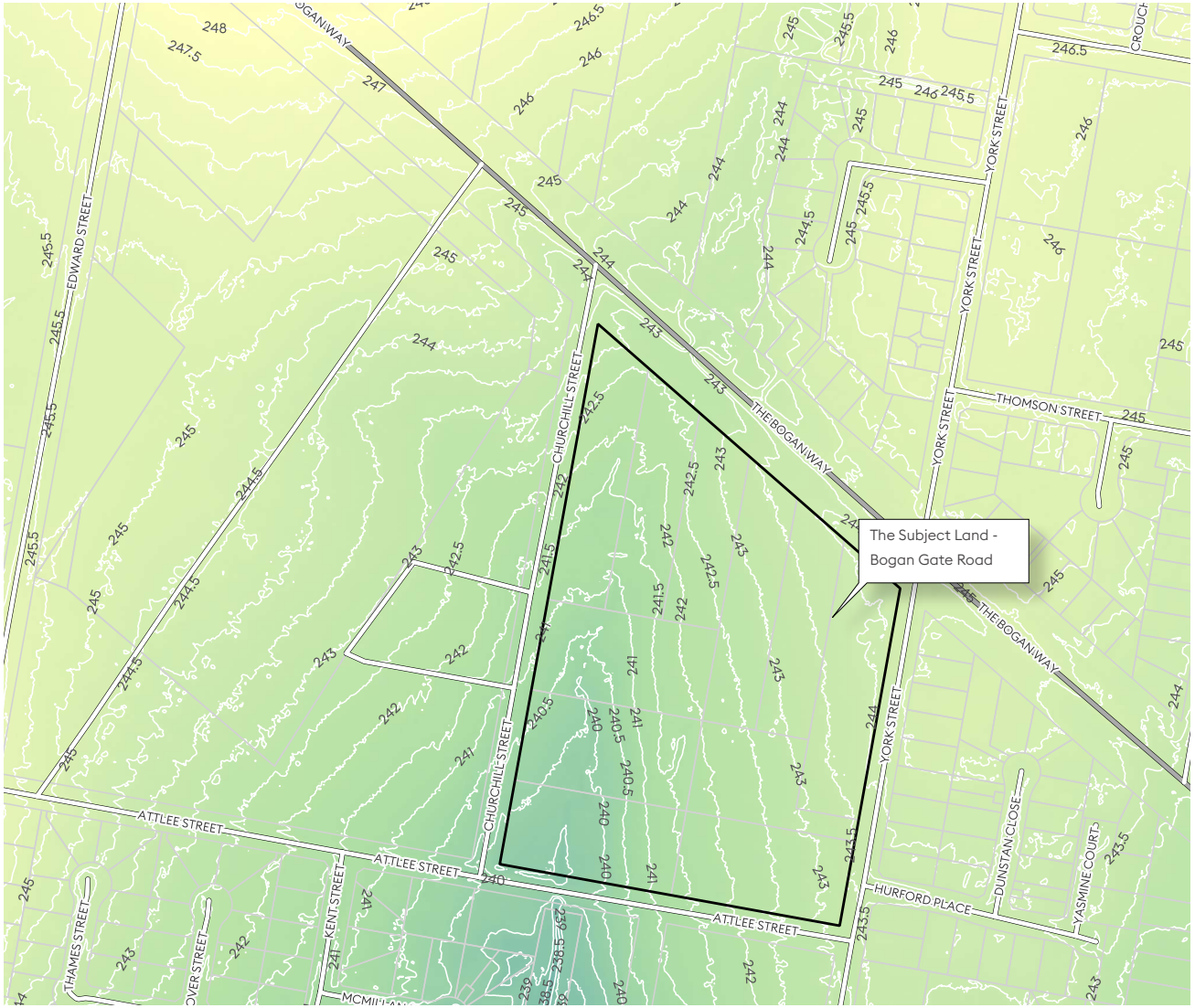
The topography of the land is described as flat to gentle. A contour map of the land is included in Figure 4.

A key topographical feature of the subject land is the existing overland stormwater drainage channel located within the boundaries of the subject land. Evidenced by the site contour information (and aerial photograph included in Figure 2, the drainage channel traverses the site in a north-south direction, generally along the western boundary of the site and accommodates flow from upstream catchments north of the Bogan Gate Road. This is an important environmental function of the site and surrounds.

Outside of the stormwater drainage channel, there are no topographical features of the land which present impediments to the subdivision of the land for residential purposes. There are no significantly elevated areas, no exposed ridgelines and no visually prominent landmarks requiring a special planning or design response.

The elevation, grade and aspect of the sites are key opportunity elements underpinning the establishment of a quality residential neighbourhood and associated drainage and public open space areas.

Figure 4 - Topography and Landform Map



2.4 Water Resources

The subject land is not mapped in Forbes Local Environmental Plan 2013 as containing vulnerable groundwater resources. These sensitive resources are generally focused along the flats and alluvial plains of the Lachlan River which is located generally south of the Forbes urban area.

The subject land is not mapped in Forbes Local Environmental Plan 2013 as being impacted by riverine flooding from the Lachlan River.

In its current state there is an upstream catchment external of the site that has an area of approximately 174.5 ha. There is another catchment to the west of the site that also contributes runoff and this catchment is approximately 22.4ha. The various catchments result in an overland stormwater drainage channel which traverses the site in a north-south direction, generally along the western boundary of the site. Water is currently conveyed under the road to the site by 6 x 1200 x 600 Reinforced Concrete Box Culverts. The runoff leaves the site under Attlee Street via 2 x 1800 x 600 Reinforced Concrete Box Culverts, subsequently discharging into an existing open watercourse.

The channel is not protected by an easement, but is zoned for public purposes (RE1) under the Forbes Local Environmental Plan 2013. The extent of flooding on the land in a 1% AEP and PMF event has been investigated by Calare Civil with key findings incorporated into the design of the proposed subdivision. The investigations confirm that flooding can be managed in a way that does not pose an impediment to residential land-use.

The are no permanent water courses on the land. There are no high value riparian areas observed to be located on the land.

Figure 5 shows the key water resource issues affecting the subject land.

Figure 5 - Water Resources and Features Map

2.5 Biodiversity

A review of the Terrestrial Biodiversity Map in Forbes Local Environmental Plan 2013 confirms that the subject land is not mapped as containing high or moderate sensitivity biodiversity.

The aerial photograph included in Figure 2 shows that the historic agricultural use of the property has resulted in a landscape that is highly disturbed and cleared of native vegetation, with the predominate landform cover being pasture grass. A small number of Isolated trees are observed in the vicinity of Lot 1051 DP 750158. The biodiversity resources of the subject land are shown in Figure 6.

Street trees have been planted within the York Street road reservation adjacent to the sites eastern property boundary.

Given the existing vegetation is located on land that is already zoned for urban purposes, a more detailed assessment of potential impact in the form of a Biodiversity Assessment Report is not deemed to be necessary. The lodgement of a Development Application with Council for the subdivision of the land will include an appropriate impact assessment where vegetation removal is required as part of civil construction work or future dwelling-house development.

Figure 6 - Biodiversity Resources Map

2.6 Heritage

European Heritage

A review of Forbes Local Environmental Plan 2013 confirms that the subject land is not listed in Schedule 5 as being of environmental heritage significance.

The Forbes Cemetery is identified to be the only listed heritage site located within a distance of 500m of the subject land. The Forbes Cemetery is identified to be of local heritage significance.

The intended future use of the subject land for residential purposes is not incompatible with the heritage significance of the Forbes Cemetery.

Aboriginal Heritage

A search of the Aboriginal Heritage Management System (AHIMS) has been completed to determine whether there are any known any items, places or relics of Aboriginal heritage significance located within 200m of the subject land. The results did not identify any Aboriginal sites or places within the search area. Copies of the searches can be produced for Forbes Shire Council if required.

Figure 7 - Heritage Map

2.7 Access, transport and traffic

The subject land is currently provided with road access as follows:

- The northern boundary of the subject site has direct frontage to Bogan Gate Road, which is a public road forming part of the classified road system. Bogan Gate Road is a two way collector road which connects the Forbes urban area to nearby regional destinations. Bogan Gate Road is currently formed to an 7m wide sealed standard with one travel lane in each direction. This provides the most direct road access route from the subject land to the inner areas of the Forbes Township. The road is speed limited to 50km/hour within town limits, increasing to 80km/h at location that is equal to the mid-point of the northern boundary of the subject land.
- The eastern boundary of the subject site has direct frontage to York Street, which is a public road forming part of the local road system. York Street is a two way local street which connects directly to Bogan Gate Road. York Street is currently formed to a 7m wide sealed standard with one travel lane in each direction. Kerb and gutter infrastructure has been installed along the eastern side of the road only. The road is speed limited to 50km/h.
- The western boundary of the subject site has direct frontage to Churchill Street, which is a public road forming part of the local road system. Churchill Street is a two way local street which connects directly to Bogan Gate Road. Churchill Street is currently formed to a 5m sealed standard with one travel lane in each direction. Churchill Street does not have kerb and gutter infrastructure. The road is speed limited to 50km/h.
- The southern boundary of the subject site has direct frontage to Attlee Street, which is a public road forming part of the local road system. Attlee Street is a two way local street and is currently formed to a 7m sealed standard with one travel lane in each direction. Attlee Street does not have kerb and gutter infrastructure. The road is speed limited to 50km/h.

There are currently no public transport facilities (bus stops etc) or pedestrian footpaths or cycleways connecting immediately to the subject land.

A map showing the existing road network surrounding the subject land is included in Figure 8.

Figure 8 - Roads Map

2.8 Environmental Hazards

Bushfire

A review of the Bushfire Prone Land Map prepared by the NSW Rural Fire Service for the area confirms that the subject land is not likely to be impact by bushfire. The nearest land that is identified to be bushfire prone is located approximately 16km west of the subject land.

Flooding

The subject land is not mapped in Forbes Local Environmental Plan 2013 as being impacted by riverine flooding from the Lachlan River. Flooding from the overland stormwater drainage is expected to occur on the land and is an important consideration in terms of establishing the suitability of the site for residential land-use. The extent of flooding on the land in a 1% AEP and PMF event has been mapped and is properly understood. A more detailed assessment of likely impact is included in **8.3**

Contamination

The subject land has been evaluated for potential contamination arising from current and known past land-use activities.

The subject land does not feature in any of the databases maintained by the Office of Environment and Heritage pertaining to the management / regulation of contaminated sites.

A part of the site is known to contain an animal burial pit with surveyed dimensions 34m north-south and 6m east-west. The pit is located on Lot 1054 DP 750158. The pit represents an area requiring an environmental management response in order to deal with potential contamination issues and this is issue is further described and reported on in Section **8.3**.

Figure 12 shows the environmental hazards impacting the site and surrounds.

Figure 9 - Environmental Hazards Map

2.9 Infrastructure and Services

Stormwater

In its current state there is an upstream catchment external of the site that has an area of approximately 174.5 ha. There is another catchment to the west of the site that also contributes runoff and this catchment is approximately 22.4ha. The various catchments result in an overland stormwater drainage channel which traverses the site in a north-south direction, generally along the western boundary of the site. Water is currently conveyed under the road to the site by 6 x 1200 x 600 Reinforced Concrete Box Culverts. The runoff leaves the site under Attlee Street via 2 x 1800 x 600 Reinforced Concrete Box Culverts, subsequently discharging into an existing open watercourse.

Sewerage

The site is available to be connected to Council's existing gravity sewerage supply system. Preliminary survey and engineering investigations have confirmed there is an existing sewer main installed along the site's frontage in Attlee Street. It is intended to connect the proposed subdivision into this infrastructure via a new reticulated sewerage main designed to service all new residential subdivision allotments.

Water Supply

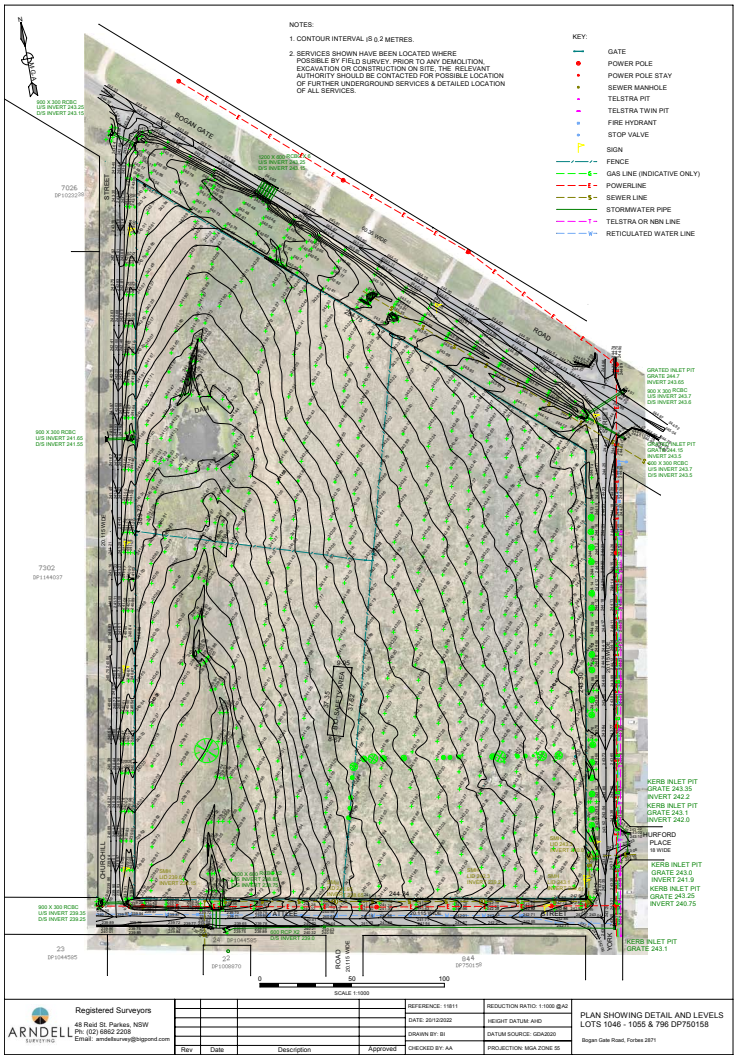
The site is available to be connected to Council's existing reticulated water supply system. Preliminary survey and engineering investigations have confirmed there is an existing 100mm diameter water main located within the road reservations to York Street and Attlee Street. It is intended to connect the proposed subdivision into this infrastructure via a new reticulated water mains designed to service all new residential subdivision allotments.

Electricity

Overhead power lines are currently installed around the external perimeter of the site. Connection of the proposed development to grid electricity is expected to be possibility and is subject to the specific requirements of Essential Energy as the relevant service provider.

Details of existing site infrastructure and services are shown in the survey completed by Arndell Surveying. An extract of the survey is shown in Figure 10, and a larger copy is included in **Appendix D** to this Planning Proposal.

Figure 10 - Infrastructure and Servicing Map



03

EXISTING PLANNING FRAMEWORK

3.1 Forbes Local Environmental Plan 2013

Forbes Local Environmental Plan 2013 is the principal environmental planning instrument applying to the subject land. The FLEP provides the statutory framework for planning, development and building within Forbes. It manages land use through zoning controls, development standards, planning controls and other planning provisions.

This section of the report provides an overview of the primary planning controls applying to the land under FLEP including zoning and minimum lot size.

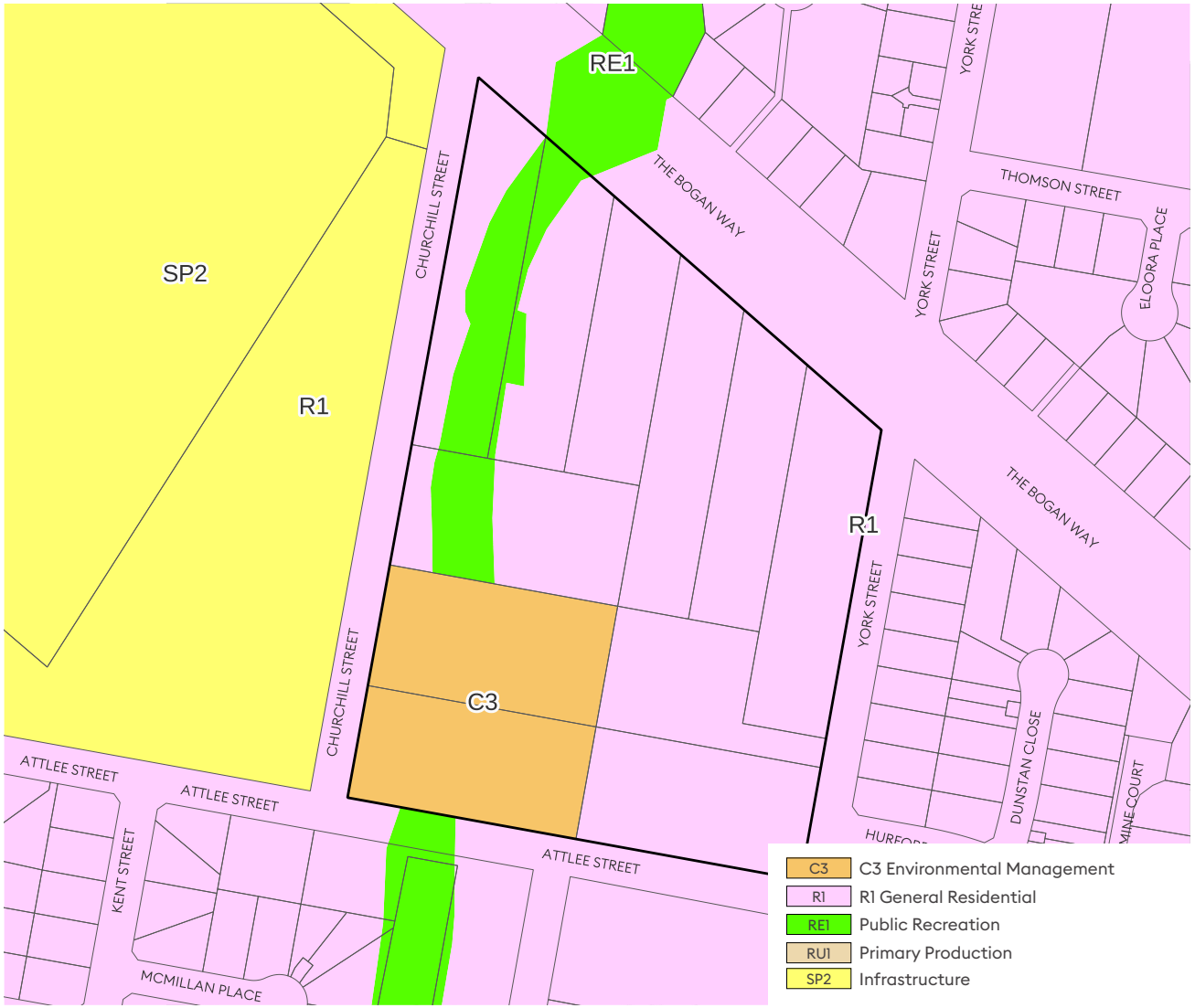
3.1.1 Zoning

Figure 11 shows the existing zoning framework applying to the subject land under the Forbes Local Environmental Plan 2013.

An analysis of the zoning framework applying to the land shows:

- Approximately 5.5ha of land is currently zoned R1 General Residential.
- Approximately 0.72ha of land is currently zoned RE1 Public Recreation. This land relates generally to the existing alignment of the overland stormwater drainage channel.
- Approximately 1.55ha of land is currently zoned C3 Environmental Management. This land relates to the land titles which contain parts of the animal burial pit.

Figure 11 - Forbes LEP 2013 Existing Zoning Map



3.1.2 Minimum Lot Size

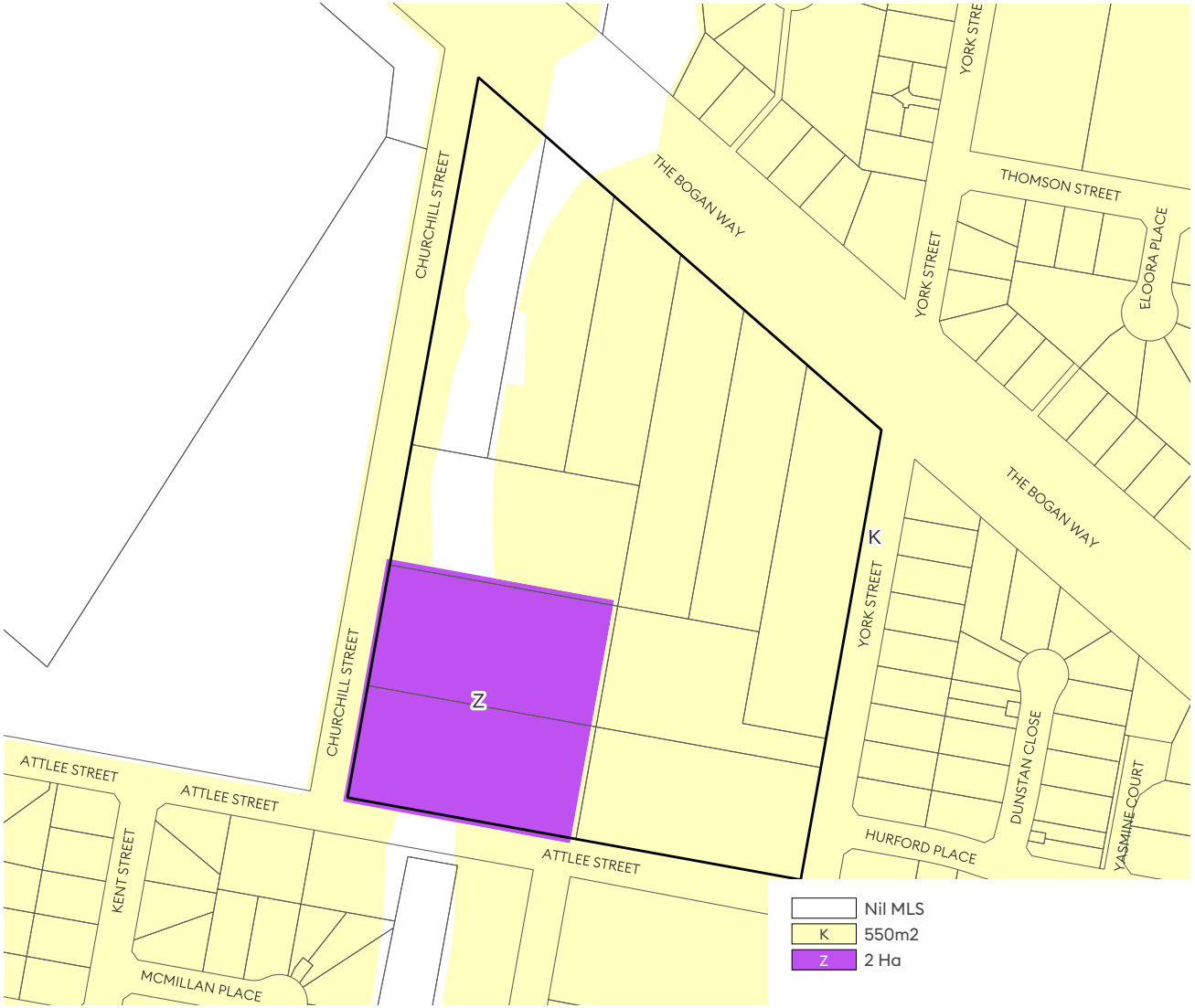
Figure 12 shows the existing minimum lot size framework applying to the subject land under the Forbes Local Environmental Plan 2013.

An analysis of the minimum lot size framework applying to the land shows:

- Approximately 5.5ha of land is currently subject to a minimum lot size of 550m2. This relates to land that is zoned R1 General Residential.
- Approximately 1.55ha of land is currently subject to a minimum lot size of 2ha. This relates to land that is zoned C3 Environmental Management.

There are no minimum lot size provisions applying to the parts of the subject land which are zoned RE1 Public Recreation.

Figure 12 - Forbes LEP 2013 Existing Lot Size Map



3.1 Forbes Development Control Plan 2013

Forbes Development Control Plan 2013 (FDCP) provides detailed planning and design guidelines to support the FLEP 2013. The FDCP provides development controls relating to residential, commercial, industrial and associated infrastructure development. There are also a number of site-specific chapters to be considered in the assessment of development applications lodged with Council for particular development types and at particular locations.

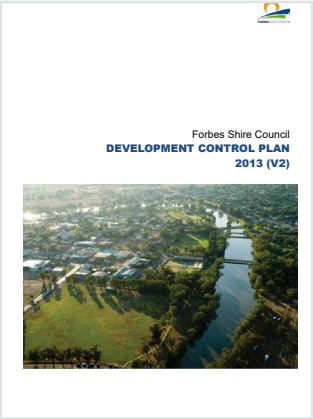
The following parts of the FDCP contain provisions which are likely to be relevant to any future development of the subject land.

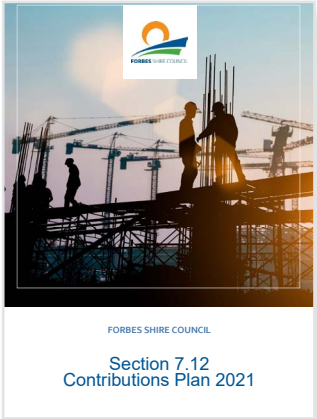
- Chapter 3 - Subdivision
- Chapter 4 - Flooding and Flood Affected Land
- Chapter 5 - Urban Residential Development
- Chapter 6 - Multi Dwelling Housing, Second Dwellings and Dual Occupancy Development.

3.2 Forbes Section 7.12 Contributions Plan 2021 Development Contributions Plan 2021

The Forbes Section 7.12 Development Contributions Plan 2021 (FCP 2021) provides the framework for the provision of public infrastructure as a result of new development in the Forbes LGA. The plan also includes specific provision for the local infrastructure requirements that will be generated from and applicable to development located within Goldridge Estate. Goldridge Estate is a residential release area located on the western edge of the Forbes Township.

The payment of a Section 7.12 Contribution Levee will be required in connection with the future subdivision of the land to which this Planning Proposal relates. According to the plan, the contributions will be used towards the playground funding program, footpath replacement program and CBD Masterplan.





04

DESCRIPTION OF THE PROPOSAL

4.1 Description of the Proposed Development

The landowners have engaged consulting firms Currajong and Calare Civil to prepare a proposed subdivision design for the subject land. The brief for the preparation of the subdivision design was a follows:

- A subdivision design which allows for the practical construction of new residential lots and subsequent housing forms having regard to detailed site investigations and constraint analysis.
- Consistency with the Forbes LEP in terms of proposed lot size and key provisions relating to subdivision minimum lot size, essential service provision and flood planning / stormwater management. .
- Consistency with the Forbes DCP in terms of enabling future residential development types that comply with minimum standards relating to important elements such as access, setbacks, density and general built form.
- Consistency with the Forbes DCP in terms of proposed lot layout, lot size and configurations of the public road network.
- Consistency with the masterplanning framework developed for the site and surrounds in the Forbes Housing Strategy.

The proposed plan of subdivision that has been prepared by Calare Civil is included in **Appendix B** and forms the basis for the preparation of this Planning Proposal. Forbes Shire Council is asked to note the following:

- The plan has been prepared to scale and is sufficient in terms of scope, accuracy and detail to inform the assessment work presented in this Planning Proposal.
- The lot layout is shown as typical only. The landowners reserve an opportunity to alter the design in a Development Application to Council, provided compliance is still able to be achieved with the final zoning and minimum lot size framework adopted in any amendment to Forbes Local Environmental Plan 2013.

The proposed plan of subdivision is considered by the landowners to represent an optimal design outcome and is the 'best fit' for the development of the land having regard to the brief outlined above.

A detailed comparison of the proposed subdivision against Forbes Local Environmental Plan 2013 shows that a number of changes will be required to existing zoning and minimum lot size controls and it is these changes that are the subject of this Planning Proposal to Forbes Shire Council.

Further work has been completed in Section **4.2** and **4.3** of this report to help Forbes Shire Council (and other relevant stakeholders) understand the precise nature of the changes which are to be requested by this Planning Proposal.

4.2 Proposed Zoning Changes

As discussed in Section **4.1**, a detailed comparison of the proposed subdivision against Forbes Local Environmental Plan 2013 shows that a number of changes will be required to the existing zoning framework.

To help Forbes Shire Council (and other relevant stakeholders) understand the scope of rezoning changes necessary to facilitate the proposed subdivision design, a comparison of the existing and proposed zoning framework is presented in Figures 13 and 14.

A broad description of the proposed changes are included as follows:

- Proposed rezoning of land from RE1 Public Recreation to R1 General Residential.
- Proposed rezoning of land from R1 General Residential to RE1 Public Recreation
- Proposed rezoning of land from C3 Environmental Management to RE1 Public Recreation.
- Proposed Rezoning of land from C3 Environmental Management to R1 General Residential.

A closer analysis of the land areas involved in the rezoning request is included in the following pages.

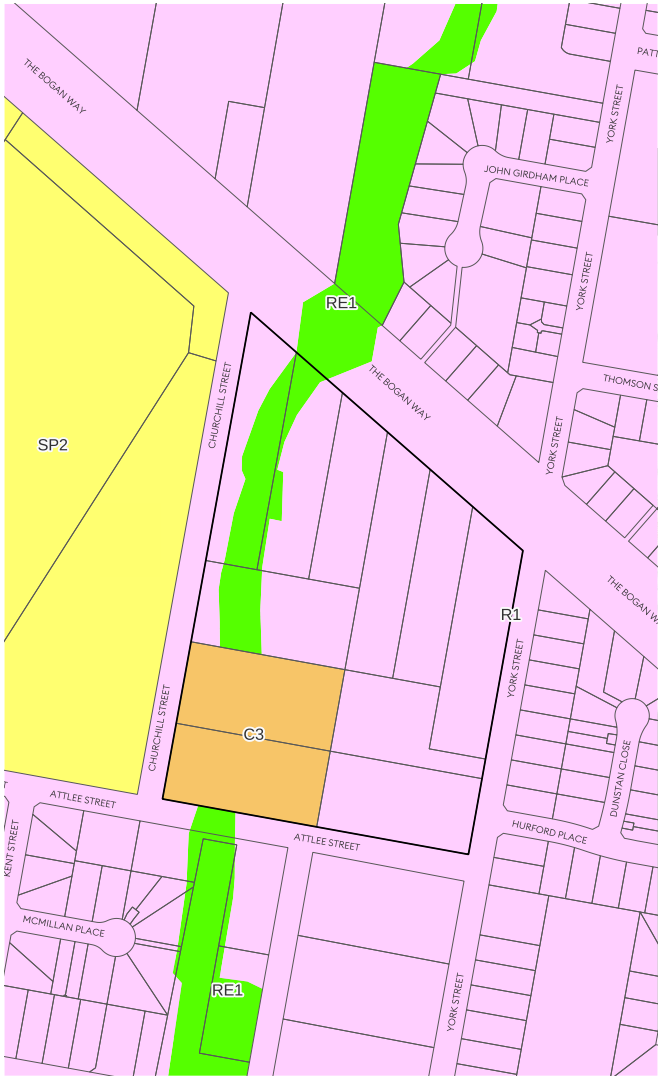


Figure 13 - Existing zoning framework

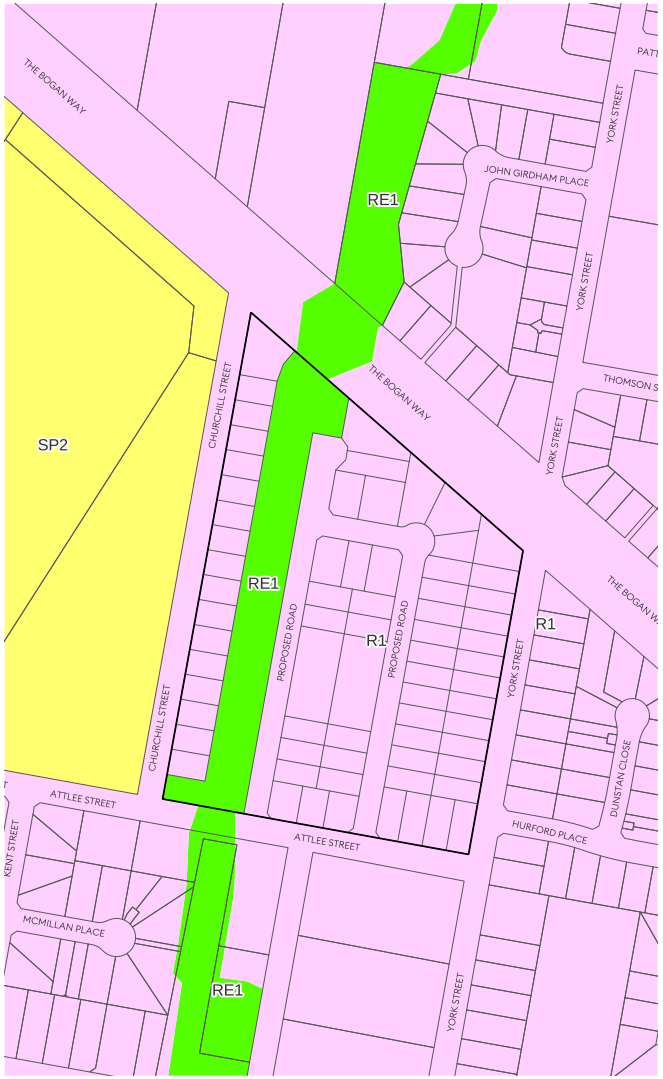


Figure 14 - Proposed zoning framework

C3	C3 Environmental Management
R1	R1 General Residential
RE1	Public Recreation
RU1	Primary Production
SP2	Infrastructure

Rezoning of land zoned C3 Environmental Management

Figure 15 shows the area of land within the property holding which is proposed to be rezoned from C3 Environmental Management to R1 General Residential. This area equates to 1.05ha or 10500m2. This land would be used for future residential subdivision lots and public road construction.

Figure 16 shows the area of land within the property holding which is proposed to be rezoned from C3 Environmental Management to RE1 Public Recreation. This area equates to 0.496ha or 4960m2 of land. This land would form part of the reserve that is to be dedicated to Forbes Shire Council for public drainage purposes.

Figure 15 - Rezoning - C3 to R1 Zones

Figure 16 - Rezoning - C3 to RE1 zones

C3	C3 Environmental Management
R1	R1 General Residential
RE1	Public Recreation
RU1	Primary Production
SP2	Infrastructure

Rezoning of land zoned R1 General Residential

Figure 17 shows the area of land within the property holding which is proposed to be rezoned from R1 General Residential to RE1 Public Recreation. This area equates to 0.438ha or 4380m2. This land would form part of the reserve that is to be dedicated to Forbes Shire Council for public drainage purposes.

Figure 18 shows the area of land within the property holding which is proposed to be rezoned from RE1 Public Recreation to R1 General Residential. This area equates to 0.275ha or 2750m2 of land. This area equates to 1.05ha or 10500m2. This land would be used for future residential subdivision lots.

Figure 17 - Rezoning - R1 to RE1 Zones

Figure 18 - Rezoning - RE1 to R1 Zones

C3	C3 Environmental Management
R1	R1 General Residential
RE1	Public Recreation
RU1	Primary Production
SP2	Infrastructure

4.3 Description of proposed minimum lot size changes

As discussed in Section **4.1**, a detailed comparison of the proposed subdivision against Forbes Local Environmental Plan 2013 shows that a number of changes will be required to existing minimum lot size framework.

To help Forbes Shire Council (and other relevant stakeholders) understand the scope of minimum lot size changes necessary to facilitate the proposed subdivision design, a comparison of the existing and proposed minimum lot size framework is presented in Figures 19 and 20.

A broad description of the proposed changes are included as follows:

- A general exercise to align existing MLS boundaries to the proposed subdivision design.
- Removal of MLS provisions where land is to be rezoned from R1 General Residential to RE1 Public Recreation.
- Changing the MLS from 2 Ha to 550m2 where land is proposed to be rezoned from C3 Environmental Management to R1 General Residential. This MLS is consistent with the framework applying to residential land in immediate and wider surrounding residential areas of Forbes Township.

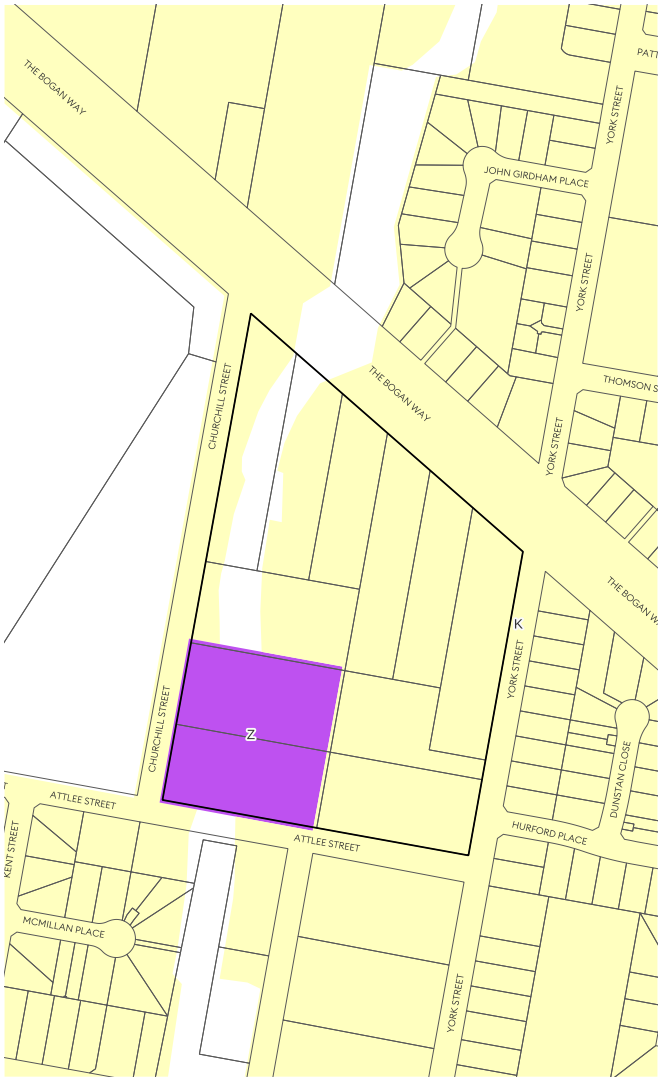


Figure 19 - Existing Lot Size Framework

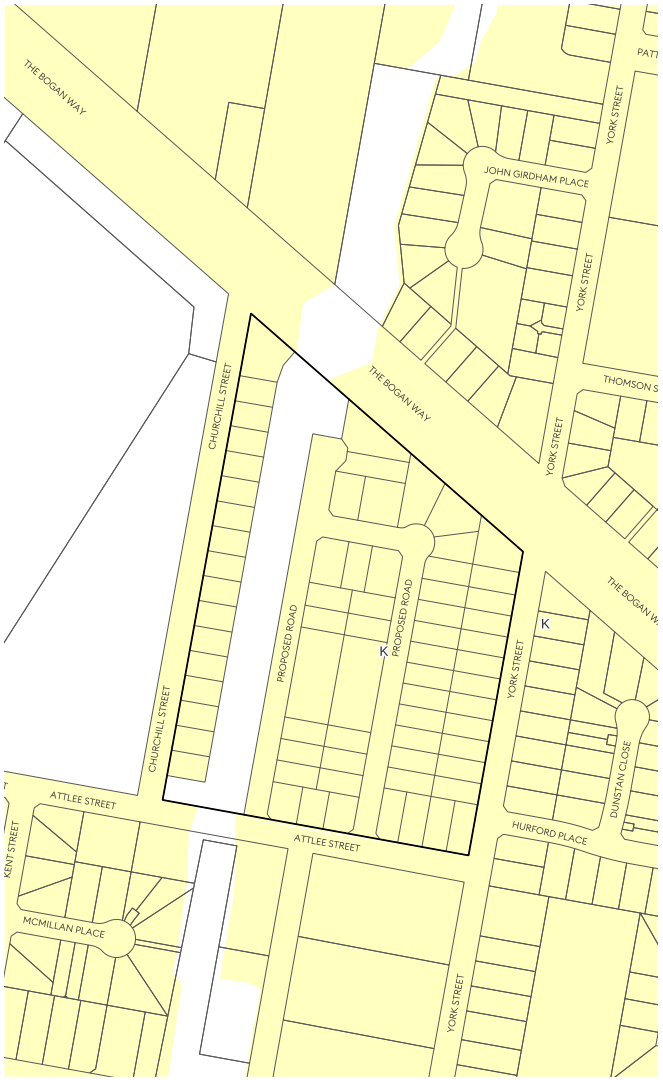


Figure 20 - Proposed Lot Size Framework

Nil MLS
K 550m2

05

STRATEGIC ALIGNMENT

5.1 Forbes Housing Strategy

The Forbes Housing Strategy was adopted by Forbes Shire Council in early 2023. The Strategy provides a comprehensive strategic framework to properly guide future housing growth in the Forbes Shire and ensure there is an adequate supply and diversity of housing within the local community.

The Forbes Housing Strategy creates a vision that "in 2041, Forbes will be the residential location of choice in the Central West because of it's thriving town centre, recreational opportunities and diverse economy".

The Strategy includes detailed information relating to existing resident population figures and population projections for the next 20 year period, accounting for the NSW Government's latest (2022) projections. The forecast is for a population increase of 3,208 people, which translates to an increase in the number of households from 4063 in 2021 to 5624 in 2041 (or an increase of 1580 households). This is likely to strengthen the local economy, create positive spin-off effects on local business and jobs growth and generate a greater demand for development-ready lots to accommodate new housing.

Within the Strategy, the Forbes Urban Area Framework Plan serves to guide housing growth in the Forbes Shire and is a response to population projections, an analysis of local housing needs and requirements, opportunities and constraints planning, and urban growth site suitability analysis. The Framework Plan has identified large areas of land to the west and north-west of the Township that will be suitable to accommodate the long term housing growth requirements of Forbes. A staged release of this land is anticipated to occur over the next 20 years to ensure a constant steady supply of land is available for new housing.

A key feature of the Framework Plan is expansive green corridors linking newly released residential areas with Lake Forbes and the Township's primary passive and active recreation areas. The primary green corridor has been planned around the existing reservation of RE1 Public Recreation zoned land that extends northward from Bedgerabong Road to Cypress Lane - part of which is located within the land owned by M & N O'Keeffe. The corridor will create a valuable opportunity to strengthen pedestrian and cycling networks back to the Forbes CBD, create a centralised and accessible area for passive recreation, whilst also providing for the proper management of urban stormwater back to the Lachlan River.

The Planning Proposal is strategically aligned with the Forbes Housing Strategy for the following reasons:

+ The Forbes Housing Strategy has suitably identified that the land owned by M G O'Keeffe Constructions PL is already zoned for residential purposes.
+ The rationalising of the existing zoning framework and subdivision of the land will facilitate the timely release of development-ready lots needed to accommodate short term housing demand.
+ The proposal retains a healthy amount of land area to be zoned RE1 Public Recreation, consistent with the vision in the Strategy for expansive green corridors.

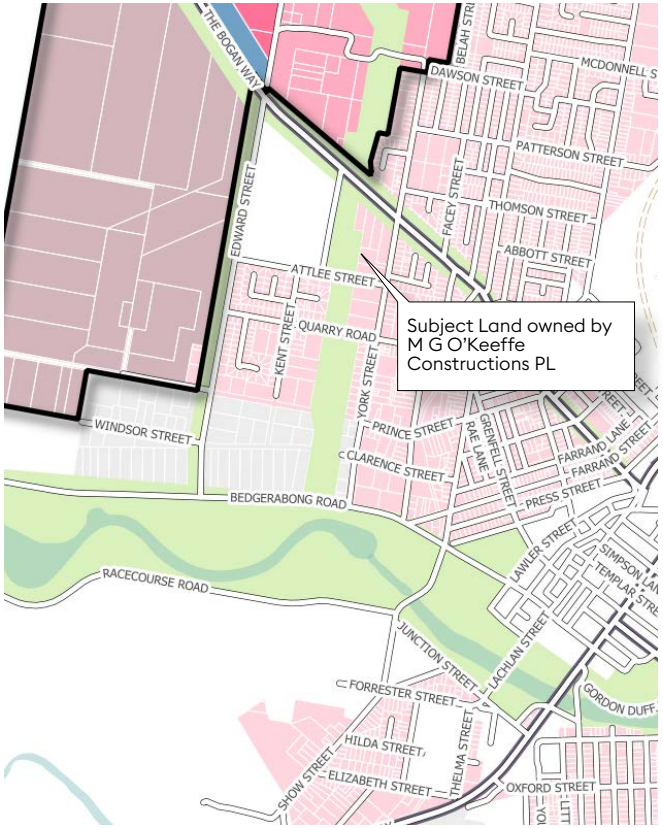


Figure 21 - Forbes Urban Area Framework Plan

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PLANNING PROPOSAL PART 1

Plan Making Guidance - Part 1

The NSW DPE Local Environmental Plan Making Guidelines require Part 1 of the Planning Proposal to:

- Provide a clear and concise description of the planning proposal and be written in plain English, so it is easily understood by the community.
- Provide a description of the objectives and intended outcomes of the planning proposal so that they are specific enough to reflect the objective of the proposal yet flexible enough to allow for alternatives.

6.1 Objectives and intended outcomes

Section 3.33(2)(a) of the Environmental Planning and Assessment Act 1979 (EP&A Act 1979) requires a Planning Proposal to include a statement of the objectives or intended outcomes of the proposed amendments.

Objective

To amend Forbes Local Environmental Plan 2013 to provide for the subdivision of the subject land for residential and public open space purposes.

Intended Outcomes

- To rationalise the existing zoning framework for the land consistent with the vision created by a masterplanning exercise for future residential subdivision.
- To enable the development of the land consistent with the vision, principles and key recommendations of the Forbes Housing Strategy.
- To ensure that the development of the land delivers an equitable balance between residential housing and public open space land.
- To permit a density of housing development for the land that contributes to housing diversity and choice within Forbes Township.

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PLANNING PROPOSAL PART 2

Plan Making Guidance - Part 2

The NSW DPE Local Environmental Plan Making Guidelines require Part 2 of the Planning Proposal to:

- Provide a detailed statement of how the objectives or intended outcomes will be achieved by amending the Forbes LEP 2011.
- Provide an explanation of provisions, clearly stated and containing enough information on the proposal to assist legal drafting of the LEP.
- Provide information relating to the proposed zones and / or development standards if known at this stage in the Planning Proposal.

7.2 Explanation of provisions

Section 3.33(2)(b) of the EP&A Act 1979 requires the Planning Proposal to include an explanation of the provisions that are to be included in the proposed amending instrument.

Intended Provisions

The objectives will be achieved (generally) by:

- Amending Forbes Local Environmental Plan 2013, and specifically Land Zoning Map - Sheet LZN_005AB in the following ways:
  - Rezoning land from RE1 Public Recreation to R1 General Residential.
  - Rezoning land from R1 General Residential to RE1 Public Recreation
  - Rezoning land from C3 Environmental Management to RE1 Public Recreation.
  - Rezoning land from C3 Environmental Management to R1 General Residential.
- Amending Forbes Local Environmental Plan 2013, and specifically Lot Size Map - Sheet LSZ_005AB in the following ways:
  - Removal of MLS provisions where land is to be rezoned from R1 General Residential to RE1 Public Recreation.
  - Changing the MLS from 2 Ha to 550m2 where land is proposed to be rezoned from C3 Environmental Management to R1 General Residential.
  - Application of a 550m2 MLS to land that is proposed to be rezoned from RE1 Public Recreation to R1 General Residential.

A series of maps clearly demonstrating the proposed scope of zoning and minimum lot size changes to the land has been included in previous sections of this report. Refer generally to Section **4**.

Aside from the zoning and minimum lot size changes, there are no other provisions of Forbes Local Environmental Plan 2013 which are sought to be amended by this Planning Proposal.

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PLANNING PROPOSAL PART 3

Plan Making Guidance - Part 3

The NSW DPE Local Environmental Plan Making Guidelines require Part 3 of the Planning Proposal to:

- Provide a detailed assessment of the proposal's strategic and site-specific merit to determine whether the Planning Proposal should be supported.
- Integrate findings from supporting studies and investigations.
- Provide justification for the proposed amendments to the LEP.
- Consider the interaction between these findings and whether the proposal will align with the strategic planning framework.
- Consider whether the proposal will have any environmental, social or economic impacts.

The assessment criteria for strategic merit includes:

- Whether the proposal gives affect to the relevant Regional Plan
- Whether the proposal demonstrates consistency with the relevant LSPS or endorsed Strategy.
- Whether the proposal responds to a change in circumstances that has not been recognised by the existing planning framework.

Demonstrating site-specific merit should include an assessment of:

- The natural environment on the site and other affected land.
- Existing, approved and likely future uses of the land.
- Services and infrastructure requirements of the proposal.

8.1 Need for the Planning Proposal

8.1.1 Is the Planning Proposal a result of any strategic study or report?

The need for the Planning Proposal is not a direct result of any strategic study or report prepared by Forbes Shire Council. The land is already largely zoned for residential purposes.

The need for the Planning Proposal is instead a result of the following circumstances:

- The findings of engagement and consultation with Forbes Shire Council planning and engineering staff regarding the requirements for subdivision of the land.
- The finalisation of detailed designs for the proposed subdivision of the land having regard to a site constraints and opportunities analysis, and review of the existing zoning and minimum lot size framework applying to the land.

As a result of the above circumstances, the landowners are proposing a development scenario for the land which involves a zoning and minimum lot size framework that properly aligns with a detailed subdivision design for the land.

Detailed justification for the Planning Proposal has been provided generally throughout this report, however the following key reasons underpin the landowners belief that the changes to Forbes Local Environmental Pan 2013 are necessary:

- The current zoning and lot size configuration fails to allow for the subdivision of the land in a manner that delivers a practical arrangement of development lots and public road infrastructure.
- The current extent of the land reserved for public drainage under the RE1 Public Recreation zone does not adequately provide for the width needed to accommodate the full range of stormwater flows modelled for the subject land and taking into account upstream catchments.

- The rationalisation of the existing zoning and lot size framework for the land will allow for the timely lodgement of a Development Application with the Forbes Shire Council for subdivision works that will deliver opportunities for new housing as advocated for in the Forbes Housing Strategy.
- The land is already largely zoned to allow for future residential development. The proposal seeks only to rationalise the existing planning framework.
- Positive outcomes are expected to result in terms of housing choice, diversity and affordability.

8.1.2 Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The only means of achieving the objectives and intended outcomes of the Planning Proposal is through appropriate changes to the zoning and minimum lot size framework in Forbes Local Environmental Plan 2013.

The following alternatives have been considered, but do not provide an appropriate pathway for the landowners to achieve the proposed design of the subdivision that has been described and mapped in this Planning Proposal:

- Use of Clause 4.6 of Forbes Local Environmental Plan 2013 relating to the variation of a development standard or control.
- Awaiting for the finalisation of a study or separate Planning Proposal by others (the landowners have not been made aware that the changes to Forbes Local Environmental Plan 2013 described in this report are intended to be pursued by Council as part of a separate process).

8.2 Relationship to the strategic planning framework

8.2.1 Will the planning proposal give effect to the objectives and actions of the applicable regional plan?

The Central West and Orana Regional Plan 2041 establishes a strategic framework, vision and direction for land use, addressing future needs for housing, jobs, infrastructure, a healthy environment, access to green spaces and connected communities. It leverages the region's central location and builds on it's strengths to provide smart, efficient and reliable connections that bring residents and visitors closer to jobs, centres, education and the natural environment.

The CWORP is structured around 23 objectives, which belong to the following themes:

+ Region-shaping investment
+ A sustainable and resilient place
+ People, centres, housing and communities
+ Prosperity, productivity and innovation.

The following objectives are particularly relevant in the context of the Planning Proposal:

+ Objective 7 - Plan for resilient places and communities
+ Objective 12 - Sustain a network of healthy and prosperous centres.
+ Objective 13 - Provide well located housing options to meet demand.
+ Objective 14 - Plan for diverse, affordable, resilient and inclusive housing.

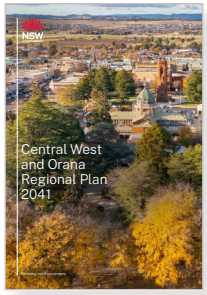
The following Local Government Priorities for Forbes are also particularly relevant in the context of this Planning Proposal:

+ Ensuring suitable housing supply by supporting a diversity in housing supply and clearly planned land releases.

Table 4 includes a brief assessment of the Planning Proposal against the relevant objectives and priorities in the Regional Plan.

Table 4 - Planning Proposal Assessment - Regional Plan

Objective	Preliminary Assessment
Plan for resilient places and communities Sustain a network of healthy and prosperous centres. Provide well located housing options to meet demand. Plan for diverse, affordable, resilient and inclusive housing.	Implementation of the zoning and lot size changes in this Planning Proposal will allow for the subdivision of the land to create quality residential lots and construction of a diverse range of new housing types for the Forbes Township. Planning for the site has considered the need for residential buildings to be located outside of land that is prone to flooding from known overland stormwater drainage functions. The subject land is located on the western edge of the Forbes Township - an area which is identified in the Forbes Housing Strategy as being suitable to accommodate the mainstay of urban growth in Forbes over the next 20 years. The site location is optimal for new residential housing with strong connections back into the Forbes Township via Bogan Gate Road. The nature, scale and location of the subject land means that the proposal is likely to be of local planning significance. Notwithstanding, the proposal is demonstrated to be generally consistent with the relevant key objectives of the Regional Plan.
LG Priority	**Preliminary Assessment**
Ensure suitable housing supply by supporting a diversity in housing supply and clearly planned land releases.	As above.



8.2.2 Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or another endorsed local strategy or strategic plan?

The Forbes Local Strategic Planning Statement (LSPS) contains planning priorities and actions for a 20-year vision for Forbes outlining how growth and change will be managed into the future. The planning priorities include:

- Deliver healthy, diverse and liveable neighbourhoods.
- Identify, plan and provide infrastructure in line with growth.
- Plan for resilience in natural hazards and a changing climate.
- Protect and enhance our heritage and biodiversity.

Table 5 includes an assessment of the Planning Priorities in the LSPS that are considered to be of particular relevance to the Planning Proposal.

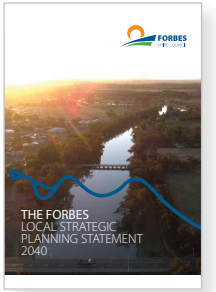


Table 5 - Planning Proposal Assessment - Forbes LSPS

Direction	Preliminary Assessment
Deliver healthy, diverse and liveable neighbourhoods.	The Forbes LSPS contains planning priorities and actions for a 20-year vision for Forbes outlining how growth and change will be managed into the future. The growth and development of land within the western and north-western edges of Forbes is consistent with the broader strategic framework for Forbes promoted by the Forbes LSPS and other documents including the Forbes Housing Strategy. The land owners intend to develop it's property holding in accordance with the existing strategic framework for residential growth prepared by Council. This is expected to create diverse housing opportunities in a strategic location to meet the needs of the local population. Efficient connections are available to and from the Forbes Town Centre. New development will avoid areas of identified environmental sensitivity, and areas prone to flooding from overland urban stormwater drainage. A green corridor is provided in accordance with the vision created by the Forbes Housing Strategy and provides enhanced opportunities for passive recreation. The changes being proposed to Forbes LEP are generally considered to be of significance only to the site and immediate surrounds, and do not create any inconsistencies with the planning priorities and actions contained in the Forbes LSPS.
Identify, plan and provide infrastructure in line with growth.	
Plan for resilience in natural hazards and a changing climate.	
Protect and enhance our heritage and biodiversity.	

8.2.3 Is the planning proposal consistent with any other applicable State or regional studies or strategies?

The following strategies / studies have been considered for potential relevant to the Planning Proposal:

- Future Transport Strategy 2056
- Net Zero Plan
- Water Resource Plan
- State Infrastructure Strategy, a 20 year Economic Vision for Regional NSW.
- NSW Public Open Space Strategy
- NSW Government Architect - Greener Places
- NSW Water Strategy

A high level assessment of each policy has been undertaken. Due to the local significance of the Planning Proposal, the listed Strategies are not identified to be particular relevance. Further detailed assessment is not considered to be necessary.

8.2.4 Is the planning proposal consistent with applicable State Environmental Planning Policies?

Table 6 shows a list of the State Environmental Planning Policies that have applicability to land within the Forbes Local Government Area. Table 6 also includes an assessment about whether there are provisions within the each SEPP that need to be considered in relation to the Planning Proposal. Where it is identified that further assessment is required, this work is presented in the following pages.

Table 6 - Preliminary SEPP Assessment

Name of SEPP	Applicability	Further Assessment Warranted?
SEPP (Biodiversity and Conservation) 2021	Applicable	Yes
SEPP (BASIX) 2004	Not applicable	No
SEPP (Exempt and Complying Development Codes) 2008	Not applicable	No
SEPP (Housing) 2021	Applicable	Yes
SEPP (Industry and Employment) 2021	Not applicable	No
SEPP 65 (Design Quality of Residential Apartment Development)	Not applicable	No
SEPP (Planning Systems) 2021	Applicable	Yes
SEPP (Primary Production) 2021	Not applicable	No
SEPP (Precincts - Central River City) 2021	Not applicable	No
SEPP (Precincts - Eastern Harbour City) 2021	Not applicable	No
SEPP (Precincts - Western Parkland City) 2021	Not applicable	No
SEPP (Precincts - Regional) 2021	Not applicable	No
SEPP (Resilience and Hazards) 2021	Applicable	Yes
SEPP (Resources and Energy) 2021	Not applicable	No
SEPP (Transport and Infrastructure) 2021	Applicable	Yes

SEPP (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (the Biodiversity SEPP) aims to protect the biodiversity values of trees and other vegetation in non-rural areas of the State and preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation. Provisions protecting bushland, trees, heritage items, waterways, wetlands and koalas are also included in the SEPP.

The SEPP is applicable to the assessment of the Planning Proposal as it affects land in a non-rural zone and will facilitate a development outcome that may result in the clearing of native vegetation with resulting potential impacts in terms of the biodiversity resources of the land.

The aerial photograph included in Figure 2 shows that the historic agricultural use of the property has resulted in a landscape that is highly disturbed and cleared of native vegetation, with the predominate landform cover being pasture grass. A small number of Isolated trees are observed in the vicinity of Lot 1051 DP 750158. The biodiversity resources of the subject land are shown in Figure 6.

Given the existing vegetation is located on land that is already zoned for urban purposes, a more detailed assessment of potential impact in the form of a Biodiversity Assessment Report is not deemed to be necessary. The lodgement of a Development Application with Council for the subdivision of the land will include an appropriate impact assessment where vegetation removal is required as part of civil construction work or future dwelling-house development.

In general, any vegetation clearing is not expected to meet the thresholds that trigger the requirements for participation in the Biodiversity Offset Scheme under the Biodiversity Conservation Act 2016.

Having regard to the above, the Planning Proposal does not create any inconsistencies with the provisions contained in this SEPP.

SEPP (Housing) 2021

This SEPP aims to enable the delivery of diverse housing types, encourage housing that meets the needs of more vulnerable members of the community, and promote the delivery of appropriately designed housing in appropriately planned locations.

The Planning Proposal requests minor changes to the local planning framework that will enable an optimum development outcome for the subject land. The landowners are committed to developing the land into a quality residential subdivision estate that will directly support the creation of new housing opportunities in accordance with the principles and provisions of this SEPP.

Development for the purposes of affordable housing, secondary dwellings, group homes, co-living housing , build-to-rent housing, and housing for seniors and people with a disability will all be permissible in the residential zone that is proposed for the subject land.

The Planning Proposal is unlikely to create any inconsistencies with the provisions contained in this SEPP.

SEPP (Planning Systems) 2021

This SEPP provides the framework to determine whether a proposed development is

+ State Significant Development, or
+ State Significant Infrastructure, or
+ Regionally Significant Development.

The proposed subdivision of the land into 55 new residential allotments is not identified to meet any of the triggers for State Significant Development and is not State Significant Infrastructure.

The capital investment value of the proposed subdivision works has not been costed at this early stage in the project, however it is not expected to exceed $30M and is therefore not likely to be Regionally Significant Development.

Having regard to the above, the Planning Proposal does not create any inconsistencies with the provisions contained in this SEPP.

SEPP (Resilience and Hazards) 2021

This SEPP requires that a consent authority must consider the contamination potential of the land, and if the land is contaminated, it is satisfied that the land is suitable for the development in its contaminated state, or that appropriate arrangements have been made to remediate the site prior to the development being carried out.

A part of the site contains an animal burial pit with dimensions 34m north-south and 6m east-west. The pit is located on Lot 1054 DP 750158. The pit represents an area requiring an environmental management response in order to deal with potential contamination issues and this issue is dealt with in a further section of this Planning Proposal.

The landowners have commissioned a Environmental Management Plan for the subject land and this is presented in the following reports:

+ Environmental Management Plan - Premise - Report No. P000462_EMP_001. A copy of this report is included in **Appendix C** to this Planning Proposal.

The Environmental Management Plan was completed in order to identify whether contamination is present that may affect the land's suitability for development, and to assess the need for possible further investigations, remediation or management of any contamination identified.

The specific objectives of the Environmental Management Plan are to:

+ Define appropriate management and mitigation measures to be implemented to manage potential environmental and health and safety risks associated with residual subsurface soil where microbial impacts may be present;
+ Ensure activities associated with any future site development and maintenance works are managed in a way that minimises the potential impact to the surrounding environment;
+ Ensure all personnel working at the site, including future site occupants and contractors, are aware of environmental issues associated with residual soil contamination.

The results of the investigations in the Environmental Management Plan conclude that:

+ No significant routes of exposure by receptors (current or future) to anthrax impacts exist outside of a 2m lateral buffer beyond the footprint of the burial pit. Similarly, no significant routes of exposure by receptors (current or future) to anthrax impacts exist in the burial pit capping material to a depth of 0.5m.
+ On the basis of the capping material and buffer area of the animal burial pit being maintained and not disturbed, and no excavation to occur within the lateral extents of the animal burial pit and buffer area, the affected area of the site is suitable for residential land uses. Future land-uses considered appropriate for the affected area are limited to passive uses that do not breach the capped material or buffer area, and may include car parking.

As an appropriate planning response to the key issues identified in the Environmental Management Plan, the proposed plan of subdivision for the site (by Calare Civil) retains larger lot forms around the burial pit location. Proposed Lots 22 and 30 have areas of approximately 2485m2 each. A masterplanned approach to future residential use / subdivision is proposed for these lots in order to ensure that the lateral extents of the animal burial pit are only utilised for passive purposes (i.e. car parking) consistent with the recommendations of the Environmental Management Plan. The masterplan will be presented to Council for detailed assessment as part of the preparation, lodgement and determination of a future DA for the project. A more detailed response to site design is not considered to be necessary as part of the rezoning process.

Having regard to the above, the Planning Proposal does not create any inconsistencies with the provisions contained in this SEPP.

SEPP (Transport and Infrastructure) 2021

This SEPP aims to facilitate the effective delivery of infrastructure across NSW by providing a consistent planning framework for infrastructure provision, and identifying where a more detailed assessment or consultation response may be required for specific types of infrastructure development.

In accordance with Schedule 3 of the SEPP, subdivision developments involving the creation of 200 or more allotments and involving the opening of a public road are identified to be traffic-generating developments of a kind that requires referral to Transport for NSW.

The Planning Proposal relates to a subdivision development that proposes the creation of 55 new development lots, and 1 new allotment to be created and dedicated for public open space purposes. The scale of the proposed development does not trigger referral. The landowners would not object should Forbes Shire Council decide that referral of any future DA for this project to Transport for NSW is required.

Preliminary feedback from Forbes Shire Council has not indicated that a Traffic Impact Assessment is required to be lodged in support of this Planning Proposal to help Forbes Shire Council.

The preliminary engineering plans prepared by Calare Civil for the project show that some upgrades will be required to York Street, Attlee Street and Churchill Street to ensure that these roads are constructed to a suitable urban standard. Generally it is considered that the surrounding public road network has capacity to accommodate the expected increases in traffic associated with the planned development scenario for the land.

Having regard to the above, the Planning Proposal does not create any inconsistencies with the provisions contained in this SEPP.

8.2.5 Is the planning proposal consistent with applicable Ministerial Directions (section 9.1 Directions)?

An assessment of the Planning Proposal against each Section 9.1 Ministerial Direction is included as follows.

Focus Area 1 - Planning Systems

Direction 1.1 - Implementation of Regional Plans

The Direction applies to the Planning Proposal as it relates to land to which the Central West and Orana Regional Plan applies.

The Direction requires the Planning Proposal to be consistent with the requirements of the Central West and Orana Regional Plan. A detailed assessment against the Regional Plan is included in Section **8.2** of this Planning Proposal. No inconsistencies have been identified.

The Planning Proposal is assessed to be consistent with Ministerial Direction 1.1.

Direction 1.2 - Development of Aboriginal Land Council Land

The Direction does not apply to the Planning proposal as it does not relate to any land that is shown on the Land Application Map of chapter 3 of the State Environmental Planning Policy (Planning Systems) 2021.

Direction 1.3 - Approval and referral requirements

The Direction applies to all Planning Proposals.

The Direction generally requires that the Planning Proposal must not include provisions which require concurrence, consultation or referral of Development Applications to a Minister of public authority without prior approval. The Planning Proposal seeks only to make changes to Lot Size Map - Sheet LZS_005AB and Land Zoning map - Sheet LZN_005AB of Forbes Local Environmental Plan 2013. These changes will not change any existing consultation or concurrence obligations for Council in assessing a future Development Application for the land.

The Planning Proposal is assessed to be consistent with Ministerial Direction 1.3.

Direction 1.4 - Site specific provisions

The Direction applies when a Planning Proposal will allow a particular development to be carried out.

Direction 1.4(1) does not apply because the Planning Proposal does not include a request to introduce or change the permissibility of a land-use on any of the existing zonings that affect the subject land.

Direction 1.4(2) requires that the Planning Proposal must contain or refer to drawings that show details of the proposed development. The Planning Proposal is assessed to be consistent with Ministerial Direction 1.4(2).

Focus Area 2 - Planning Systems - Place Based

Ministerial Directions 1.5 to 1.22 have no applicable to the subject land. Further consideration is not considered to be necessary.

Focus Area 2 - Design and Place

This Focus Area was blank when the Directions were made

Focus Area 3 - Biodiversity and Conservation

Direction 3.1 - Conservation Zones

The Direction applies to all Planning Proposals.

Direction 3.1(1) requires that the Planning Proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas. Direction 3.1(2) requires that the Planning Proposal must not reduce the conservation standards that apply to the land.

The Planning Proposal is inconsistent with the requirements of Direction 3.1(2) as the proposal is to rezone land from C3 Environmental Management to R1 General Residential and RE1 Public Recreation. Part of the site is currently zoned C3 Environmental Management because the land is known to contain animal burial pit that is a potential source of land contamination. The Planning Proposal is supported by an Environmental Management Plan which aims to demonstrate that the animal burial pit is not an environmental risk to future residential occupation of the land, subject to the implementation of an appropriate risk management framework and suitable land-use activities being dedicated to affected land.

On the basis of the recommendations in the Environmental Management Plan, the application of a C3 zoning to (parts of) the site is no longer necessary and the Planning Proposal is justifiably inconsistent with the terms of Ministerial Direction 3.1.

Direction 3.2 - Heritage Conservation

The Direction applies to all Planning Proposals.

Direction 3.2(1) requires that the Planning Proposal must contain provisions that facilitate the conservation of any environmental heritage items identified in a study of the environmental heritage of the area, Aboriginal objects or places protected under the National Parkes and Wildlife Act 1974 or identified by an Aboriginal heritage survey prepared by or on behalf an Aboriginal Land Council, Aboriginal body or public authority.

The planning proposal is assessed to be consistent with this Ministerial Direction for the following reasons:

+ The Planning Proposal does not impact on any known items of Aboriginal significance.
+ The subject land is not mapped in Forbes Local Environmental Plan 2013 as containing any items of environmental heritage significance.
+ The suitability of the land for residential and public recreation purposes has already been established by the existing zoning framework in the Forbes Local Environmental Plan 2013.
+ The Planning Proposal does not change, alter or reduce any of the existing provisions in Forbes Local Environmental Plan 2013 which facilitate the protection and conservation of heritage areas. Clause 5.10 would continue to apply to any future development on the land, and provides an appropriately regulatory framework for the assessment of heritage issues and matters as part of a Development Application to Forbes Shire Council.

Direction 3.3 - Sydney Drinking Water Catchments

The Direction does not apply to the Planning Proposal as it does not affect land in any of the Local Government Areas located within the Sydney Drinking Water Catchment.

Direction 3.4 - Application of C2 and C3 zones and Environmental Overlays in Far North Coast LEPs.

The Direction does not apply to the Planning Proposal as it does not affect land on the New South Wales Far North Coast.

Direction 3.5 - Recreation Vehicle Areas

The Direction applies to all Planning Proposals.

Direction 3.5(1) requires that a Planning Proposal must not enable land to be developed for the purposes of a recreation vehicle area where:

+ The land is within a conservation zone,
+ Where the land comprises a beach or a dune adjacent to or adjoining a beach.
+ Where the land is not within an area or zone referred to in paragraphs (a) or (b) unless the relevant planning authority has taken into consideration the provisions of the guidelines entitled Guidelines for Selection, Establishment and Maintenance of Recreation Vehicle Areas, Soil Conservation Service of New South Wales, September, 1985, and
+ The provisions of the guidelines entitled Recreation Vehicles Act 1983, Guidelines for Selection, Design, and Operation of Recreation Vehicle Areas, State Pollution Control Commission, September 1985.

The planning proposal is assessed to be consistent with this Ministerial Direction for the following reasons:

+ The proposal is to allow the land to be developed for residential and public recreation purposes only.
+ The proposal does not retain land within the C3 Environmental Management zone.
+ Development for the purposes of a 'Recreation Vehicle Area' is currently not permissible in the RE1 Public Recreation zone to Forbes Local Environmental Plan 2013. There is no proposal to change this permissibility.

Direction 3.6 - Strategic Conservation Planning

This Direction does not apply to the Planning Proposal as it does not relate to land that is identified as 'avoided land' or a 'strategic conservation area' under State Environmental Planning Policy (Biodiversity and Conservation) 2021.

Direction 3.7 - Public Bushland

This Direction does not apply to the Planning Proposal as it does not relate to land in a prescribed Local Government Area.

Direction 3.8 - Willandra Lakes Region

This Direction does not apply to the Planning Proposal as it does not relate to land identified as the Willandra Lakes World Heritage Property.

Direction 3.9 - Sydney Harbour Foreshores and Waterways area

This Direction does not apply to the Planning Proposal as it does not relate to land within the Foreshores and Waterways Area.

Direction 3.10 - Water Catchment Protection

This Direction does not apply to the Planning Proposal as it does not relate to land within a regulated catchment.

Focus Area 4 - Resilience and Hazards

Direction 4.1 - Flooding

The Direction applies to the Planning Proposal as it proposes to alter an existing zone that is affected by flood prone land.

Direction 4.1(1) requires that the planning proposal must include provisions that give effect to and are consistent with:

a. The NSW Flood Prone Land Policy,
b. The principles of the Floodplain Development Manual 2005,
c. The Considering flooding in land use planning guideline 2021, and
d. Any adopted flood study and/or floodplain risk management plan prepared in accordance with the principles of the Floodplain Development Manual 2005 and adopted by the relevant council

The Planning Proposal is assessed to be consistent with the requirements of Direction 4.1(1) for the following reasons:

+ The subject land is not located within the Flood Planning Area defined by Forbes Local Environmental Plan 2013, but is affected by overland stormwater drainage that generates flood impacts on the land.
+ The relevant study adopted by Forbes Council is the 'Catchment Study & Flood Investigation - Cypress Lane to Lake Forbes, Forbes - October 2005' prepared by Rickard Hails Moretti and hereafter referred to as the Flood Study.
+ The Flood Study has been considered by Calare Civil as part of the preparation of a subdivision design for the subject land in order to ensure that stormwater is appropriately managed through the site and to ensure that future residential land-use is not impacted by flooding in a 1% AEP or PMF event. Relevant technical detail and mapping has been incorporated into the report by Calare Civil 'Conceptual Engineering & Stormwater Management Plan - A/30.1023'.

Direction 4.1(2) requires that a Planning Proposal must not rezone land within the flood planning area from Recreation, Rural, Special Purpose or Conservation Zones to a Residential, Employment, Mixed Use, W4 Working Waterfront or Special Purpose Zones. The Planning Proposal is inconsistent with the Direction as it involves the rezoning of parts of the site which are flood prone from RE1 Public Recreation to R1 General Residential. The Planning Proposal is assessed to be justifiably inconsistent for the following reasons:

+ The Planning Proposal is supported by a flood and risk impact assessment that considers the findings of the Council's adopted Flood Study.

- The site is already largely zoned for residential purposes. The proposed zoning framework is to be guided by a proposed plan of subdivision that has considered the requirements for the management of stormwater through the site.
- Currently, there are areas of land within the site that are zoned R1 General Residential and below the flood planning area. The proposed zoning framework ensures that residential development will occur above the 1% AEP and PMF events, which improves planning outcomes for the site in terms of managing flood risk.

Direction 4.1(3) requires that a Planning Proposal must not contain provisions that apply to the flood planning area which:

a. Permit development in floodway areas,

b. Permit development that will result in significant flood impacts to other properties,

c. Permit development for the purposes of residential accommodation in high hazard areas,

d. Permit a significant increase in the development and/or dwelling density of that land,

e. Permit development for the purpose of centre-based childcare facilities, hostels, boarding houses, group homes, hospitals, residential care facilities, respite day care centres and seniors housing in areas where the occupants of the development cannot effectively evacuate,

f. Permit development to be carried out without development consent except for the purposes of exempt development or agriculture. Dams, drainage canals, levees, still require development consent,

g. Are likely to result in a significantly increased requirement for government spending on emergency management services, flood mitigation and emergency response measures, which can include but are not limited to the provision of road infrastructure, flood mitigation infrastructure and utilities, or

h. Permit hazardous industries or hazardous storage establishments where hazardous materials cannot be effectively contained during the occurrence of a flood event

The Planning Proposal is assessed to be consistent with the requirements of Direction 4.1(3) for the following reasons:

- The Planning Proposal demonstrates that future residential land-use will not occur within defined floodway areas.
- The report by Calare Civil 'Conceptual Engineering & Stormwater Management Plan - A/30.1023' concludes that the proposed subdivision design and stormwater / flood management framework does not worsen downstream conditions.
- The Planning Proposal demonstrates that future residential land-use will not occur within high hazard areas.
- The majority of the site is already zoned R1 General Residential and allows for subdivision development to occur into minimum 550m2 lots. The Planning Proposal maintains a 550m2 lot size for the site and does not seek to permit an increase in dwelling density for the land beyond opportunities that already exist within the Forbes LEP.
- The Planning Proposal demonstrates that future residential land-use will not occur below the 1% AEP (including freeboard) or PMF. The R1 General Residential for the site will permit the range of sensitive land-uses listed in the Ministerial Direction, however not in locations that are flood prone.
- There are no changes to the range of permissible uses (without consent) in the R1 General Residential zone or RE1 Public Recreation zone.
- The physical changes to the landscape required to manage stormwater (and flood risk) on the land will be completed by the landowners following the determination of a Development Application and Subdivision Works Certificate. There is no expectation that the proposal will require government spending to mitigate the site against flooding. New public roads are generally located outside of flood prone locations.
- The Planning Proposal does not seek to enable hazardous industries or hazardous storage establishments on the land.

Direction 4.1(4) requires that a Planning Proposal must not contain provisions that apply to areas between the flood planning area and probable maximum flood to which Special Flood Considerations apply which:

a. Permit development in floodway areas,

b. Permit development that will result in significant flood impacts to other properties,

c. Permit a significant increase in the dwelling density of that land,

d. Permit the development of centre-based childcare facilities, hostels, boarding houses, group homes, hospitals, residential care facilities, respite day care centres and seniors housing in areas where the occupants of the development cannot effectively evacuate,

e. Are likely to affect the safe occupation of and efficient evacuation of the lot, or

f. Are likely to result in a significantly increased requirement for government spending on emergency management services, and flood mitigation and emergency response measures, which can include but not limited to road infrastructure, flood mitigation infrastructure and utilities.

The Planning Proposal is assessed to be consistent with the requirements of Direction 4.1(4). The proposal does not seek to enable residential land-use on land that is below the PMF.

Direction 4.2 - Coastal Management

The Direction does not apply to the Planning Proposal as it does not affect land within the coastal zone, as defined under the Coastal Management Act 2016.

Direction 4.3 - Planning for Bushfire Protection

The Direction does not apply to the Planning Proposal as it does not affect land that is mapped as bushfire prone land, or land that is within proximity to land that is mapped as bushfire prone land.

Direction 4.4 - Remediation of contaminated land

The Direction applies to the Planning Proposal as it relates to land, a part of which is known to contain an area of potential land contamination. There is an animal burial pit located on Lot 1054 DP 750158. This pit exists within Council's knowledge and record keeping and is the reason for the current C3 Environmental Management zoning that has been applied to the relevant part of the site.

Direction 4.4(1) requires that a planning proposal authority must not include in a particular zone (within the meaning of the local environmental plan) any land to which this direction applies if the inclusion of the land in that zone would permit a change of use of the land, unless:

a. The planning proposal authority has considered whether the land is contaminated, and

b. If the land is contaminated, the planning proposal authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and

c. If the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning proposal authority is satisfied that the land will be so remediated before the land is used for that purpose. In order to satisfy itself as to paragraph 1(c), the planning proposal authority may need to include certain provisions in the local environmental plan.

Direction 4.4(2) requires, before including any land to which this direction applies in a particular zone, the planning proposal authority is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the contaminated land planning guidelines.

The Planning Proposal is assessed to be consistent with the requirements of Direction 4.4(1) and 4.4(2) for the following reasons:

+ The Planning Proposal is supported by a report in (**Appendix C** prepared by Premise and titled 'Site Microbial Investigation, Anthrax - Rev B 20 December 2021'. This report was prepared with consideration of the Managing Land Contamination - Planning Guidelines under the (then relevant) State Environmental Planning Policy (SEPP) No. 55 - Remediation of Land 1998. This report investigated the nature and extent of potential land contamination resulting from the presence of an animal burial pit on the subject land.

+ The Planning Proposal is supported by a plan of survey prepared by Arndell Surveyors which accurately defines the location of the animal burial pit on the subject land.

+ The Planning Proposal is supported by a report in (**Appendix C**) prepared by Premise and titled 'Environmental Management Plan - Rev 001B - 31 October 2023'. This report considers the suitability of land-use at the site having regard to the known location of the pit and contamination risk created by it's existence. The report also develops an environmental management framework for the site to ensure it can be suitably developed in accordance with the recommendations of this Planning Proposal.

+ As an appropriate planning response to the key issues identified in the Premise Reports, the proposed plan of subdivision for the site (by Calare Civil) retains larger lot forms around the burial pit location. Proposed Lots 22 and 30 have areas of approximately 2485m2 each. A masterplanned approach to future residential use / subdivision is proposed for these lots in order to ensure that the lateral extents of the animal burial pit are only utilised for passive purposes (i.e. car parking) consistent with the recommendations of the Environmental Management Plan. The masterplan will be presented to Council for detailed assessment as part of the preparation, lodgement and determination of a future DA for the project.

+ As the Premise Reports have not identified the need for site remediation to occur, a more detailed response to site design (than what is presented to Council in the Calare subdivision design) is not proposed as part of the rezoning process.

Direction 4.5 - Acid Sulphate Soils

The Direction does not apply to the Planning Proposal as it does not affect land having a probability of containing acid sulfate soils.

Direction 4.6 - Mine Subsidence and Unstable Land

The Direction does not apply to the Planning Proposal as it does not affect land that is within a declared mine subsidence district.

Focus Area 5 - Transport and Infrastructure

Direction 5.1 - Transport and Infrastructure

The Direction applies to the Planning Proposal as it will create, alter and remove a zoning provision relating to urban land, including land zoned for residential purposes.

Direction 5.1(1) requires that the Planning Proposal must located zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of:

d. Improving Transport Choice – Guidelines for planning and development (DUAP 2001), and

e. The Right Place for Business and Services – Planning Policy (DUAP 2001).

The planning proposal is assessed to be consistent with this Ministerial Direction for the following reasons:

+ The Planning Proposal does not propose significant changes to the planned uses for the land, which will continue to be for residential and public recreation purposes.

+ The Planning Proposal does not propose significance changes to the planned density of residential use on the land, which remains generally consistent with the current permissibility of residential land subdivision under the Forbes LEP.

+ The development scenario that is to be facilitated by this Planning Proposal should not be expected to compromise the safety or function of the surrounding road network.

Direction 5.2 - Reserving land for public purposes

The Direction applies to all Planning Proposals.

Direction 5.2(1) requires that a planning proposal must not create, alter or reduce existing zonings or reservations of land for public purposes without the approval of the relevant public authority and the Planning Secretary (or an officer of the Department nominated by the Secretary).

The Planning Proposal is inconsistent with Direction 5.2(1) as it seeks to alter the extent of land within the subject site that is zoned RE1 Public Recreation.

For the following reasons, the The Planning Proposal is considered to be justifiably inconsistent with the terms of Direction 5.2(1):

+ There is no proposal to remove (entirely) the existing reservation of land for stormwater drainage. The proposal seeks only to rationalise the extent of the RE1 Public Recreation zone based on a masterplanned subdivision design for the site that considers in detail the likely requirements for managing stormwater drainage through the site.
+ The proposal retains RE1 Public Recreation zoned land within the site in a way that is consistent with the strategic framework for housing development in this parts of the Forbes Township created through the Forbes Housing Strategy.
+ It is expected that the Planning Proposal will require approval from Forbes Shire Council and the Planning Secretary and that this will occur as part of the next stages of the plan making process.

Direction 5.2(2) does not apply to the Planning Proposal.

Direction 5.2(3) does not apply to the Planning Proposal.

Direction 5.2(4) does not apply to the Planning Proposal.

Direction 5.3 - Development Near Regulated Airports and Defence Airfields

The Direction does not apply to the Planning Proposal as it does not create, alter or remove a zone or provision relating to land near a regulated airport.

Direction 5.4 - Shooting Ranges

The Direction does not apply to the Planning Proposal as it does not create, alter or remove a zone or provision relating to land adjacent to and / or adjoining an existing shooting range.

Focus Area 6 - Housing

Direction 6.1 - Residential Zones

The Direction applies to the Planning Proposal as it affects land within an existing or proposed residential zone.

Direction 6.1(1) requires the Planning Proposal to include provisions that encourage the provision of housing that will:

f. Broaden the choice of building types and locations available in the housing market, and

g. Make more efficient use of existing infrastructure and services, and

h. Reduce the consumption of land for housing and associated urban development on the urban fringe, and

i. Be of good design.

The Planning Proposal is assessed to be consistent with the requirements of Direction 6.1(1). The proposed subdivision design will provide for a diverse range of housing types and choices. The construction of the residential subdivision project will contribute to the supply of quality housing opportunities in Forbes.

Direction 6.2(2)(a) requires that the Planning Proposal must contain a requirement that residential development is not permitted until land is adequately serviced or that appropriate arrangements have been made for the servicing of the land. The Planning Proposal is assessed to be consistent with the requirements of this Direction for the following reasons:

+ Appropriate arrangements have been made already for the supply of all necessary infrastructure and servicing to the land. Preliminary servicing details are shown on the Calare Civil plans submitted with this Planning Proposal.
+ The landowners will contribute equitably to this provision through the payment of contributions in accordance with the relevant contribution plans of Council.

Direction 6.2(2)(b) requires that the Planning Proposal not contain provisions which will reduce the permissible residential density of land. The Planning Proposal is not requesting that changes be made to Forbes Local Environmental Plan 2013 which will have the effect of reducing the permissible density of residential housing on the subject land. The Planning Proposal is consistent with the Direction.

Direction 6.2 - Caravan Parks and Manufactured Home Estates

This Direction applies to any Planning Proposal.

The Planning Proposal does not seek to identify suitable zones, locations and provisions for caravan parks or manufactured home estates. The permissibility of these land-use types in any existing zone under Forbes Local Environmental Plan 2013 will not be changed as a result of this Planning Proposal. The Planning Proposal is not inconsistent with the requirements of the Direction.

Focus Area 7 - Industry and Employment

Direction 7.1 - Business and Industrial Zones

The Direction does not apply to the Planning Proposal as it does not affect land within an existing or proposed business or industrial zone.

Direction 7.2 - Reduction in non-hosted short-term rental accommodation period

The Direction does not apply to the Planning Proposal as it does not affect land within the Byron Shire Local Government Area.

Direction 7.3 - Commercial and Retail Development along the Pacific Highway, North Coast

The Direction does not apply to the Planning Proposal as it does not affect land within those council areas on the North Coast that the Pacific Highway traverses.

Focus Area 8 - Resources and Energy

Direction 8.1 - Mining, Petroleum Production and Extractive Industries

The Direction does not apply to the Planning Proposal as it does not have the effect of:

+ Prohibiting the mining of coal or other minerals, production of petroleum, or winning or obtaining of extractive materials, or
+ Restricting the potential development of resources of coal, other minerals, petroleum or extractive materials which are of State or regional significance by permitting a land use that is likely to be incompatible with such development.

Focus Area 9 - Primary Production

Direction 9.1 - Primary Production

The Direction does not apply to the Planning Proposal as it does not rezone land from a rural zone to a residential, business, industrial, village or tourist zone.

Direction 9.2 - Rural Lands

The Direction does not apply to the Planning Proposal as it does not affect land within an existing or proposed rural or conservation zone, and does not proposes changes to the existing minimum lot size on land within a rural or conservation zone.

Direction 9.3 - Oyster Aquaculture

This Direction does not apply to the Planning Proposal as it does not affect land within a 'Priority Oyster Aquaculture Area'.

Direction 9.4 - Farmland of State and Regional Significance on the NSW Far North Cost

This Direction does not apply to the Planning Proposal as it does not affect land within a Far North Coast Local Government Area.

8.3 Environmental, Social and Economic Impact

8.3.1 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?

The aerial photograph included in Figure 2 shows that the historic agricultural use of the property has resulted in a landscape that is highly disturbed and cleared of native vegetation, with the predominate landform cover being pasture grass. A small number of Isolated trees are observed in the vicinity of Lot 1051 DP 750158. The biodiversity resources of the subject land are shown in Figure 6.

Given the existing vegetation is located on land that is already zoned for urban purposes, a more detailed assessment of potential impact in the form of a Biodiversity Assessment Report is not deemed to be necessary. The lodgement of a Development Application with Council for the subdivision of the land will include an appropriate impact assessment where vegetation removal is required as part of civil construction work or future dwelling-house development.

In general, any vegetation clearing is not expected to meet the thresholds that trigger the requirements for participation in the Biodiversity Offset Scheme under the Biodiversity Conservation Act 2016.

Having regard to the above, the proposal is unlikely to generate adverse impacts on critical habitat, threatened species, populations or ecological communities or their habitats.

8.3.2 Are there any other likely environmental effects of the planning proposal and how are they proposed to be managed?

Flooding

The subject land is not located within the Flood Planning Area defined by Forbes Local Environmental Plan 2013, but is affected by overland stormwater drainage that generates flood impacts on the land.

The relevant study adopted by Forbes Council is the 'Catchment Study & Flood Investigation - Cypress Lane to Lake Forbes - October 2005' prepared by Rickard Hails Moretti and hereafter referred to as the Flood Study.

The Flood Study has been considered by Calare Civil as part of the preparation of a subdivision design for the subject land in order to ensure that stormwater is appropriately managed through the site. Relevant technical detail and mapping has been incorporated into the report by Calare Civil 'Conceptual Engineering & Stormwater Management Plan - A/30.1023'. A copy of the report is included in **Appendix A** to this Planning Proposal.

The Calare report:

- Analyses existing flood behaviour and constraint associated with overland stormwater drainage.
- Models expected flood behaviour based on the design of the proposed subdivision, and accounts for upstream flows based on pre-developed scenarios.
- Performs a flood impact assessment for the project accounting for the 1% AEP and PMF scenarios.
- Consider the requirements of the relevant flood study for the area which has been adopted by Forbes Council.

The Flood Risk Impact assessment concludes the likely flood impacts on the development are within acceptable limits and that the land is capable of being developed for residential purposes without significant impact from overland stormwater drainage flows in a 1% AEP or PMF event.

Contamination

The Planning Proposal is supported by a report in (**Appendix C**) prepared by Premise and titled 'Site Microbial Investigation, Anthrax - Rev B 20 December 2021'. This report was prepared with consideration of the Managing Land Contamination - Planning Guidelines under the (then relevant) State Environmental Planning Policy (SEPP) No. 55 - Remediation of Land 1998. This report investigated the nature and extent of potential land contamination resulting from the presence of an animal burial pit on the subject land.

The Planning Proposal is supported by a plan of survey prepared by Arndell Surveyors which accurately defines the location of the animal burial pit on the subject land.

The Planning Proposal is supported by a report in (**Appendix C**) prepared by Premise and titled 'Environmental Management Plan - Rev 001B - 31 October 2023'. This report considers the suitability of land-use at the site having regard to the known location of the pit and contamination risk created by it's existence. The report also develops an environmental management framework for the site to ensure it can be suitably developed in accordance with the recommendations of this Planning Proposal.

As an appropriate planning response to the key issues identified in the Premise Reports, the proposed plan of subdivision for the site (by Calare Civil) retains larger lot forms around the burial pit location. Proposed Lots 22 and 30 have areas of approximately 2485m2 each. A masterplanned approach to future residential use / subdivision is proposed for these lots in order to ensure that the lateral extents of the animal burial pit are only utilised for passive purposes (i.e. car parking) consistent with the recommendations of the Environmental Management Plan. The masterplan will be presented to Council for detailed assessment as part of the preparation, lodgement and determination of a future DA for the project.

As the Premise Reports have not identified the need for site remediation to occur, a more detailed response to site design (than what is presented to Council in the Calare subdivision design) is not proposed as part of the rezoning process.

8.3.3 Has the planning proposal adequately addressed any social and economic effects

Social Impact Assessment

An assessment of potential impacts of the proposed development has been undertaken with regards to scoping methodology outlined in the Social Impact Assessment Guideline 2017 (SIA Guideline), published by the Department of Planning and Environment. Table 7 provides an assessment of the Planning Proposal against the criteria in the SIA Guideline.

Table 7 - SIA Guideline - Impact Assessment

Matters	Key links to social impacts	Risk of impact without mitigation	Nature of Impact	Explanation
Amenity				
Acoustic	Way of life;	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Visual	Surroundings	Likely	Negative	The Planning Proposal is unlikely to generate impacts.
Odour	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Micro climate	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Access				
Access to property	Way of life;	N/A	Nil	The Planning Proposal is unlikely to generate impacts.
Utilities and public transport	Access to infrastructure, services and facilities;	Unlikely	Negative	Connection to urban service and utilities is required and will be completed to requirements of relevant authorities.
Road and rail	Personal and property rights.	Unlikely	Negative	The proposed development is within the capacity of local road conditions.
Built Environment				
Public domain	Community;	Likely	Negative	The Planning Proposal alters land zoned for public purposes. Appropriate justifications for the reduction have been included in Section 5.
Public infrastructure	Access to infrastructure, services and facilities;	Likely	Negative	Appropriate arrangements will be made for public infrastructure to be provided to the development.
Other built assets	Surroundings; Personal and property rights	Unlikely	Nil.	The Planning Proposal is unlikely to generate impacts.
Heritage				
Natural	Way of life;	Unlikely	Nil	The Planning Proposal is unlikely to generate impacts.

Table 8 - Table 9 - SIA Guideline - Impact Assessment

Matters	Key links to social impacts	Risk of impact without mitigation	Nature of Impact	Explanation
Cultural	Community;	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Aboriginal culture	Culture;	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Built	Surroundings.	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Community				
Health	Health and wellbeing;	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Safety	Surroundings	Unlikely	Negative	The Planning Proposal has addressed identified safety risks related to flooding and environmental hazards.
Services and facilities	Way of life, Access to infrastructure, services and facilities;	Likely	Negative	Appropriate arrangements will be made for public infrastructure to be provided to the development.
Cohesion	Way of life; Community; Culture	Likely	Positive	The Planning Proposal is unlikely to generate impacts.
Housing	Way of life, Personal and property rights.	Likely	Positive	The Planning Proposal will result in a well-designed and construction housing project that is likely to have positive impacts for the local community.
Economic				
Natural resource area	Way of life;	Unlikely	Negative	The Planning is unlikely to generate impacts.
Livelihood	Surroundings;	Unlikely	Positive	The Planning Proposal is likely to have a positive impact.
Opportunity cost	Personal and property rights	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Air				
Air emissions.	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Biodiversity				
Native vegetation and fauna	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Land				
Land capability, topography	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.
Water				
Quality, availability, hydrological flows	Surroundings	Unlikely	Negative	The Planning Proposal is unlikely to generate impacts.

Having regard to the findings of the Social Impact Assessment presented in Table 7, it is generally concluded that the proposed changes to Forbes Local Environmental Plan 2013 are unlikely to be adverse. Only positive changes are expected in terms of:

+ The landowners commitment to design and construct a premium residential land subdivision that creates housing opportunity and choice for the Forbes community.
+ The landowners commitment to create a development that is consistent with the Forbes Housing Strategy in terms of proposed locations of residential and public open space uses.
+ The landowners commitment to create a development that is consistent with the Forbes DCP in terms of subdivision design and future housing provision.
+ The landowners commitment to the provision of public infrastructure and services to service the future development of the land.

Economic Impact Assessment

Due to the nature, scope and scale of the Planning Proposal, a detailed Economic Impact Assessment has not been commissioned by the landowners and has not been determined by Forbes Shire Council to be necessary in any of the preliminary consultation processes leading to the preparation and lodgement of this Planning Proposal.

The Planning Proposal is not seeking changes to the Forbes Local Environmental Plan 2013 which are likely to create adverse economic consequences. The rationalise of the existing zoning and lot size framework will enable the development of the land for a purpose that is likely to result in positive outcomes, with additional opportunities to be created for residential construction projects, small increases to local populations and utilisation of planned recreation land in this part of the Forbes Township.

8.4 Infrastructure (Local, State and Commonwealth)

8.4.1 Is there adequate public infrastructure for the Planning Proposal?

Generally

The Planning Proposal seeks to amend Forbes Local Environmental Plan 2013 by rationalising the existing zoning and lot size framework applying to the land. As the subject land is already largely zoned for residential purposes, the Planning Proposal does not have the effect of changing the permissible use of the land or density of housing that is to be expected on the site. For this reason, the Planning Proposal does not create an increased demand for public infrastructure and services.

The proposed plan of subdivision that has been prepared by Calare Civil has considered the likely requirements for connecting public infrastructure and services to the proposal. Generally, the design shows that key essential services (water, sewer and stormwater) are available to service the land subject to appropriate augmentations and upgrades by the developer to the satisfaction of Forbes Shire Council.

Infrastructure Provisioning Responsibilities

The responsibility for the provision of new public infrastructure, services and utilities is shared between Forbes Shire Council, as the relevant Local Government Authority, and M G O'Keeffe Constructions PL as the developers.

The landowners recognise that they will have primary financial responsibility for the physical provision of public infrastructure, services and utilities to the proposed development. In addition to the physical provision of this infrastructure, the landowners recognise that the proposed development will trigger the requirements for the payment of development contributions towards open space, road widening and construction having regard to specific public works items identified in the Forbes Development Contribution Plan.

The proposal will also result in an increase in the amount of land to be dedicated as public open space and zoned RE1 Public Recreation under Forbes Local Environmental Plan 2013. M & N O'Keeffe recognise that this dedication of land is a necessary part of the development of their land and are not seeking cost reimbursement or a reduction of contribution liability in return. The dedication of the land is therefore to be provided to the net benefit of Forbes Council and local community.

8.5 State and Commonwealth Interests

8.5.1 What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination

State Government Interests

The specific changes that are requested to Forbes Local Environmental Plan 2013 under this Planning Proposal are unlikely to be of any significance or interest to any identified NSW Government agencies.

Section **8.2.4** has however considered the likely consultation / referral triggers for the proposed development (as a whole) under State Environmental Planning Policy (Transport and Infrastructure) 2021.

In accordance with Schedule 3 of the SEPP, subdivision developments involving the creation of 200 or more allotments and involving the opening of a public road are identified to be traffic-generating developments of a kind that requires referral to Transport for NSW.

The Planning Proposal relates to a subdivision development that proposes the creation of 55 new development lots, and 1 new allotment to be created and dedicated for public open space purposes. The scale of the proposed development does not trigger referral. The landowners would not object should Forbes Shire Council decide that referral of any future DA for this project to Transport for NSW is required.

Preliminary feedback from Forbes Shire Council has not indicated that a Traffic Impact Assessment is required to be lodged in support of this Planning Proposal to help Forbes Shire Council.

Federal Government Interests

The Planning Proposal is unlikely to be any particular interested to the Federal Government.

09

PLANNING PROPOSAL PART 4

Plan Making Guidance - Part 4

The NSW DPE Local Environmental Plan Making Guidelines provides the following guidance:

- Mapping must be consistent with the Department's Standard Technical Requirements for Spatial Datasets and Maps, using the same format, symbology, labeling and appropriate scale.
- All existing and proposed mapping submitted to the Department as part of a Planning Proposal should be accompanied by GIS data. All LEP mapping should commence as early as possible in GIS, particularly with complex planning proposals or Principal LEPs.
- Mapping may include the subject site and immediate surrounds, current zoning, current development standards and any alternative zones if a change is proposed.
- Other relevant maps or figures may include maps illustrating changes of development standards, extent of heritage conservations areas, location of specific heritage items, extent of native vegetation, extent of environmental conservation areas and areas to which a local provision will apply.
- Additional material such as aerial photographs clearly identifying the subject site should also be included where appropriate.

9.1 Project Mapping

This Planning Proposal has been prepared to include a number of different maps and visuals that:

- Show the location of the subject land both in terms of the immediately surrounding environment and the wider locality
- Demonstrate an understanding of the existing environmental conditions applying to the subject land.
- Shows the proposed layout of the subdivision development planned for the entire site.
- Aid Forbes Shire Council's understanding of the scope of the changes that are requested to the existing zoning framework applying to the land under Forbes Local Environmental Plan 2013.
- Aid Forbes Shire Council's understanding of the scope of the changes that are requested to the existing minimum lot size framework applying to the land under Forbes Local Environmental Plan 2013.

The landowners submit that the mapping presented in this Planning Proposal is adequate to enable assessment of the key issues by Forbes Shire Council, and to enable the community to understand the scope of the proposed amendments to Forbes Local Environmental Plan 2013.

The landowners are prepared to support Forbes Shire Council with the preparation of final map datasets consistent with the Department's Standard Technical Requirements for Spatial Datasets and Maps, should this be considered necessary at a later stage.

10

PLANNING PROPOSAL PART 5

Plan Making Guidance - Part 5

The NSW DPE Local Environmental Plan Making Guidelines provides that Part 5 of the Planning should describe:

- Consultation and outcomes undertaken with council, state agencies or authorities during the pre-lodgement stage.
- Any community consultation undertaken, or consultation with other key stakeholders
- The extent of consultation having regard for the public exhibition requirements in Section 1 of the guideline.
- The required public exhibition period based on the different planning proposal categories.
- Community consultation will be considered at the Gateway stage, with the Gateway determination confirming the requirements.
- The Gateway determination may also specify additional information or studies to be finalised before any consultation commences, often to make sure that everyone can make an informed opinion. In some cases, the Gateway determination may require the PPA to submit studies to the Department for review prior to public exhibition.

10.1 Consultation - Pre-lodgement stage

In early 2022, the landowners consulted with Forbes Council regarding their proposal to develop the subject land for residential and public open space purposes. Preliminary plans were provided to Council showing indicative subdivision layouts, proposed zoning frameworks, and proposed dedications of land for public drainage purposes.

Council provided feedback to the landowners on key issues relating to the proposal including:

- Management of contamination risk associated with the animal burial site.
- Requirements for lodging a Development Application for the subdivision.
- General subdivision design, including infrastructure provision and costings.

Councils feedback has been considered, as necessary, during the preparation of this Planning Proposal.

10.1 Community Consultation

Forbes Community Participation Plan 2019

In accordance with the Forbes Community Participation Plan 2019, the Planning Proposal will require public exhibition for a minimum of 28 days, or any other period as might be specified in a Gateway Determination issued by NSW Department of Planning and Environment.

The landowners are prepared to support Forbes Shire Council with any specific tasks involved in the public exhibition of the Planning Proposal, should this be considered necessary.

11

PLANNING PROPOSAL PART 6

Plan Making Guidance - Part 6

The NSW DPE Local Environmental Plan Making Guidelines provides that Part 6 of the Planning should describe the project timeline as a tool for the Planning Proposal Authority, the Department and the Parliamentary Counsel's Office to monitor the project through the LEP making process and manage resources accordingly.

As a minimum, the project timeline should describe:

- Anticipated commencement date (date of Gateway determination)
- Anticipated time frame to finalise the infrastructure studies/plan
- Anticipated time frame for completion of any additional technical studies, not completed prior to Gateway
- Time frame for public agency consultation
- Anticipated dates of public exhibition and, if required, a public hearing
- Time frame for submissions to be considered
- Time frame for the consideration of a proposal after the exhibition
- Date the plan will be made (where council is the LPMA) or date of submission to the Department to finalise the LEP
- Date of notification

11.1 Project Timeline

An anticipated timeline has been developed for the project and is based on the maximum time frame recommendations provided in the NSW DPE Local Environmental Plan Making Guidelines for a standard category Planning Proposal. The timeline is shown in Figure 22.

The Planning Proposal is deemed to fall into the Standard Planning Proposal Category.

Figure 22 - Project Timeline


CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Appendix A.

Conceptual Engineering & Stormwater Management Plan

PREPARED BY CALARE CIVIL

PROJECT
Planning Proposal

SITE
Bogan Gate Road, Forbes NSW

LANDOWNER
M G O'Keeffe Constructions Pty Ltd

APPLICANT
Currajong Pty Ltd

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

CONCEPTUAL ENGINEERING & STORMWATER MANAGEMENT PLAN

Proposed Residential Development

DEVELOPMENT ADDRESS

1 Bogan Gate Road
Forbes, NSW 2871

LEGAL DESCRIPTION

Lots 796 & 1046-1055 DP750158

FOR

M.G. O'Keefe Constructions

ORIGINAL REPORT DATE
October 2023

AMENDMENT / DATE
A / 30-10-23

CALARE PROJECT REF:
2022.0849

Report Details

Client: M.G. O'Keefe Constructions

Document Name: Conceptual Engineering & Stormwater Management Plan

Site Address: Lots 796 & 1046-1055 DP750158
1 Bogan Gate Road
Forbes, NSW 2871

Job Number: 2022.0849

File Name: 2022.0849-Engineering Report-A.docx

Author: CALARE CIVIL PTY LTD

Document Control

Issue	Rev	Checked	Date	Approved	Date	Distributed to:	Qty.
Original Issue	A	GD	30/07/23	GD	30/07/23	Client	01

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Rainfall Data

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Watercom Drains Data

APPENDIX C

Existing Topographical Survey

FIGURES

1. INTRODUCTION

This report has been prepared by Calare Civil Pty Ltd on behalf of our client M.G. O'Keefe Constructions in support of an application seeking approval for the re-zoning & development of 11 existing lots identified as Lots 796 & 1046-1055 DP750158 herein referred to as the principal lot or site.

The subject site is approx. 7.73ha.

This report summarises our various findings relating to engineering opportunities & constraints for the development along with the control of external stormwater runoff traversing the site.

Developer	M.G. O'Keefe Constructions
Address	1 Bogan Gate Road, Forbes, NSW 2871
Local Authority	Forbes Shire Council
Property Description	Lots 796 & 1046-1055 DP750158
Size of Development	Approx. 7.73ha
Type of Development	Proposed Residential Development
Time to Undertake Works	9 – 12 Months
Existing Land Use & Zone	Currently Existing Vacant Land
Adjacent Land Use & Zone	Adjacent sites comprise of existing residential and open paddocks.
Engineering Consultant	Calare Civil
Report Written By	Grant Lyons
Qualifications	Senior Civil Designer
Experience	27+ years civil engineering experience. 10 years New Zealand, 2 years England & 15+ years Australia, Prepared Stormwater Management Plans since 2004 (2006 Australia).
Report Checked By	Garth Dean Director
Qualifications	B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)
Experience	30+ Years Civil Engineering Experience

2. SITE DESCRIPTION

2.1. Location & Topography

The proposed development is located on the south side of Bogan Gate Road just on the outskirts of town, west of the extent of existing residential dwellings.

The site gently falls to an open drain running through the site that drains from the north towards the south. The average slope is around 1.5% with the fall and has elevations ranging from 239m AHD to 244m AHD. The slope towards the southern side of the site is approximately 0.5%

The proposed development is to subdivide the existing allotments into residential sized lots for resale.

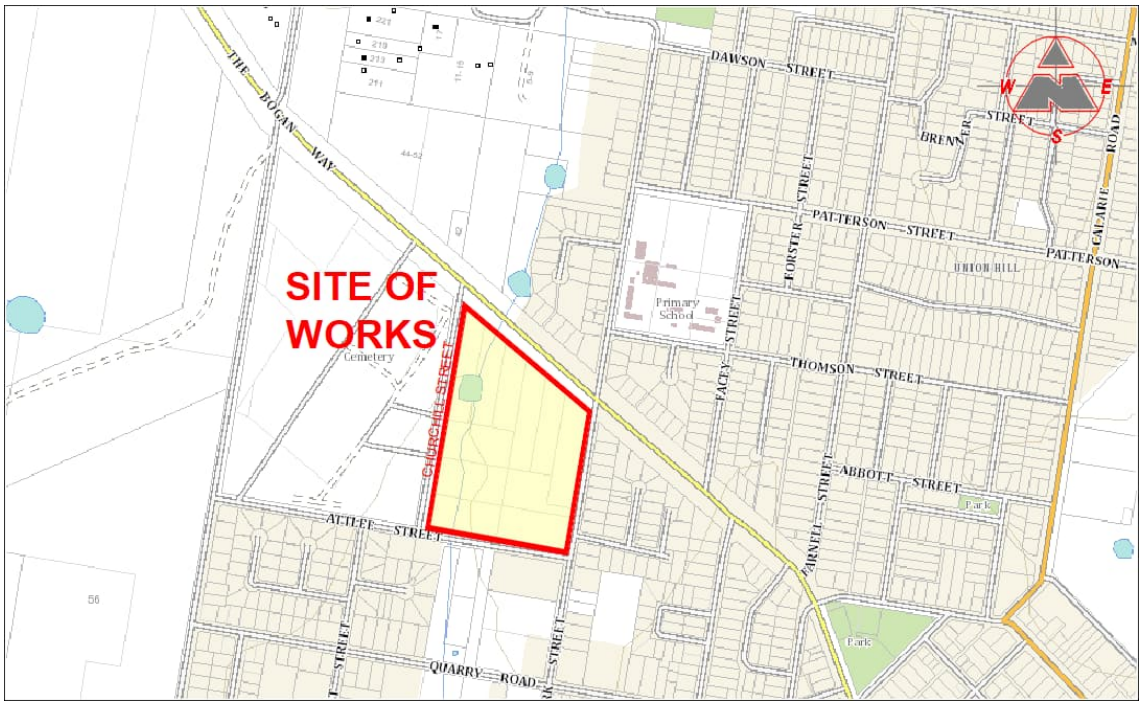


Image obtained from Six Maps

2.2. Soils

A Geotechnical investigation has been undertaken for this site by K&H Geotechnical Services Pty Ltd Ref:W23/07706. This defines the soils to generally be sandy & silty clays.

Please refer to this document for further information.

2.3. Flora & Fauna

From a review of the survey provided and satellite imagery it is ascertained that there is no vegetation on the site.

No fauna survey has been undertaken and does not form part of this report.

If any protected, threatened, or endangered species of fauna are found to be inhabitant within the site prior to or during construction works the relevant authorities should be informed immediately.

3. EARTHWORKS

Earthworks will be required to construct the proposed road network and the open drain.
Additional earthworks will be required to fill some proposed lots along Churchill Street to ensure they have flood immunity.

Some other minor reshaping of the ground may be required.

It is noted that there is an Anthrax contaminated area within the site, there is a separate report addressing this issue, please refer to the two Premise reports:

1. Environmental Management Plan – Dated 13/09/23 Ref: P000462_EMP_001 Rev. 001A.
2. Site Microbial Investigation, Anthrax – Dated 20/12/21 Ref: 221306_REP_001B

4. EROSION & SEDIMENT CONTROL

Erosion & Sediment Control is to be undertaken in accordance with the Landcom “Bluebook” requirements to the satisfaction of Council and any other relevant consenting authority.

5. SEWER SERVICES

There is an existing sewer main running along the site frontage in Attlee Street, it is intended to connect the proposed subdivision into this line via a new reticulated sewer main suitable to service all proposed allotments.

6. WATER RETICULATION / FIRE FIGHTING

A 100 dia watermain runs down York Street and along Attlee Street.
The lots fronting York Street will be connected by providing crossroad connections from the existing main in accordance with Councils guidelines & standard details.
The remainder of the subdivision will be serviced by a reticulated 100 dia watermain with hydrants located as appropriate for firefighting purposes.
No study has been undertaken to assess the current pressure of this main, this should be undertaken to assess if a booster pump will be required.

7. OTHER SERVICES

7.1. Electricity

Overhead power lines run around the extremities of the development site.
Connection suitability would have to be confirmed with the service provider.

7.2. Telecommunications

Telecommunication services existing only along York Street, these services would have to be extended in accordance with the service providers requirements.

8. TRAFFIC GENERATION & SITE ACCESS

The possible development of these lots will increase the traffic generation along York, Attlee & Churchill Streets.

It is deemed that the increase will not put undue pressure on the surrounding road system given the village environment currently has minor traffic volumes.

Access to the allotments fronting York & Churchill Streets will access from those respective roads while the remainder of the lots will access from Attlee Street.

No lots will have access to Bogan Gate Road.

9. ROADWORKS

It is expected that the existing road network will require upgrading due to this proposed development and that it would be required to upgrade the half road frontage on the development side.

The two proposed intersection to the new internal roads and those roads themselves will require construction to Council standards and be handed over to Council as their asset once completed.

10. STORMWATER

10.1. Existing Drainage

A large catchment north of Bogan Gate Road is conveyed under the road to the site by 6x 1200x600 Reinforced Concrete Box Culverts (RCBC). The runoff then passes through the site via an existing open drain and leaves the site under Attlee Street via 2x 1800x600 RCBC's.

There is an existing piped network along the southern side of Attlee Street that consists of 2x600 dia concrete pipes. A portion of York Street connects into this system.

The Attlee Street drainage discharges into the existing open watercourse opposite the proposed development.

10.2. Watercourses & Catchments

In its current state there is an upstream catchment external of the site that traverses through it. The approximate catchment area to the north of the site is 174.5ha.

There is another catchment to the west of the site that also contributes runoff, this catchment is approximately 22.4ha, and then the site itself along with a small portion external to the east with a combined 13.1ha.

The site may will be reshaped due to the development. Consideration is to be undertaken for future overland flowpaths & piped drainage system to ensure all runoff will discharge to an engineered open drain in the same location as exists.

10.3. Data

10.3.1. Related Studies

In 2005 Rickard Hails Moretti Pty Ltd (RHM) presented a catchment study from Cypress Lane to Lake Forbes that has been adopted by Council. RHM Ref:05-1024/071005
This document incorporated a section though the subject site and gave recommendation on the open drain size along with detention capacity.

Although this document has been used for reference, Calare Civil notes that since the date of authoring the guidelines and standards have changed with advancements in hydraulic modelling. Therefore a new catchment hydraulic model has been undertaken to better reflect current data & practices.

10.3.2. Existing Stormwater Infrastructure

This site currently discharges to the existing open watercourse previously mentioned, via sheet flow of surface water.

The external catchment to the north enters the site via 6x 1200x600 RCBC. This flow along with the additional contributing flows from the site and western catchment then exit the site via 2x 1800x600 RCBC.

10.3.3. Stormwater Management Plans

This report forms a stormwater management plan to detail how the catchment runoff will be conveyed through the site.

10.3.4. Hydrologic & Hydraulic needs/wants

The site is within a known flood flow path, any future buildings should be designed as such to minimise the impact of the flood and to protect infrastructure and life. Residential dwellings should have a floor level 500mm above the 1% AEP flood level as defined.

10.3.5. Water Quality/Stream Health

No study has been undertaken to determine the water quality of the recipient waterway and does not form a part of this document.

10.4. OPPORTUNITIES AND CONSTRAINTS

10.4.1. Key Site Characteristics

As detailed previously the site currently grades to the existing open drain on this property with culverts at both the upstream and downstream property boundaries.

Although the site lies within the Lake Forbes flood zone, it is sufficiently upstream that any flooding of the lake will not impact the site.

10.4.2. Opportunities

By widening the existing watercourse there is opportunity to offset the impact of the development by minimising the loss of flood conveyance.
Discussed further in this report.

10.4.3. Constraints

Any future proposal will need to account for the possible flooding issues, by using smart design processes these can be overcome.

In designing an open drain through the site care must be taken to ensure that there is sufficient protection for the proposed residential lots by the inclusion of a 500mm freeboard to the 1% AEP flood level, and that there is no adverse effect on any neighbouring properties or infrastructure.

10.5. STORMWATER QUANTITY – FLOWPATH CONVEYANCE

10.5.1. Introduction

The site is approximately 1km from Lake Forbes and it's catchment contributes to the Lake Forbes Storage. An assessment has been undertaken to define the impact of the proposed development on the surrounding environment.

10.5.2. Methodology

A previous flood assessment has been undertaken by RHM and has been referenced to provide calibration for this assessment.

10.5.3. Catchments

The catchments were assessed using the NSW Water Management (General) Regulation 2018 Hydroline Spatial Data 1.0 to determine the extent of creeks and tributaries. The areas have been calculated by overlay in AutoCAD.

The upstream catchment forks north of the subject site with one leg heading north (Catchment 1). This catchment is generally rural land with some large block residential. There is a possibility that this area will become residential in the future and as such this has been accounted for in the modelling.

The other fork heads east (Catchment 2).
This catchment is generally residential and as such this has been accounted for in the modelling.

Additionally, another catchment north of Bogan Gate Road combines the two upstream catchments with its own catchment (Catchment 3).
As per Catchment 2 this catchment is generally residential. There is a small portion of rural (vacant) land but again, with the possibility that this area will become residential in the future this too has been accounted for in the modelling.

The overall northern contributing catchment has been broken down into the three respective catchments.

An additional catchment (Catchment 4) has been modelled to represent the site and western catchment.
The site itself will be residential while the western catchment is an existing cemetery and is not expected to be developed in the future.

The fraction impervious adopted for all catchments is anticipated to be on average 0.50 (50%) which allows for the sealed and grassed areas of any future road network, residential developments & council reserves, including open watercourses. This is consistent with the RHM report.

Sub-Catchment	Area (ha)	Fraction Impervious (F_i)
Catchment 1	104.8	0.50
Catchment 2	54.6	0.50
Catchment 3	15.0	0.50
Catchment 4	35.5	0.50

Refer to drawing 2022.0849 SW04 for catchment details.

10.5.4. Hydrology

To undertake the hydrologic analysis of the development, the methodologies detailed in Australian Rainfall & Runoff 2019 (AR&R) have been used. Flows and levels have been calculated using a rainfall intensity chart developed using the Bureau of Meteorology IFD software for the Forbes area.

10.5.5. Watercom Drains

A hydrologic assessment of the existing catchments and the proposed system has been undertaken using Watercom Drains, producing an Initial Loss/Continuing Loss (IL/CL) model to ensure that the development is able to convey the runoff safely through the site and does not adversely affect the downstream system by overloading it in its current state.

Rainfall data for the Forbes region was used, with the adopted IL/CL values derived from the AR&R data hub for the sites co-ordinates and adopting Option 5 of the NSW specific data found at (https://data.arr-software.org/nsw_specific).

Impervious Area Initial Loss	0mm
Impervious Area Continuing Loss	0mm/hr
Pervious Area Initial Loss	30mm
Pervious Area Continuing Loss	0.52mm/hr (40% of outputted value of 1.3mm/hr in accordance with Option 5 of the AR&R NSW specific data)

This model has used the Murray Basin temporal pattern and the AR&R 2019 rainfall depths based on the co-ordinates of the site and obtained from the BoM.

A Watercom Drains model was set up assuming the upstream catchment and the site is fully developed to produce a hydrograph for use in HEC-RAS.

The catchments were assessed using a WBNM model with Watecom Drains, this set the times of concentration and the hydrographs for each sub-catchment.

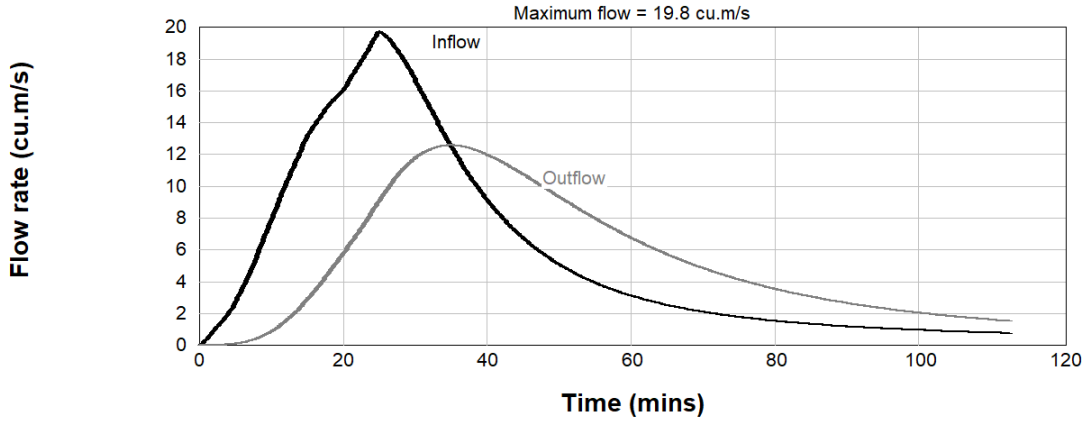
The overall lag factor for the WBNM Hydrological model was set to 1.7 as per recommendation for ungauged catchments.

The lag factor for links between catchments was set to 1 for natural channels.

For the full calculations please refer to the supplied Watercom Drains model file. If not included in the package the Watercom drains file can be obtained by contacting the author.

10.5.6. Hydrograph

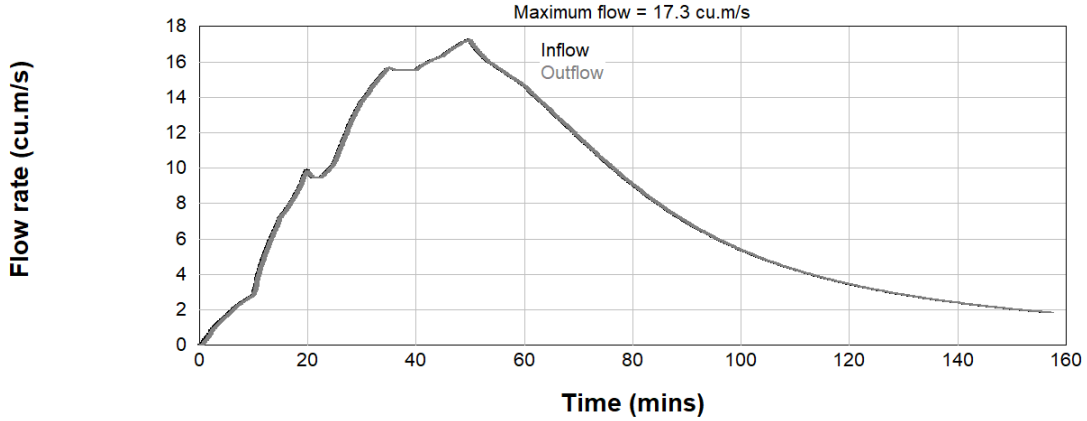
Watercom Drains was used to produce hydrographs, these were assessed against the RHM report. The resultant hydrographs were then exported for use in HEC-RAS.
Shown below are the 1% AEP hydrographs.



Catchment entering site from Bogan Gate Road (Catchments 1, 2 & 3)

The RHM report for their sub-catchment 1 (equivalent to Calare Civil Catchments 1, 2 & 3) showed a peak flowrate of 25.74m^3/s. Comparatively our modelling has a peak inflow of 19.8m^3/s. This flow is 23% lower than the RHM findings but is reflective of the altered rainfall data, specifically the changes in the initial loss & continuing loss (IL/CL), and the separation of the equivalent catchment into three sub-catchments.
The current AR&R data for IL/CL in Forbes is 30mm / 0.52mm/hr respectively, the adopted IL/CL in the RHM report is 15mm / 2.5mm/hr.
The high initial loss contributes to the lower volume of runoff. To confirm this we undertook a sensitivity test based on the RHM values, and the resultant flow was closer to the RHM peak of 25.74m^3/s coming in at 22.2m^3/s, it is still lower due to updated rainfall intensity values.

It should be noted that the above figures are the inflow at the top of the catchment. Once the lag factor and losses are considered for that leg, the outflow is substantially lower at 12.65m^3/s at the culverts under Bogan Gate Road.



Combined Catchment at Attlee Street (Catchments 1, 2, 3 & 4)

For the catchments that combine at Attlee Street the total inflow is 17.3m^3/s. As this is a smaller catchment compared with catchments 1,2&3, the outflow is almost identical to the inflow at 17.27m^3/s and is reflective of the retardation and losses within the overall catchment.
To be slightly conservative we have adopted the 17.3m3/s inflow and applied that, not only to the drain through the site and the culverts at Attlee Street, but also the culverts at Bogan Gate Road as this is more conservative than the 12.65m3/s as calculated for the assessment of the northern catchments at that point.

10.5.7. HEC-RAS

A model has been set up in HEC-RAS to represent the developed terrain for all storm events from the 20% AEP through to, and including, the 1% AEP.

By creating these models, we can assess the impact the development will have on both the subject and neighbouring sites and be able to size the drain along with alteration to culverts as required.

The terrain model imported into HEC-RAS used a combination of surveyed & LIDAR information along with preliminary earthworks design of the drain, road and minor lot filling along the western side of the drain.

Please note that the LIDAR surface levels have not been confirmed and may be inaccurate but are deemed sufficient to assess an approximate contributing catchment for the purposes of overland flow assessment and flood modelling.

An unsteady flow 2D model was created using the inflow hydrograph for the combined sub-catchments as discussed in section 5.2.4.

This model included a modified open drain, sized with a 26m wide base and 1:4 batters with between 1.1m & 1.5m depth to attain capacity to convey the 1% AEP storm event of 17.3m^3/s. This allowed for 500mm freeboard to the proposed lots, some lots will require a small amount of fill to meet these requirements.

The modelling indicates that both Bogan Gate Road & Attlee Street are free of inundation for the 20% AEP storm event, Attlee Street is inundated from the 5% AEP while Bogan Gate Road will not have water incursion until the 1% AEP event.

The modelling indicates that the proposed drain will convey the 1% AEP event with 500mm freeboard to all allotments throughout the development. It will also convey the Probable Maximum Flood (PMF) event.

The full flood extents for each modelled storm event is detailed on drawings SW05 – SW06.

10.5.8. Integration with Waterway Corridor

The catchment will drain into the existing waterway south of Attlee Street and on to ultimately drain into Lake Forbes. By not increasing the culvert capacity at Attlee Street there will be minimal change to the flow dynamics. The increase runoff due to the development is not expected to adversely affect any neighbouring properties.

11. Lifecycle Cost Assessment

The initial costs of construction will be borne by the developers, once the drain is stabilised following an on-maintenance period it will be handed over to Council.

As construction costs fluctuate and a timeline for construction has not been set, the initial cost of construction has not been assessed.

The lifecycle cost will be subject to Councils maintenance program but will only include rubbish collection and mowing. The road network may require additional maintenance but the pavement should be designed for a 20 year lifespan.

12. ASSET HANDOVER

The road network and associated infrastructure along with the drainage allotment will be handed over to Council and become their asset upon completion of the on-maintenance period.

13. CONCLUSION

13.1. Services

This report has found that suitable services exist around the parameter of the site and preliminary investigations indicate that they can be used to service the development. In particular, the stormwater drainage and sewer reticulation will have suitable fall to meet the relevant standards and guidelines for the respective service.

13.2. Roading

The existing road network appears suitable to be able to absorb the additional increase in traffic.

13.3. Overland Flow Drainage / Floodway

To ensure no additional impact on the upstream property north of Bogan Gate Road (Lot 38 DP859871) it is recommended that an additional 4x 1200x600 RCBC's to the current 6 culverts. This will protect Bogan Gate Road from further inundation and reduce the detained volume within Lot 38 DP859871.

The open drain through the development will typically be 26m wide with depths ranging from 1.1m deep with to 1.5m deep dependent on location. 1:4 side batters will ensure ease of maintenance. This drain is to be grassed only with no significant planting. Isolated tree planting would be suitable.

At the Attlee Street end the flow is deeper to allow for some detention caused by the restrictive flow through the existing 2x 1800x600 RCBC's.

It is not intended to increase the number of culverts at Atlee Street at this stage as it would increase the flow to the existing properties south of Attlee Street. Currently the design ensures no worsening of the downstream system due to the increased drain size and capacity to store detained runoff flow.

It is however recommended that this is reviewed upon development of any southern lots to alleviate pressure on the existing culverts and better flood protect Attlee Street.

14. REFERENCES

1. Australian Rainfall & Runoff (AR&R) 2019.
    - Regional Flood Frequency Estimation Modelling
    - AR&R Data Hub
    - FFA-Reconciled Losses Map
    - WMA Water Review of AR&R Design Inputs for NSW - Appendix C
2. Bureau of Meteorology.
    - Design Rainfall Data System
3. NSW Water Management (General) Regulation 2018 Hydroline Spatial Data 1.0
4. Rickard Hails Moretti Pty Ltd (RHM)
    - Catchment Study & Flood Investigation – Cypress Lane to Lake Forbes, Forbes
        - October 2005
        - Ref: 05-1024/071005 Report
5. K&H Geotechnical Services Pty Ltd – Ref:W23/07706
6. Premise reports:
    - Environmental Management Plan – Dated 13/09/23 Ref: P000462_EMP_001 Rev. 001A.
    - Site Microbial Investigation, Anthrax – Dated 20/12/21 Ref: 221306_REP_001B

APPENDIX A
Rainfall Data

Rainfall Depths - Forbes

		Exceedances per Year (EY)				
		Annual Exceedance Probability (AEP)				
Duration	Duration (min)	20%	5%	2%	1%	1 in 1000
1 min	1	2.63	3.71	4.45	5.04	6.99
2 min	2	4.56	6.47	7.77	8.8	12.2
3 min	3	6.23	8.82	10.6	12	16.6
4 min	4	7.68	10.8	13	14.7	20.4
5 min	5	8.96	12.6	15.1	17.1	23.7
10 min	10	13.6	19.2	23	26.1	36.1
15 min	15	16.8	23.6	28.4	32.2	44.6
20 min	20	19.1	27	32.4	36.8	51
25 min	25	21	29.7	35.7	40.5	56.1
30 min	30	22.6	31.9	38.4	43.5	60.3
45 min	45	26.2	37	44.6	50.5	69.9
1 hour	60	28.9	40.8	49	55.6	76.9
1.5 hour	90	32.8	46.3	55.5	62.8	86.9
2 hour	120	35.8	50.3	60.2	68.1	94.2
3 hour	180	40.3	56.4	67.2	75.8	105
4.5 hour	270	45.3	62.9	74.8	84	117
6 hour	360	49.2	68	80.6	90.4	125
9 hour	540	55.2	75.7	89.5	100	139
12 hour	720	59.8	81.7	96.4	108	150
18 hour	1080	66.8	90.8	107	120	166
24 hour	1440	71.9	97.7	115	129	178
30 hour	1800	76	103	122	136	187
36 hour	2160	79.2	108	127	142	195
48 hour	2880	84.3	115	136	152	208
72 hour	4320	91	125	148	166	227
96 hour	5760	95.1	131	155	174	239
120 hour	7200	98	135	159	178	246
144 hour	8640	100	137	162	181	249
168 hour	10080	102	139	163	182	250

Results - ARR Data Hub

Input Data Information

Latitude,-33.387000

Longitude,148.008000

River Region

Division,Murray-Darling Basin

River Number,13

River Name,Lachlan River

Time Accessed,31 July 2023 11:24AM

Version,2016_v1

Storm Losses

ID,13019.0

Storm Initial Losses (mm),30.0

Storm Continuing Losses (mm/h),1.3

Time Accessed,31 July 2023 11:24AM

Version,2016_v1

Transformational Pre-burst Rainfall

min (h)\AEP(%),50.0,20.0,10.0,5.0,2.0,1.0

60 (1.0),9.2,17.4,17.1,15.6,16.3,18.3

90 (1.5),9.4,17.2,17.0,15.2,16.0,18.0

120 (2.0),8.9,16.1,16.4,15.5,16.0,18.6

180 (3.0),8.0,15.1,16.5,16.5,18.4,21.5

360 (6.0),7.1,13.4,15.7,15.9,19.4,24.1

720 (12.0),5.4,11.9,13.6,13.9,18.0,23.9

1080 (18.0),3.5,9.1,10.6,10.8,14.4,19.7

1440 (24.0),2.0,7.5,8.5,8.5,11.2,17.2

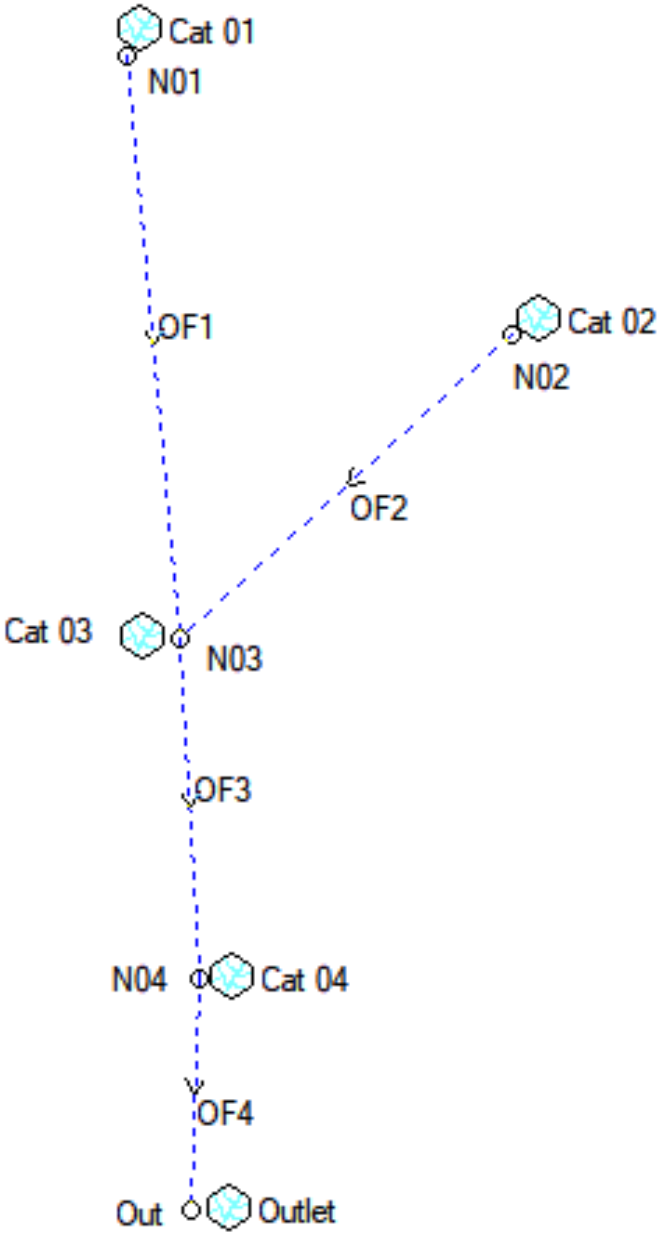
2160 (36.0),0.6,5.3,5.3,4.7,7.8,14.6

2880 (48.0),0.0,4.5,4.6,4.3,6.4,13.5

4320 (72.0),0.0,3.9,2.7,2.0,4.3,9.0

APPENDIX B
Watercom Drains Data

Network Schematic



20% AEP Results

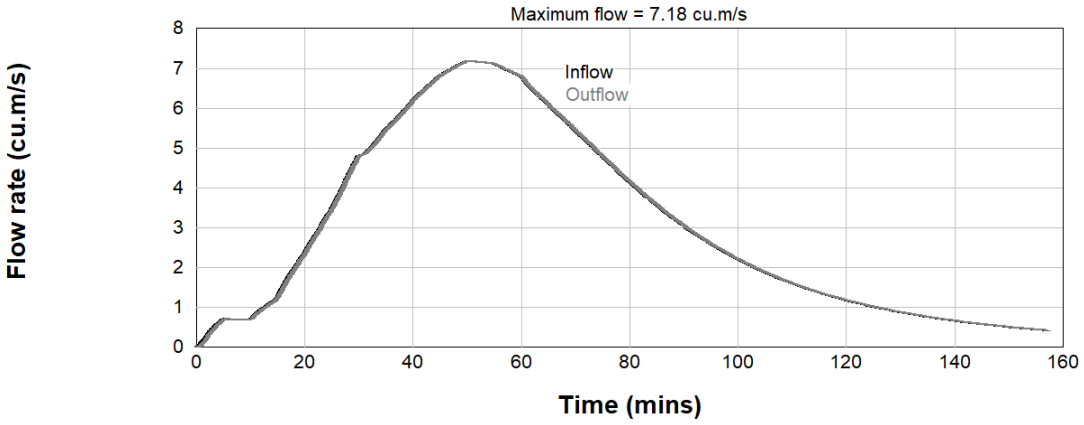
SUB-CATCHMENT DETAILS

Name	Max Flow (cu.m/s)	Due to Storm
Cat 01	10.168	20% AEP, 10 min burst, Storm 6
Cat 02	5.805	20% AEP, 10 min burst, Storm 6
Cat 03	1.859	20% AEP, 5 min burst, Storm 1
Cat 04	3.68	20% AEP, 10 min burst, Storm 6
Outlet	0.001	20% AEP, 2 hour burst, Storm 8

WBNM STREAM DETAILS

Name	Max Q U/S	Due to Storm
OF1	10.168	20% AEP, 10 min burst, Storm 6
OF2	5.805	20% AEP, 10 min burst, Storm 6
OF3	9.702	20% AEP, 30 min burst, Storm 1
OF4	7.178	20% AEP, 1 hour burst, Storm 9

20% AEP Hydrograph & Downstream Leg – Bogan Gate Road to Attlee Street



5% AEP Results

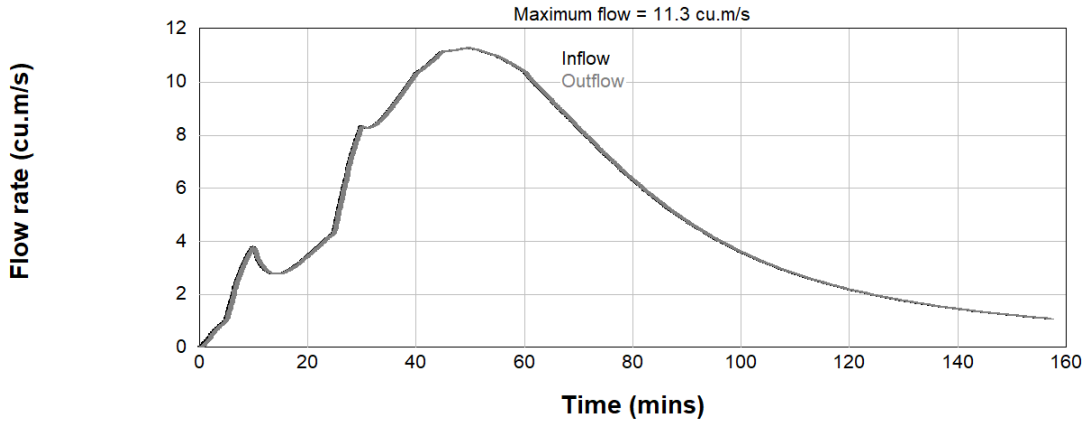
SUB-CATCHMENT DETAILS

Name	Max Flow (cu.m/s)	Due to Storm
Cat 01	14.862	5% AEP, 10 min burst, Storm 4
Cat 02	8.396	5% AEP, 10 min burst, Storm 4
Cat 03	2.699	5% AEP, 5 min burst, Storm 1
Cat 04	5.24	5% AEP, 5 min burst, Storm 1
Outlet	0.002	5% AEP, 2 hour burst, Storm 1

WBNM STREAM DETAILS

Name	Max Q U/S	Due to Storm
OF1	14.862	5% AEP, 10 min burst, Storm 4
OF2	8.396	5% AEP, 10 min burst, Storm 4
OF3	14.229	5% AEP, 30 min burst, Storm 7
OF4	11.277	5% AEP, 1 hour burst, Storm 6

5% AEP Hydrograph & Downstream Leg – Bogan Gate Road to Attlee Street



2% AEP Results

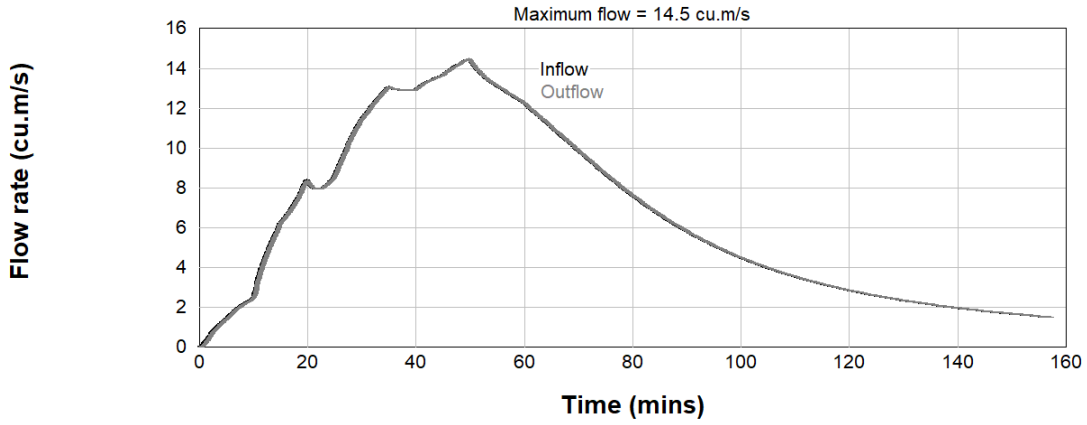
SUB-CATCHMENT DETAILS

Name	Max Flow (cu.m/s)	Due to Storm
Cat 01	17.303	2% AEP, 10 min burst, Storm 2
Cat 02	9.655	2% AEP, 5 min burst, Storm 1
Cat 03	3.284	2% AEP, 5 min burst, Storm 1
Cat 04	6.421	2% AEP, 5 min burst, Storm 1
Outlet	0.002	2% AEP, 30 min burst, Storm 4

WBNM STREAM DETAILS

Name	Max Q U/S	Due to Storm
OF1	17.303	2% AEP, 10 min burst, Storm 2
OF2	9.655	2% AEP, 5 min burst, Storm 1
OF3	17.145	2% AEP, 30 min burst, Storm 6
OF4	14.485	2% AEP, 1 hour burst, Storm 4

2% AEP Hydrograph & Downstream Leg – Bogan Gate Road to Attlee Street



1% AEP Results

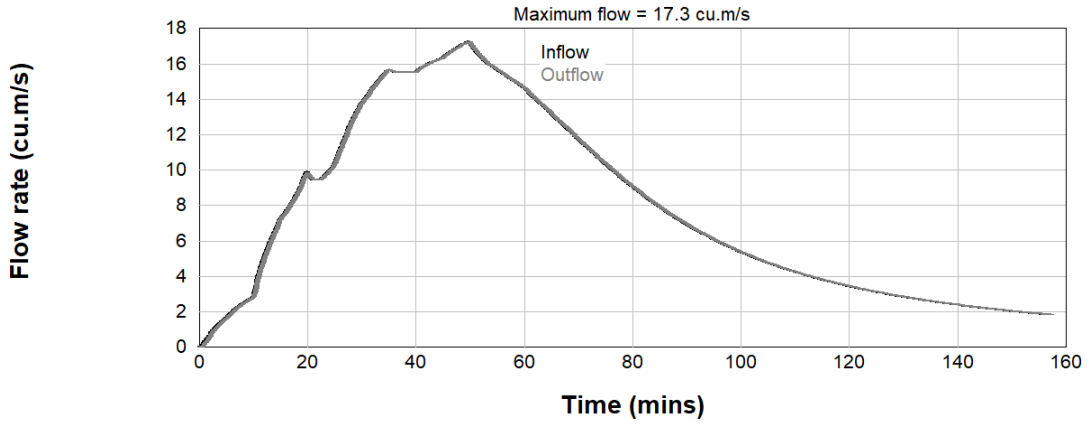
SUB-CATCHMENT DETAILS

Name	Max Flow (cu.m/s)	Due to Storm
Cat 01	19.837	1% AEP, 10 min burst, Storm 2
Cat 02	11.128	1% AEP, 5 min burst, Storm 1
Cat 03	3.756	1% AEP, 5 min burst, Storm 1
Cat 04	7.378	1% AEP, 5 min burst, Storm 1
Outlet	0.003	1% AEP, 30 min burst, Storm 6

WBNM STREAM DETAILS

Name	Max Q U/S	Due to Storm
OF1	19.837	1% AEP, 10 min burst, Storm 2
OF2	11.128	1% AEP, 5 min burst, Storm 1
OF3	19.849	1% AEP, 25 min burst, Storm 1
OF4	17.289	1% AEP, 1 hour burst, Storm 4

1% AEP Hydrograph & Downstream Leg – Bogan Gate Road to Attlee Street



PMF Results

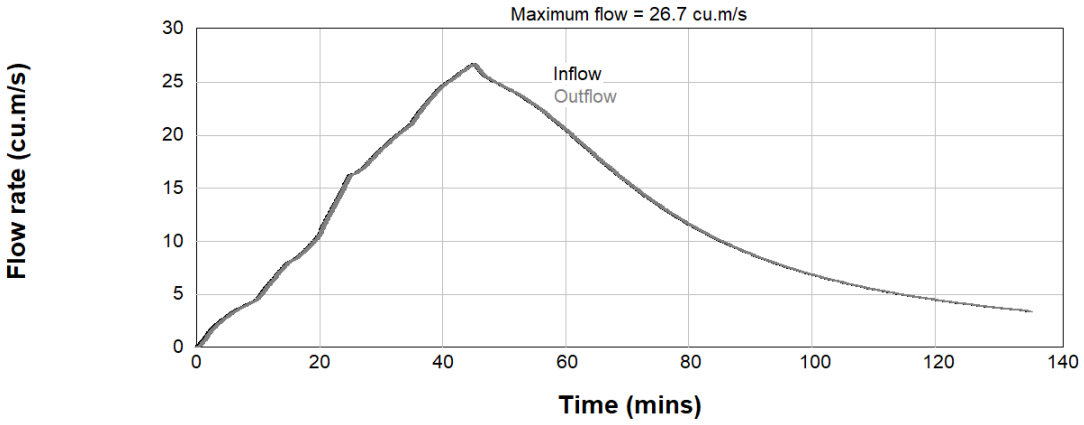
SUB-CATCHMENT DETAILS

Name	Max Flow (cu.m/s)	Due to Storm
Cat 01	28.531	1 in 1000 AEP, 10 min burst, Storm 2
Cat 02	16.115	1 in 1000 AEP, 5 min burst, Storm 1
Cat 03	5.332	1 in 1000 AEP, 5 min burst, Storm 1
Cat 04	10.601	1 in 1000 AEP, 5 min burst, Storm 1
Outlet	0.005	1 in 1000 AEP, 20 min burst, Storm 2

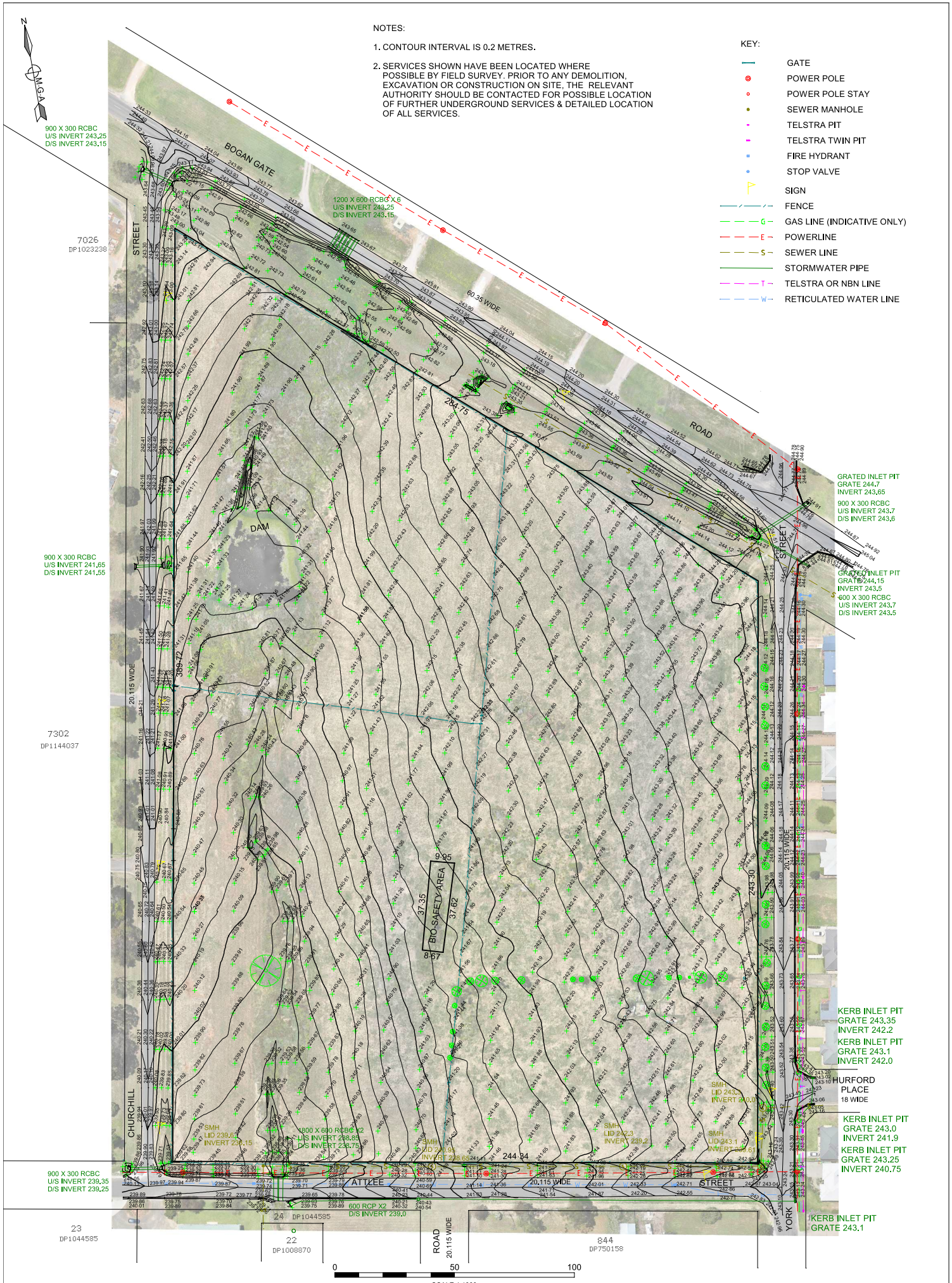
WBNM STREAM DETAILS

Name	Max Q U/S	Due to Storm
OF1	28.531	1 in 1000 AEP, 10 min burst, Storm 2
OF2	16.115	1 in 1000 AEP, 5 min burst, Storm 1
OF3	30.576	1 in 1000 AEP, 30 min burst, Storm 6
OF4	26.721	1 in 1000 AEP, 45 min burst, Storm 7

1% AEP Hydrograph & Downstream Leg – Bogan Gate Road to Attlee Street



APPENDIX C
Existing Topographical Survey



ARNDELL SURVEYING
Registered Surveyors
48 Reid St. Parkes, NSW
Ph: (02) 6862 2208
Email: amdellsurvey@bigpond.com

Rev	Date	Description	Approved

REFERENCE: 11811	REDUCTION RATIO: 1:1000 @A2
DATE: 20/12/2022	HEIGHT DATUM: AHD
DRAWN BY: BI	DATUM SOURCE: GDA2020
CHECKED BY: AA	PROJECTION: MGA ZONE 55

PLAN SHOWING DETAIL AND LEVELS LOTS 1046 - 1055 & 796 DP750158

Bogan Gate Road, Forbes 2871

FIGURES

Drawing Schedule As Per Cover Sheet

LOOK UP AND LIVE

OVERHEAD POWER LINES IN VICINITY OF WORKS.

ENSURE ALL POWER LINES ARE CLEARLY MARKED WITH ORANGE WEATHERPROOF TAPE OR RIBBON

ALL WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE NSW WORK COVER 'WORK NEAR OVERHEAD POWER LINES CODE OF PRACTICE 2006'

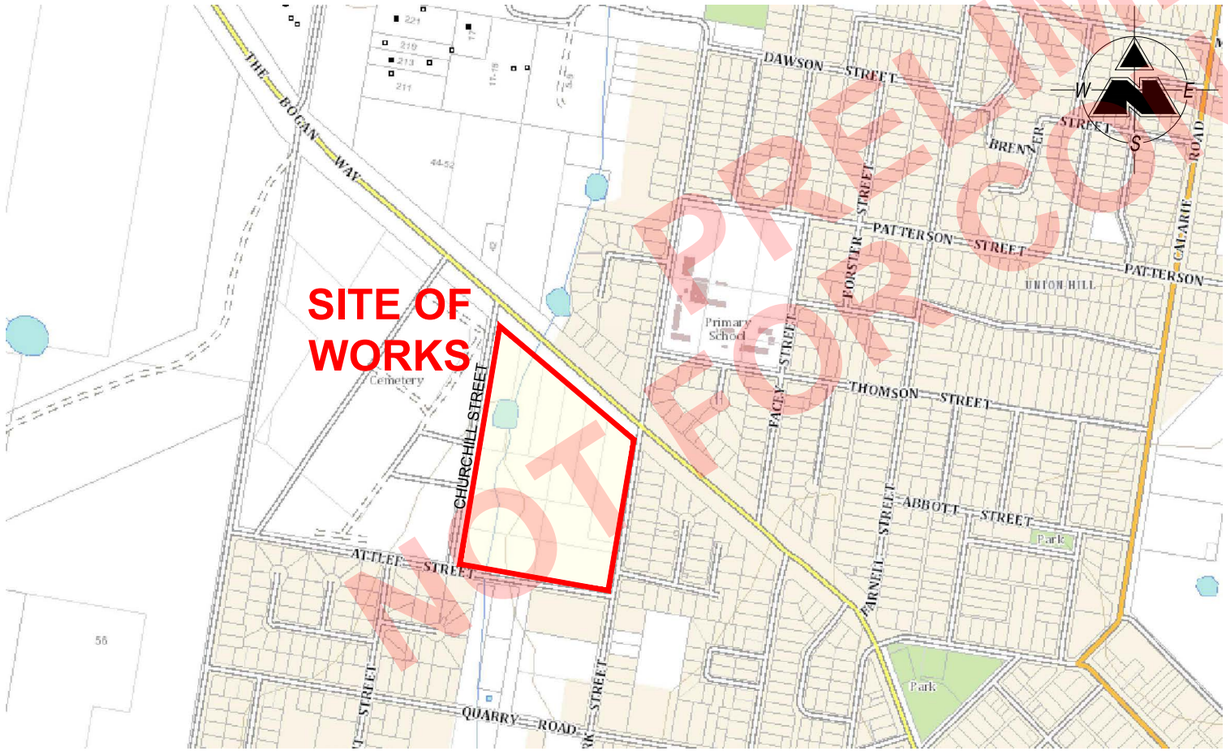
http://www.workcover.nsw.gov.au/health-and-safety/industry-safety/electrical-and-power/power-lines/publications/work-near-overhead-power-lines-code-of-practice-2006

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

FOR
M G O'KEEFFE CONSTRUCTIONS

THERE MAY BE EXISTING SERVICES WITHIN THE WORKS AREA THAT ARE NOT SHOWN ON THESE PLANS. THE CONTRACTOR IS TO LOCATE ALL SERVICES PRIOR TO THE COMMENCEMENT OF WORKS.

DIAL BEFORE YOU DIG www.1100.com.au



LOCALITY PLAN
N.T.S.

DRAWING INDEX	
Dwg No.	Title
G01	COVER SHEET
G02	LEGEND
G03	GENERAL ARRANGEMENT PLAN
R01	ROAD LAYOUT INDEX PLAN
R02	ROAD 01 PLAN & LONGSECTION
R03 - R04	ROAD 01 CROSS SECTIONS
R05	ROAD 02 PLAN & LONGSECTION
R06 - R07	ROAD 02 CROSS SECTIONS
R08	CHURCHILL STREET PLAN & LONGSECTION
R09 - R11	CHURCHILL STREET CROSS SECTIONS
R12	YORK STREET PLAN & LONGSECTION
R13 - R14	YORK STREET CROSS SECTIONS
R15	ATTLEE STREET PLAN & LONGSECTION
R16 - R17	ATTLEE STREET CROSS SECTIONS
SW01	STORMWATER LAYOUT PLAN
SW02 - SW03	STORMWATER LONGSECTIONS
SW04	STORMWATER CATCHMENT PLAN
SW05 - SW06	FLOOD LEVELS & EXTENTS
SW07	DRAINAGE CHANNEL PLAN & LONGSECTION
SW08 - SW14	DRAINAGE CHANNEL CROSS SECTIONS
SS01	SEWER LAYOUT PLAN
SS02 - SS07	SEWER LONGSECTIONS
W01	WATER LAYOUT PLAN

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:35

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	AS SHOWN
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

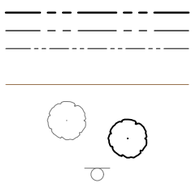
COVER SHEET

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. G01
Issue A
No. in set 42

Legend - Existing



Principal Boundary
Abutting Boundary
Easement Boundary

Contour

Tree
Tree - To Be Protected

Road Sign

Stormwater Line
Stormwater Swale / Table Drain
Stormwater Pit
Stormwater Field Inlet
Stormwater Manhole
Stormwater Headwall

Sewer Line
Sewer Maintenance Hole

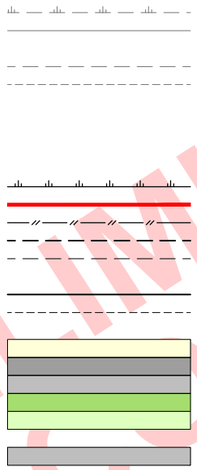
Water Line
Valve
Hydrant

Telecommunication Line
Fibre Optic Line
Telecommunication Pit
Telecommunication Plinth

Electricity Line Overhead
Electricity Line Underground
Electricity Pole
Street Light

Gas Line
Gas Valve

Legend - Existing



Bank / Batter
Retaining Wall

Edge Of Seal / Bitumen
Edge Of Gravel

Legend - Proposed

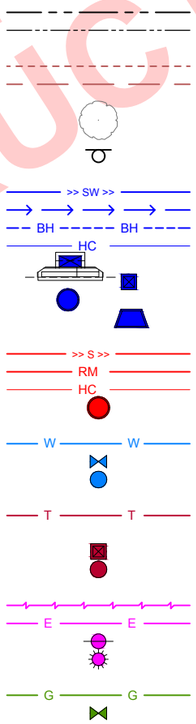
Bank / Batter
Retaining Wall
Fence
Edge Of Seal / Bitumen
Edge Of Gravel

Building
Building Over

Proposed Allotment
Proposed Seal / Bitumen
Proposed Concrete
Proposed Landscaping
Proposed Drainage

Existing Seal / Bitumen

Legend - Proposed



Boundary
Easement Boundary

Contour
Limit Of Works

Tree

Road Sign

Stormwater Line
Stormwater Swale / Table Drain
Building Hydraulics (Indic. Only)
Stormwater House Connection
Stormwater Pit
Stormwater Field Inlet
Stormwater Manhole
Stormwater Headwall

Sewer Line
Sewer Rising Main
Sewer House Connection
Sewer Maintenance Hole

Water Line
Valve
Hydrant

Telecommunication Line
Fibre Optic Line
Telecommunication Pit
Telecommunication Plinth

Electricity Line Overhead
Electricity Line Underground
Electricity Pole
Street Light

Gas Line
Gas Valve

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:35

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	AS SHOWN
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

COVER SHEET

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. G02
Issue A
No. in set 42

Lot 23
DP 1044585

Existing drainage channel to be re-shaped to convey flow in 1% AEP event. Refer to SW07-SW14 for details

Lot 7302
DP 1144037

Half-width of Churchill Street to be reconstructed as part of subdivision development works. Stormwater drainage design to be confirmed at DA Stage

Stormwater to discharge into drainage channel via appropriate headwall

Existing culvert

Existing dam to be filled

Lot 7026
DP 1023238

Existing culvert

Existing culvert

CHURCHILL STREET

Proposed connection into existing watermain

Proposed sewer to discharge into existing manhole

Existing culverts

Lot 22
DP 1008870

Proposed sewer network to connect into existing main via new manhole

Proposed connection into existing watermain

Lot 24
DP 1044585

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

ROAD

Half-width of Attlee Street to be reconstructed as part of subdivision development works

Proposed connection into existing watermain

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

Proposed sewer network to connect into existing main via new manhole

Proposed connection into existing watermain

Lot 844
DP 750158

ATTLEE STREET

Lots 17 Lot 16 Lot 15 Lot 14 Lot 13 Lot 12 Lot 11 Lot 10 Lot 09 Lot 08 Lot 07 Lot 06 Lot 05 Lot 04 Lot 03 Lot 02 Lot 01

Proposed Drainage Channel

6.4m 34.8m 26.0m

ROAD 1

9.3m

4.3m

Lot 18 Lot 19 Lot 20 Lot 21 Lot 22 Lot 23 Lot 24 Lot 25

Bio-Safety Zone

Lot 34 Lot 33 Lot 32 Lot 31 Lot 30 Lot 29 Lot 28 Lot 26 Lot 27

ROAD 2

Lot 53 Lot 55 Lot 54 Lot 52 Lot 51 Lot 50

Lot 35 Lot 36 Lot 37 Lot 38 Lot 39 Lot 40 Lot 41 Lot 42 Lot 43 Lot 44 Lot 45 Lot 46 Lot 47 Lot 48 Lot 49

Lot 69 Lot 68 Lot 67 Lot 66 Lot 65 Lot 64 Lot 63 Lot 62 Lot 61 Lot 60 Lot 59 Lot 58 Lot 57 Lot 56

YORK STREET

HURFORD PLACE

BOGAN GATE ROAD

Lots 1265
DP 750158

Existing culverts

Lots 35-38
DP 859871

Lots 6-8
DP 248297

Lots 35-36
DP 1087508

Proposed stormwater line to discharge into existing pit

Proposed connection into existing watermain

Lots 37-45
DP 1087508

Half-width of York Street to be reconstructed as part of subdivision development works

Proposed connection into existing watermain

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:37

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

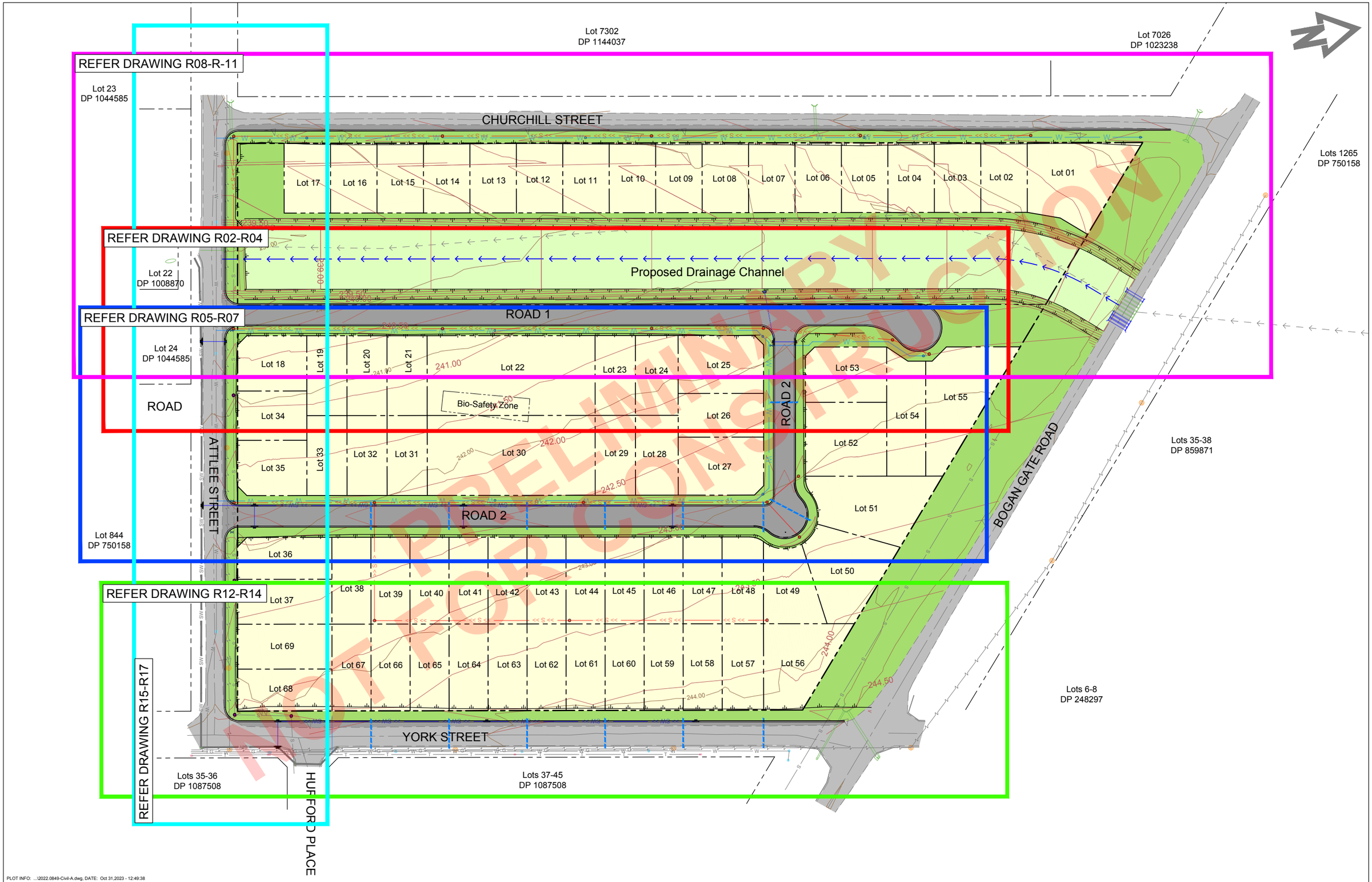
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

GENERAL ARRANGEMENT PLAN

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. G03
Issue A
No. in set 42



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Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

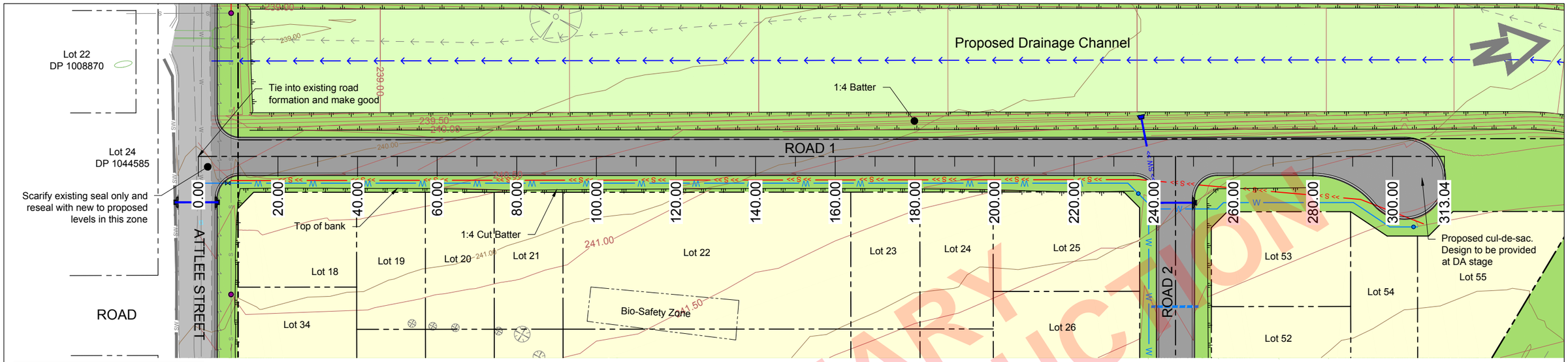
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD LAYOUT INDEX PLAN

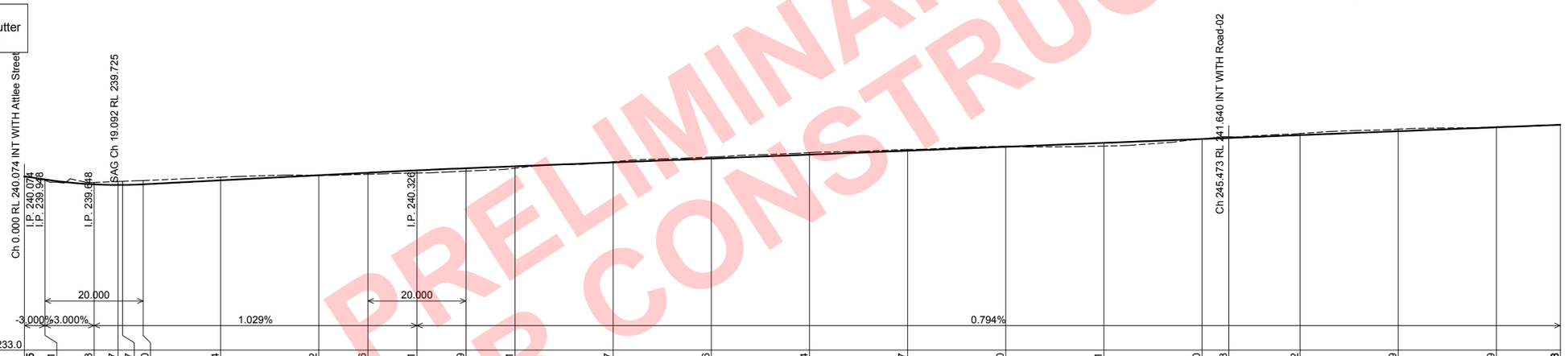
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R01
Issue A
No. in set 42



Note:
All kerbs are to be rollover kerb and gutter to Forbes Shire Council Specifications



Existing Surface	**240.05**	239.91	239.83	239.87	239.87	239.90	240.04	240.12	240.16	240.21	240.29	240.41	240.67	240.86	241.04	241.17	241.30	241.31	241.60	241.68	241.82	241.99	242.09	**242.18**
Design Surface	240.07	239.95	239.75	239.73	239.73	239.75	239.91	240.12	240.22	240.32	240.41	240.48	240.64	240.80	240.96	241.12	241.28	241.44	241.60	241.64	241.76	241.91	242.07	242.18
Cut (-) Fill (+)	+0.02	-0.02	-0.25	-0.30	-0.30	-0.30	-0.23	-0.12	-0.07	-0.03	+0.01	+0.03	-0.03	-0.06	-0.08	-0.05	-0.02	+0.13	+0.00	-0.04	-0.06	-0.08	-0.02	+0.00
Design Left Edge of Seal																								
Design Right Edge of Seal																								
Chainage	0.00	4.20	14.20	19.09	20.00	24.20	40.00	60.00	70.00	80.00	90.00	100.00	120.00	140.00	160.00	180.00	200.00	220.00	240.00	245.47	260.00	280.00	300.00	313.04
Horizontal Geometry	L=313.04 B=10°16'45"																							

LONGITUDINAL SECTION
SCALE 1:500 H 1:100 V

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:49:44

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

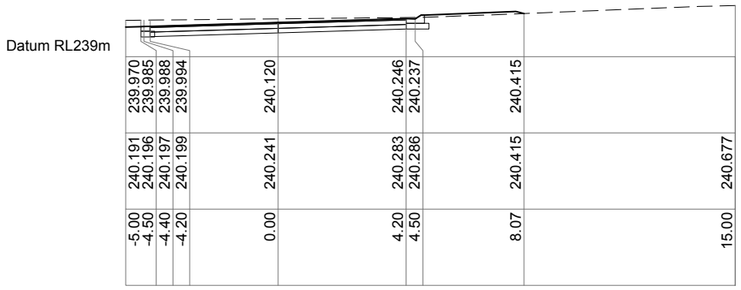
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD 01 PLAN & LONGSECTION

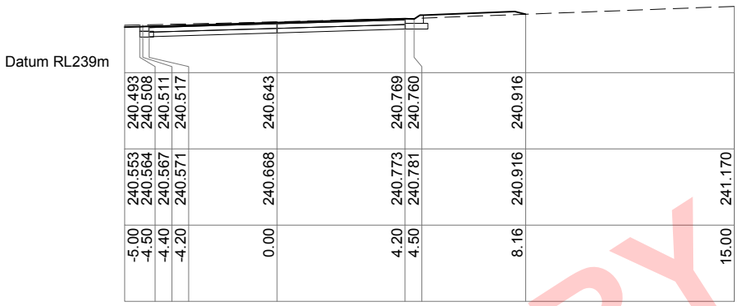
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

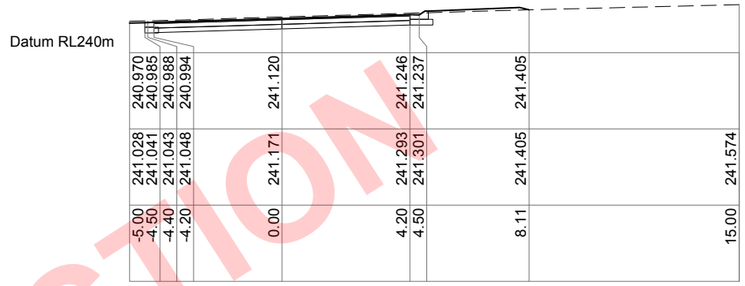
Job No. 2022.0849
DWG. No. R02
Issue A
No. in set 42



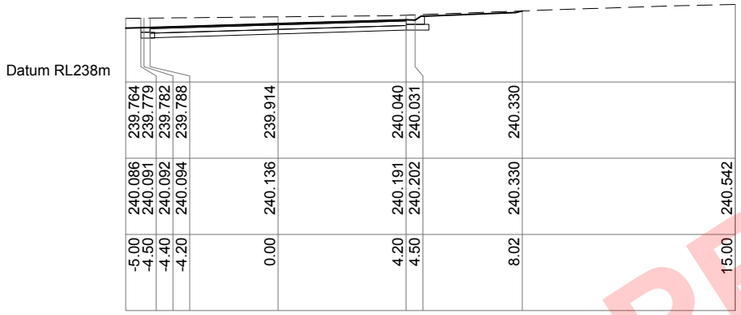
Ch 60.00 m



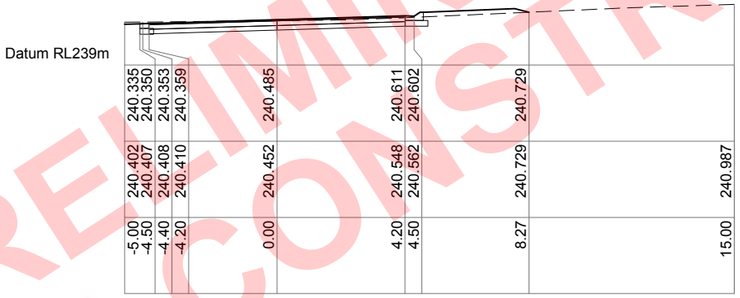
Ch 120.00 m



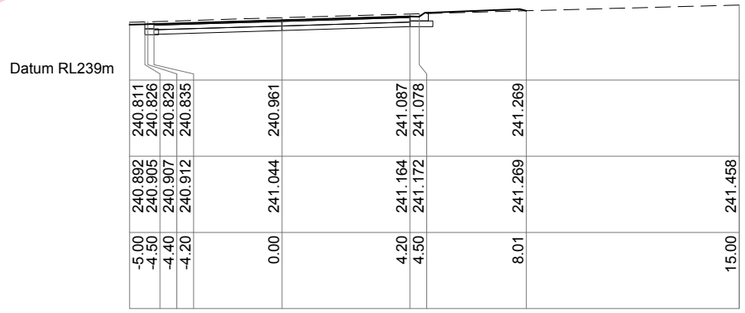
Ch 180.00 m



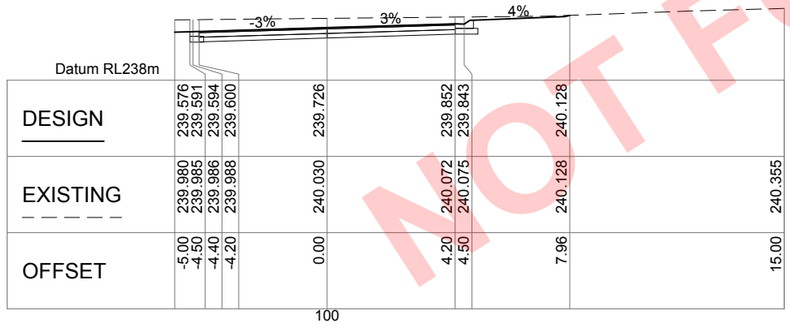
Ch 40.00 m



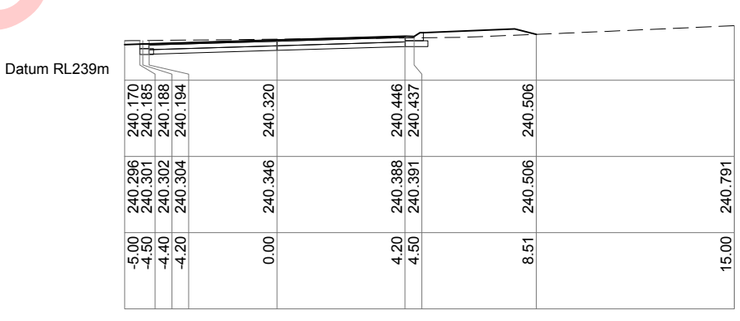
Ch 100.00 m



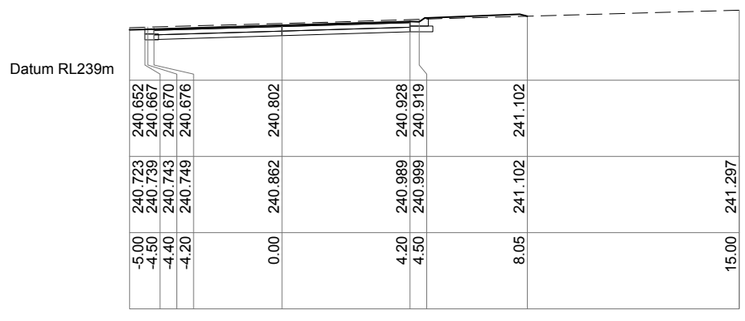
Ch 160.00 m



Ch 20.00 m



Ch 80.00 m



Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:45

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

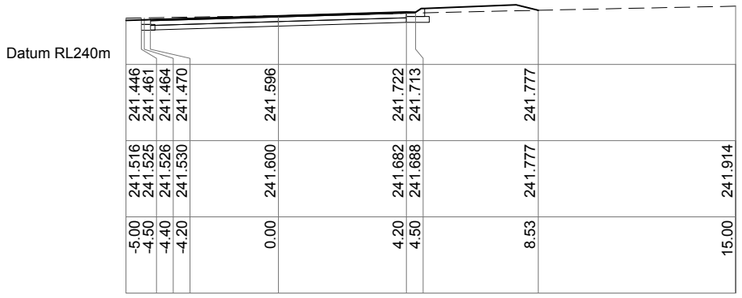
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD 01 CROSS SECTIONS

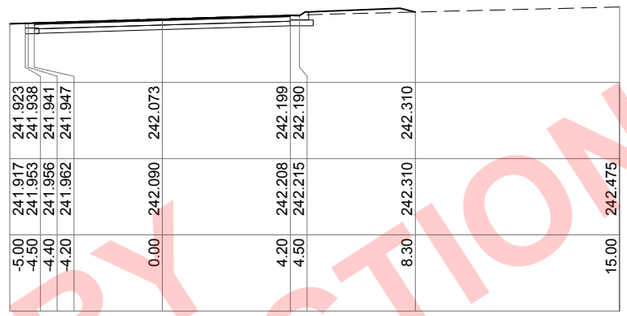
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

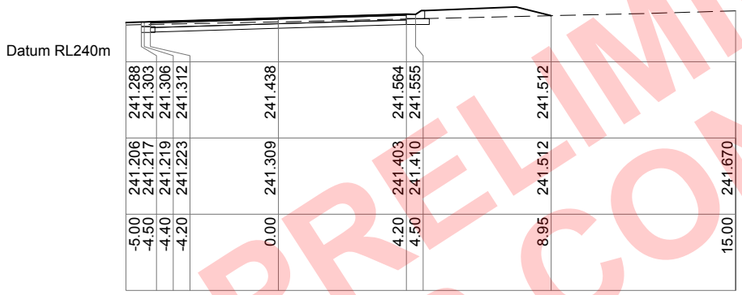
Job No. 2022.0849
DWG. No. R03
Issue A
No. in set 42



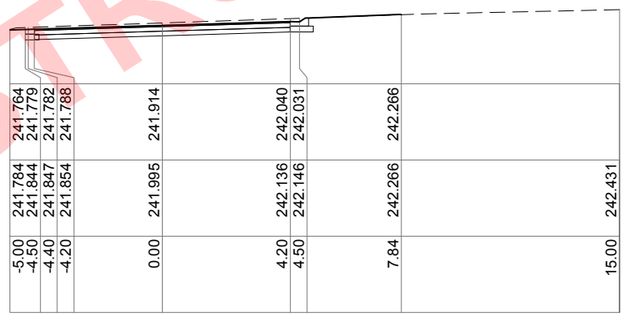
Ch 240.00 m



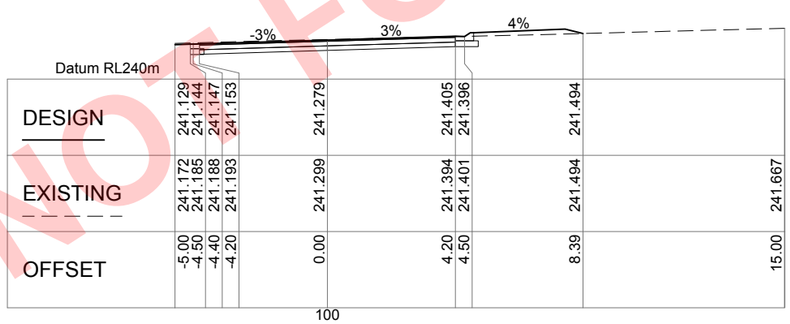
Ch 300.00 m



Ch 220.00 m



Ch 280.00 m



Ch 200.00 m

Ch 260.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:46

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

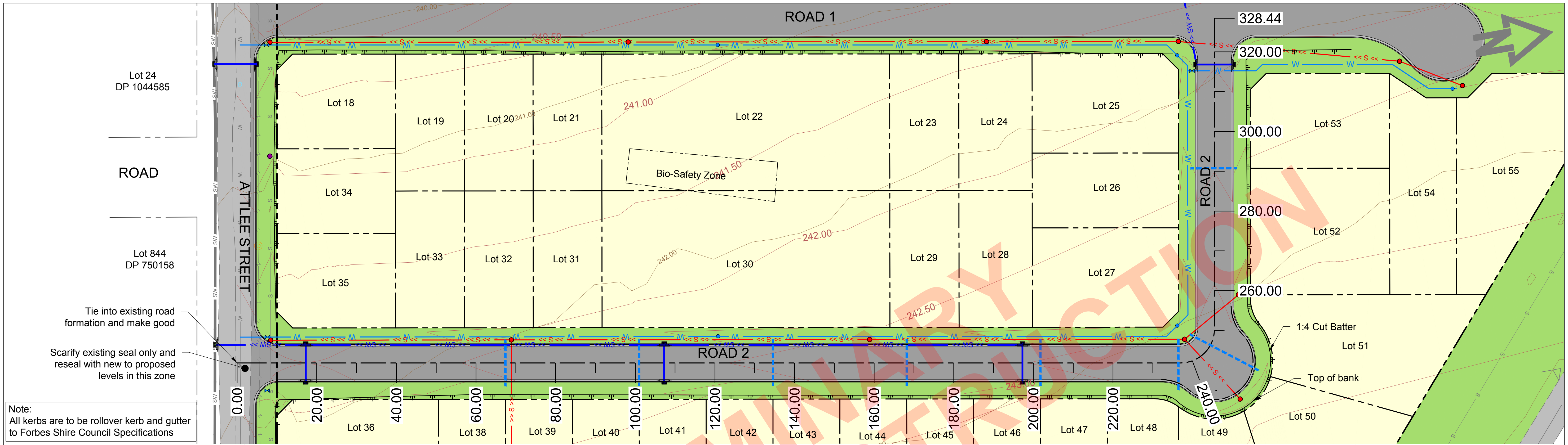
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

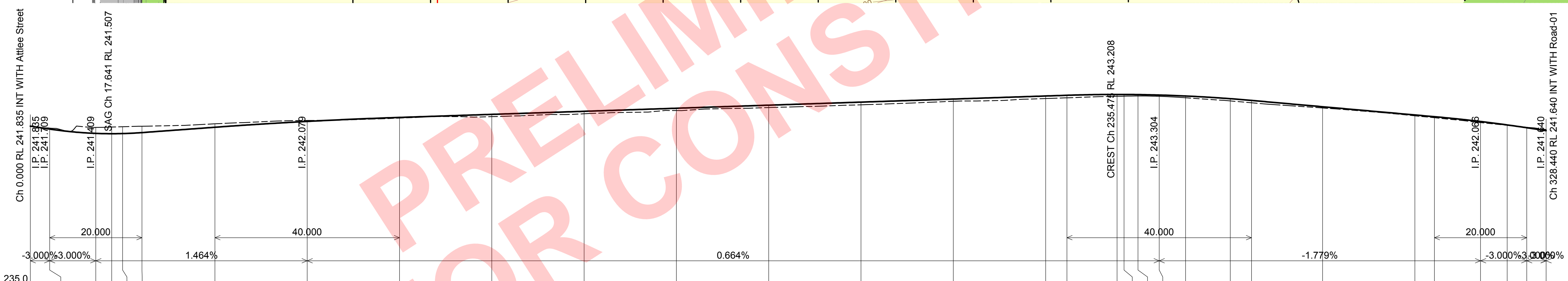
ROAD 01 CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R04
Issue A
No. in set 42





Chainage	0.00	4.20	14.20	17.64	20.00	24.20	40.00	60.00	80.00	100.00	120.00
Existing Surface	241.82	241.75	241.78	241.80	241.81	241.83	241.93	242.08	242.18	242.25	242.37
Design Surface	241.83	241.71	241.52	241.51	241.51	241.56	241.79	242.04	242.21	242.34	242.48
Cut (-) Fill (+)	+0.01	-0.04	-0.26	-0.29	-0.30	-0.27	-0.14	-0.04	+0.03	+0.09	+0.11
Design Left Edge of Seal											
Design Right Edge of Seal											

Chainage	140.00	160.00	180.00	200.00	220.00	224.61	235.48	236.97	240.00	244.61
Existing Surface	242.51	242.64	242.76	242.91	243.03	243.06	243.13	243.13	243.14	243.13
Design Surface	242.61	242.74	242.88	243.01	243.14	243.17	243.21	243.21	243.20	243.18
Cut (-) Fill (+)	+0.10	+0.10	+0.12	+0.10	+0.11	+0.11	+0.08	+0.08	+0.06	+0.05
Design Left Edge of Seal										
Design Right Edge of Seal										

Chainage	250.32	260.00	264.61	280.00	300.00	304.24	314.24	320.00	324.24	328.44
Existing Surface	243.07	242.93	242.85	242.62	242.28	242.20	241.99	241.87	241.78	241.68
Design Surface	243.14	243.02	242.95	242.67	242.32	242.24	242.04	241.89	241.77	241.64
Cut (-) Fill (+)	+0.07	+0.09	+0.10	+0.05	+0.04	+0.04	+0.05	+0.02	-0.01	-0.04
Design Left Edge of Seal										
Design Right Edge of Seal										

Horizontal Geometry: L=236.97 B=10°16'45" | L=13.35 R=8.50 | L=78.11 B=280°16'45"

LONGITUDINAL SECTION
SCALE 1:500 H 1:100 V
ROAD - 02

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:48

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn: JB
Designed: GBL
Checked: TM
Scale (A1): 1:500
Date: 04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

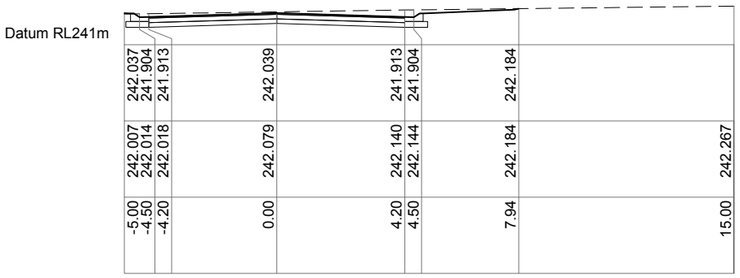
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD 02 PLAN & LONGSECTION

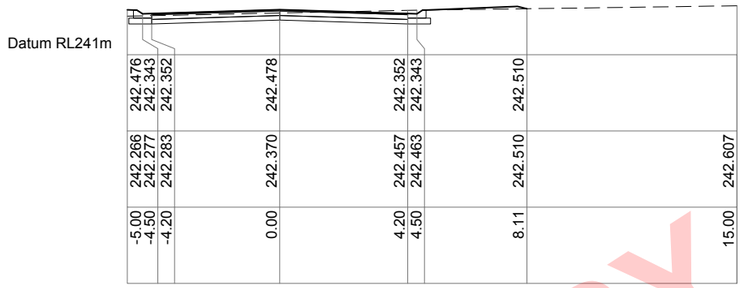
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

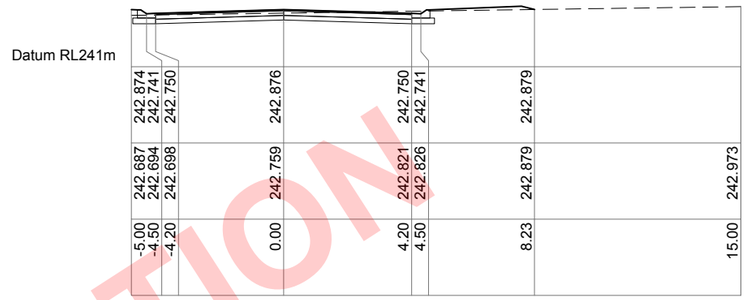
Job No. 2022.0849
DWG. No. R05 Issue A
No. in set 42



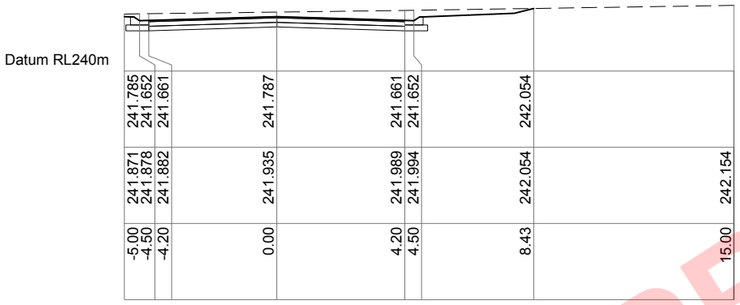
Ch 60.00 m



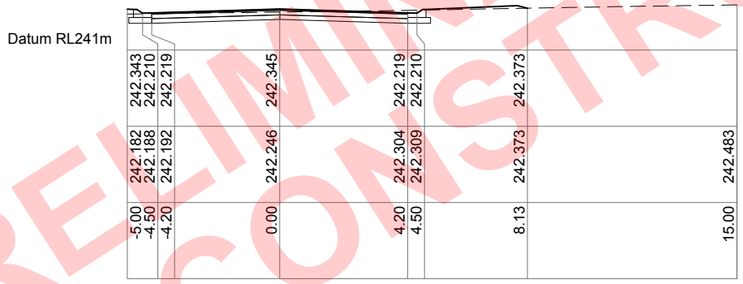
Ch 120.00 m



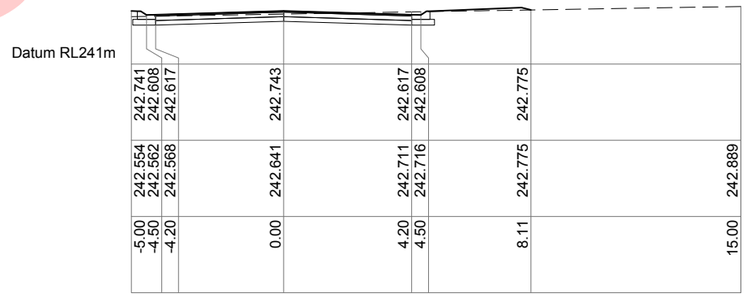
Ch 180.00 m



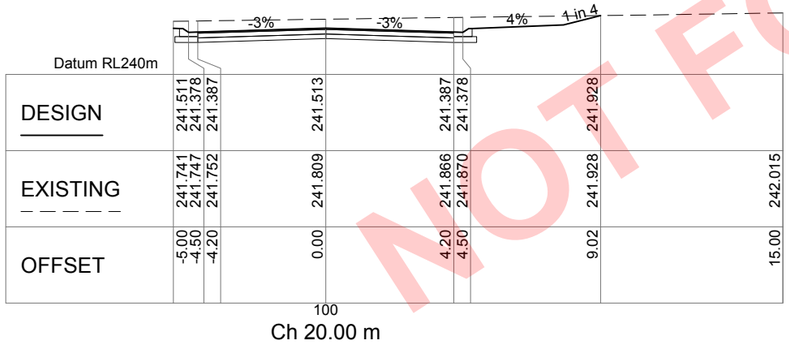
Ch 40.00 m



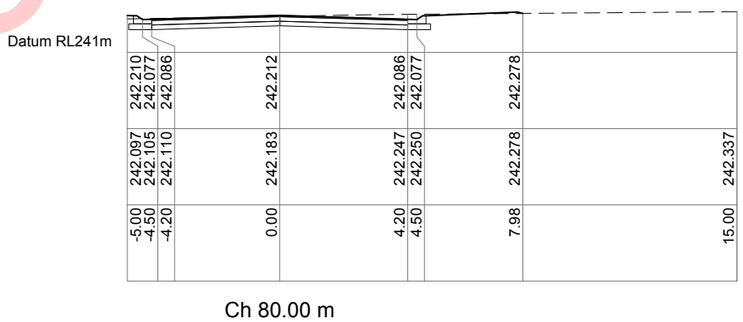
Ch 100.00 m



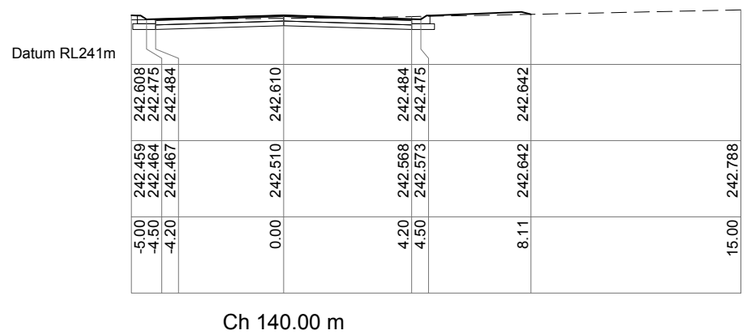
Ch 160.00 m



Ch 20.00 m



Ch 80.00 m



Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:49

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

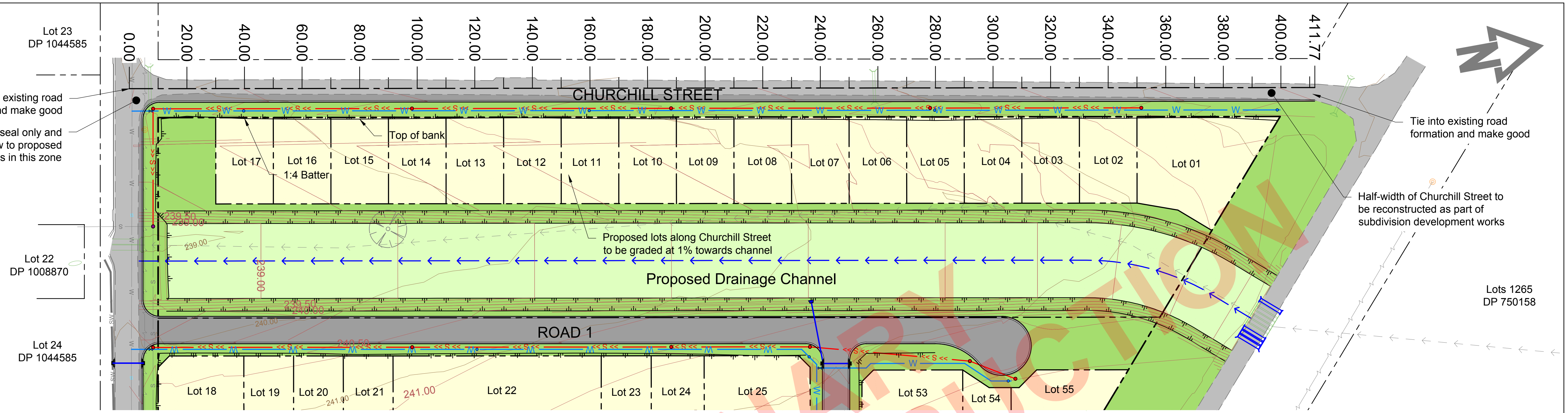
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD 02 CROSS SECTIONS

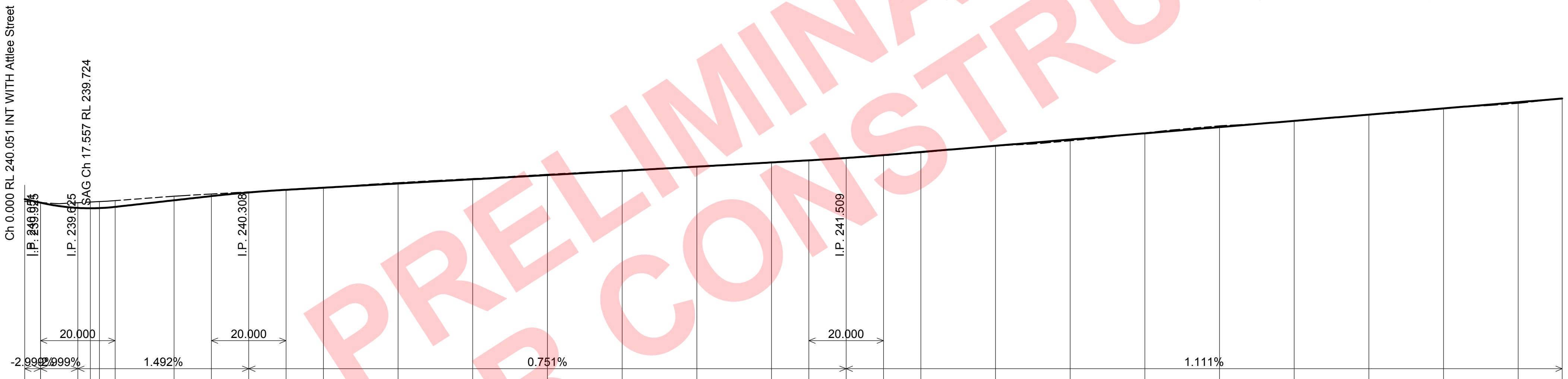
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R06
Issue A
No. in set 42



Notes:
- Stormwater drainage design to be confirmed at DA Stage.
- All kerbs are to be rollover kerb and gutter to Forbes Shire Council Specifications.



Chainage	0.00	4.20	4.20	14.20	17.56	20.00	24.20	40.00	50.00	60.00	70.00
Existing Surface	239.97	239.93	239.93	239.92	239.95	239.96	240.00	240.16	240.23	240.31	240.38
Design Surface	240.05	239.92	239.92	239.74	239.72	239.73	239.77	240.01	240.16	240.29	240.38
Cut (-) Fill (+)	+0.08	-0.01	-0.01	-0.18	-0.23	-0.23	-0.23	-0.15	-0.07	-0.02	+0.00
Design Left Edge of Seal											
Design Right Edge of Seal											

Chainage	80.00	100.00	120.00	140.00	160.00	180.00	200.00	210.00	220.00	230.00
Existing Surface	240.45	240.64	240.78	240.94	241.08	241.20	241.35	241.43	241.51	241.60
Design Surface	240.46	240.61	240.76	240.91	241.06	241.21	241.36	241.43	241.52	241.62
Cut (-) Fill (+)	+0.01	-0.03	-0.02	-0.03	-0.02	+0.01	+0.01	+0.00	+0.01	+0.02
Design Left Edge of Seal										
Design Right Edge of Seal										

Chainage	240.00	260.00	280.00	300.00	320.00	340.00	360.00	380.00	400.00	411.77
Existing Surface	241.71	241.94	242.13	242.41	242.67	242.83	243.05	243.27	243.47	243.64
Design Surface	241.73	241.95	242.18	242.40	242.62	242.84	243.06	243.29	243.51	243.64
Cut (-) Fill (+)	+0.02	+0.01	+0.05	-0.01	-0.05	+0.01	+0.01	+0.02	+0.04	+0.00
Design Left Edge of Seal										
Design Right Edge of Seal										

Horizontal Geometry: L=411.77 B=10°13'25"

LONGITUDINAL SECTION
SCALE 1:750 H 1:100 V

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:51

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

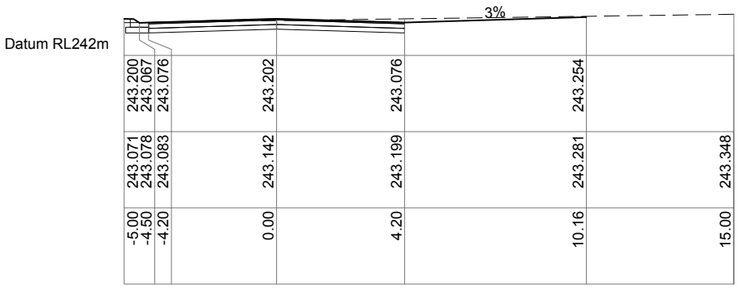
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

CHURCHILL STREET PLAN & LONGSECTION

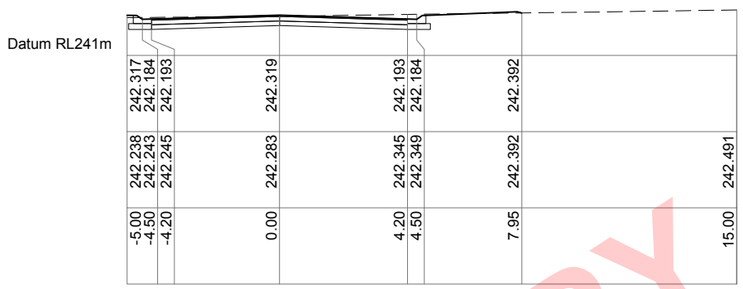
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

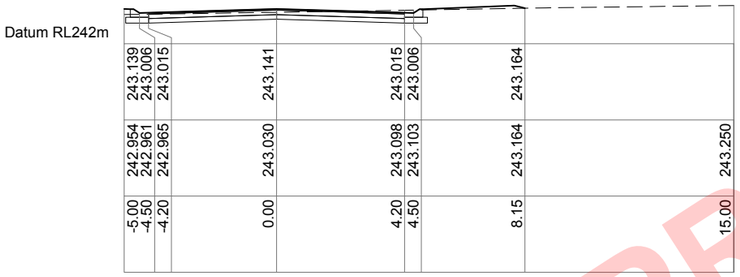
Job No. 2022.0849
DWG. No. R08 Issue A
No. in set 42



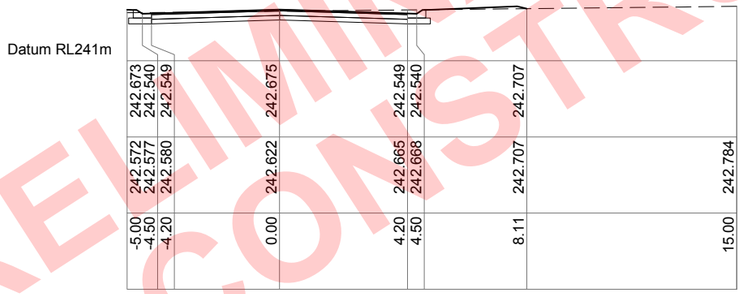
Ch 240.00 m



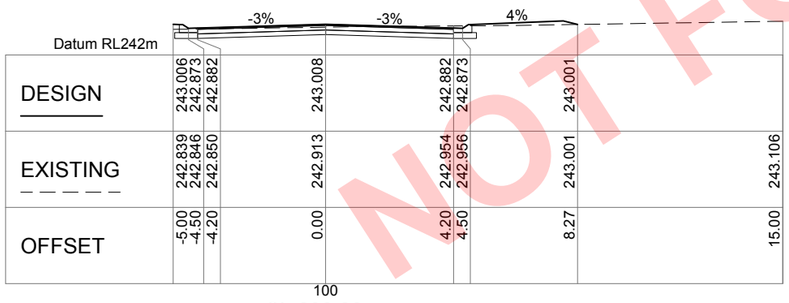
Ch 300.00 m



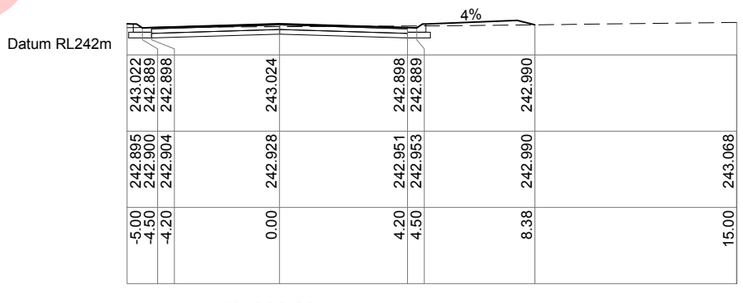
Ch 220.00 m



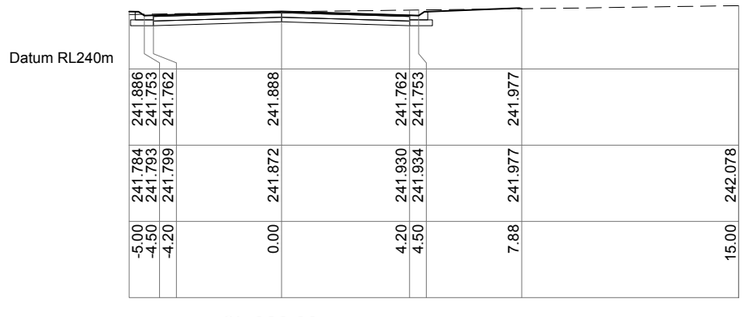
Ch 280.00 m



Ch 200.00 m



Ch 260.00 m



Ch 320.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:52

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

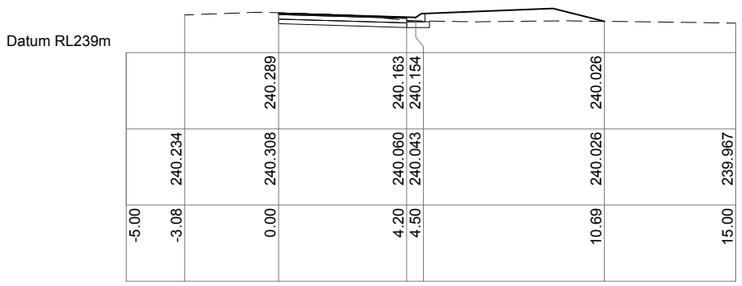
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ROAD 02 CROSS SECTIONS

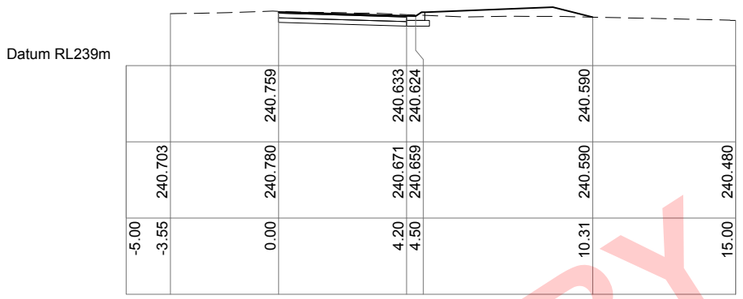
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

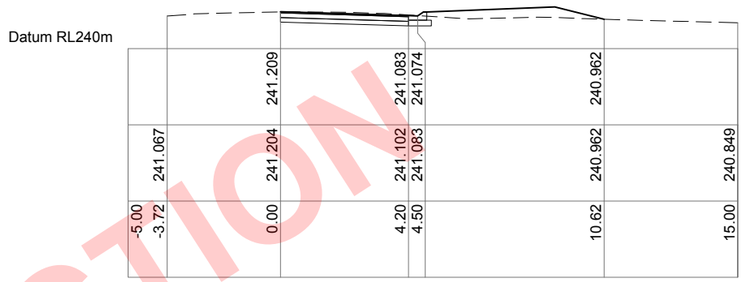
Job No. 2022.0849
DWG. No. R07
Issue A
No. in set 42



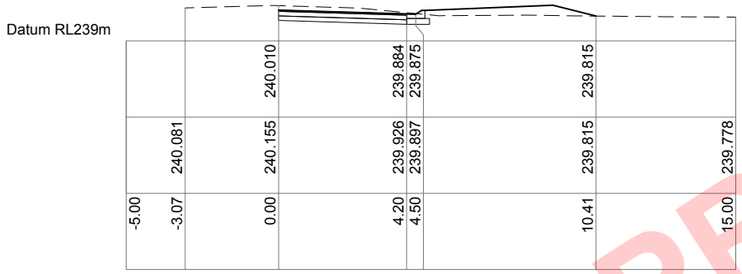
Ch 60.00 m



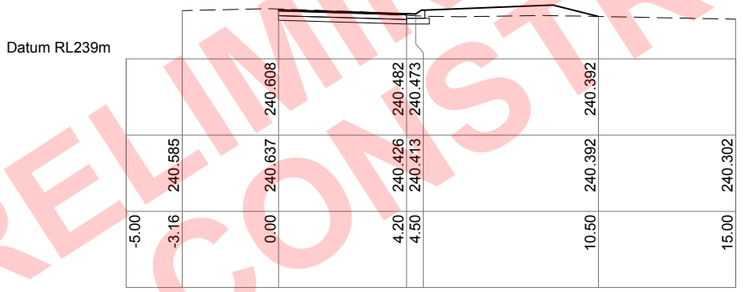
Ch 120.00 m



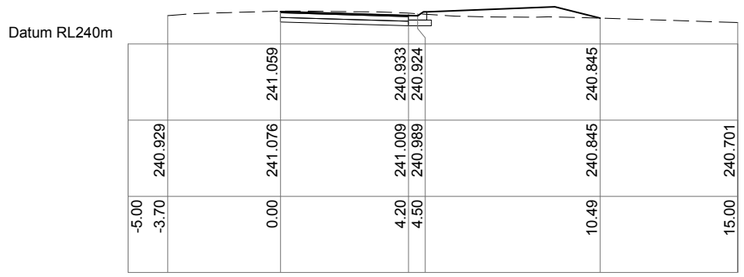
Ch 180.00 m



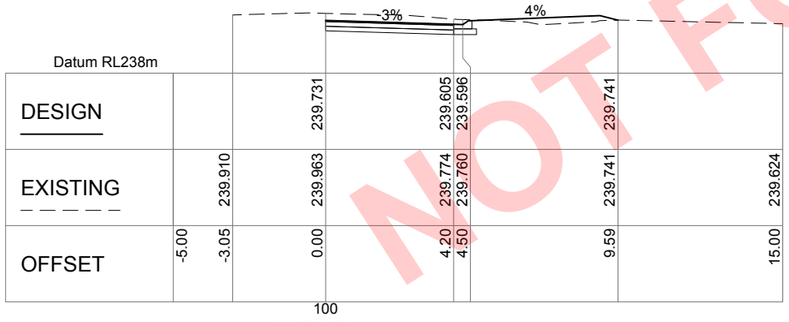
Ch 40.00 m



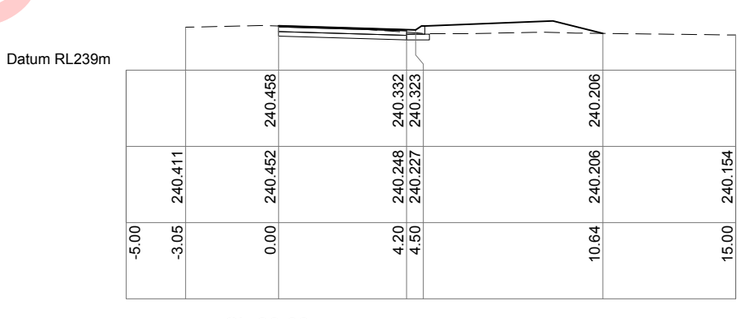
Ch 100.00 m



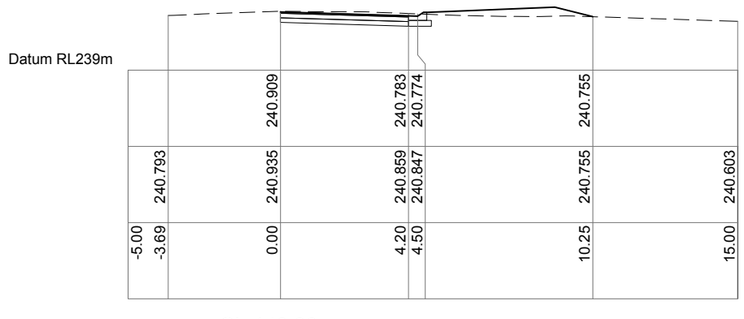
Ch 160.00 m



Ch 20.00 m



Ch 80.00 m



Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:53

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

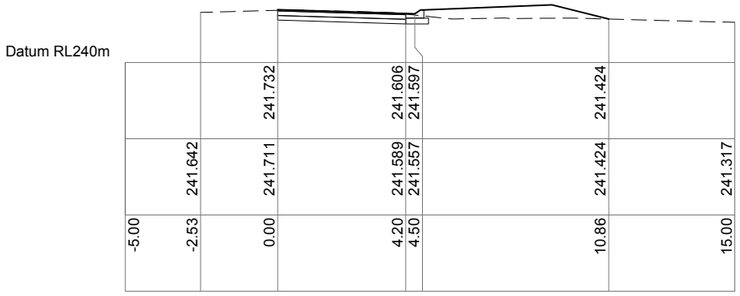
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

CHURCHILL STREET CROSS SECTIONS

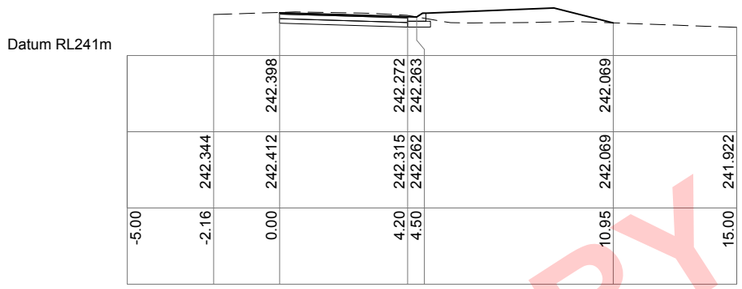
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

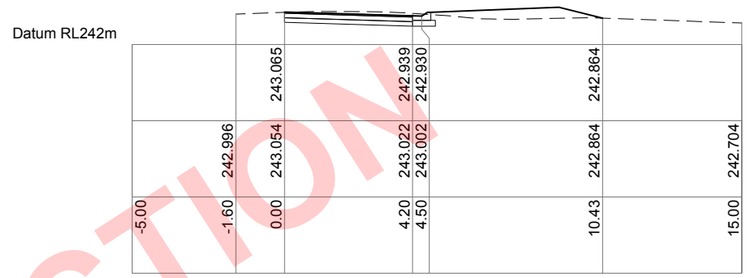
Job No. 2022.0849
DWG. No. R09
Issue A
No. in set 42



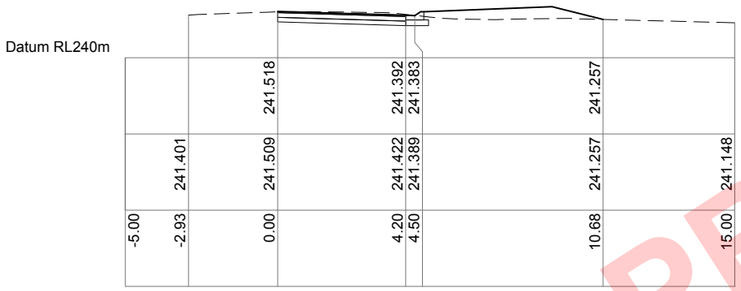
Ch 240.00 m



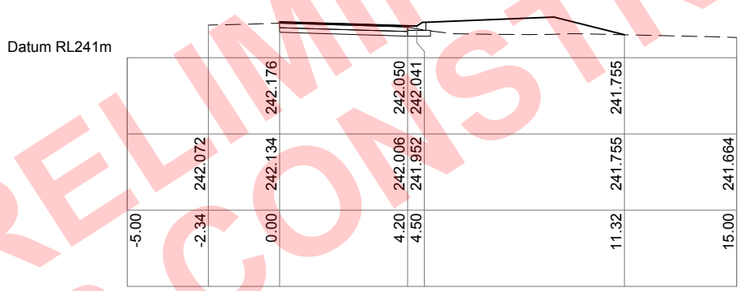
Ch 300.00 m



Ch 360.00 m



Ch 220.00 m



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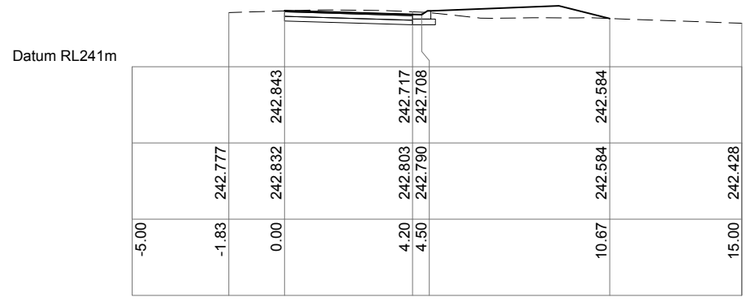
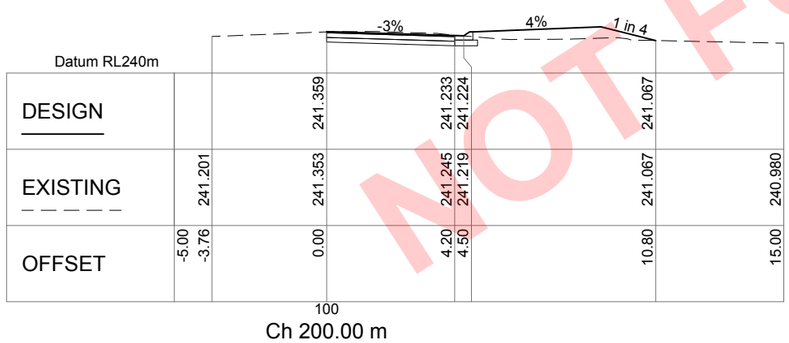
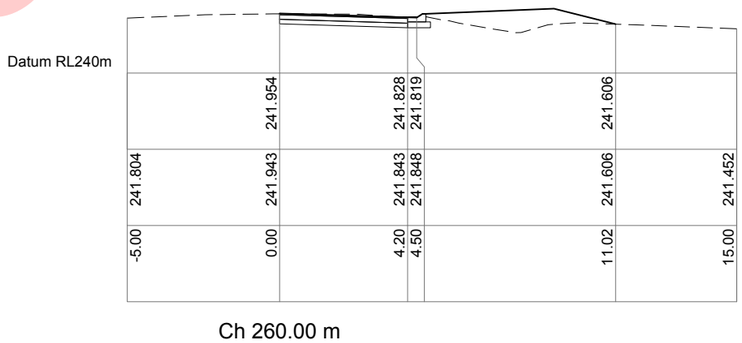


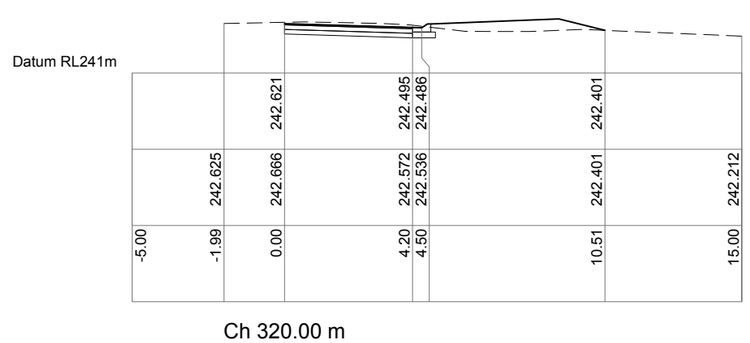
Ch 340.00 m



Ch 200.00 m



Ch 260.00 m



Ch 320.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:54

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

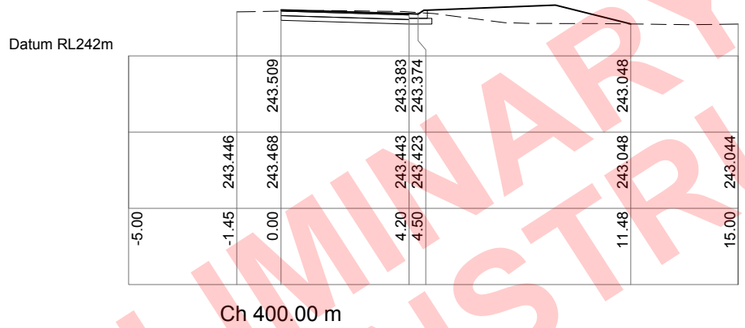
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

CHURCHILL STREET CROSS SECTIONS

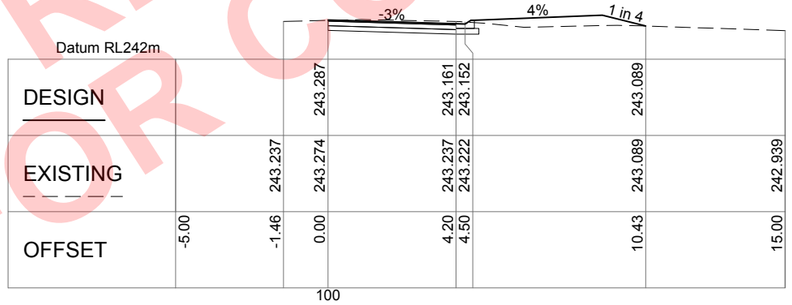
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R10
Issue A
No. in set 42



Ch 400.00 m



Ch 380.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:55

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

CHURCHILL STREET CROSS SECTIONS

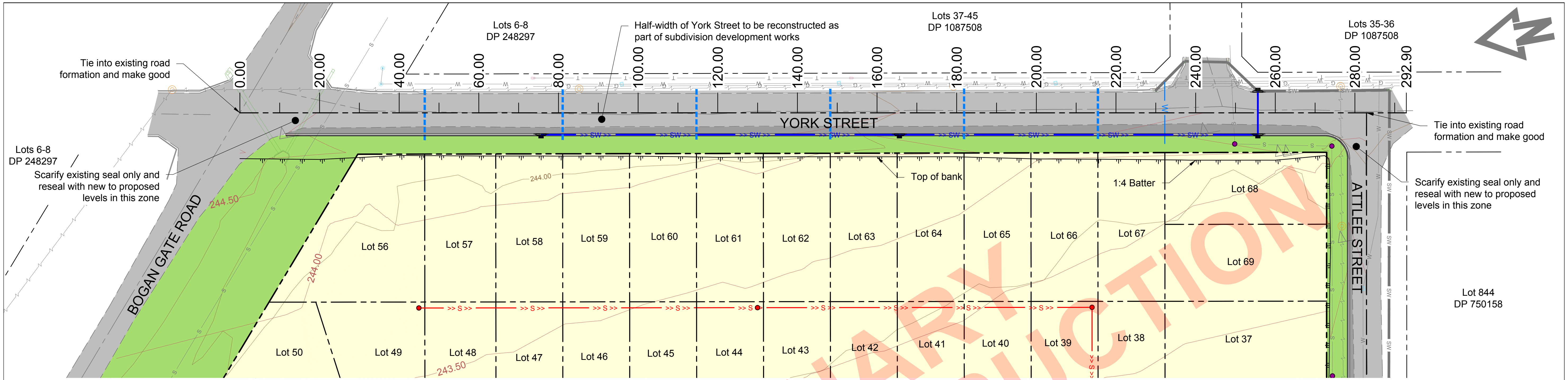
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

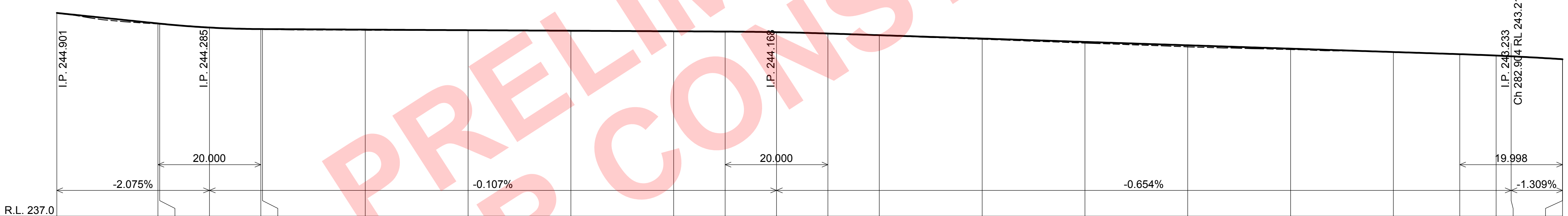
Job No. 2022.0849

DWG. No. R11 Issue A

No. in set 42



Note:
All kerbs are to be rollover kerb and gutter
to Forbes Shire Council Specifications



Chainage	Existing Surface	Design Surface	Cut (-) Fill (+)	Design Left Edge of Seal	Design Right Edge of Seal
0.00	244.90	244.90	+0.00		
19.68	244.47	244.49	+0.02		
20.00	244.47	244.49	+0.02		
29.68	244.35	244.33	-0.02		
39.68	244.28	244.27	-0.01		
40.00	244.27	244.27	+0.00		
60.00	244.23	244.25	+0.02		
80.00	244.23	244.23	+0.00		
100.00	244.21	244.21	+0.00		
120.00	244.18	244.19	+0.01		
130.00	244.16	244.18	+0.02		
140.00	244.17	244.15	-0.02		
150.00	244.10	244.10	+0.00		
160.00	244.04	244.04	+0.00		
180.00	243.88	243.91	+0.03		
200.00	243.73	243.77	+0.04		
220.00	243.58	243.64	+0.06		
240.00	243.48	243.51	+0.03		
260.00	243.38	243.38	+0.00		
272.91	243.29	243.30	+0.01		
280.00	243.25	243.24	-0.01		
282.90	243.23	243.22	-0.01		
292.90	243.10	243.10	+0.00		
292.90	243.10	243.10	+0.00		

Horizontal Geometry: L=292.90 B=190°16'45"

LONGITUDINAL SECTION
SCALE 1:500 H 1:100 V

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:03

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn: JB
Designed: GBL
Checked: TM
Scale (A1): 1:500
Date: 04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

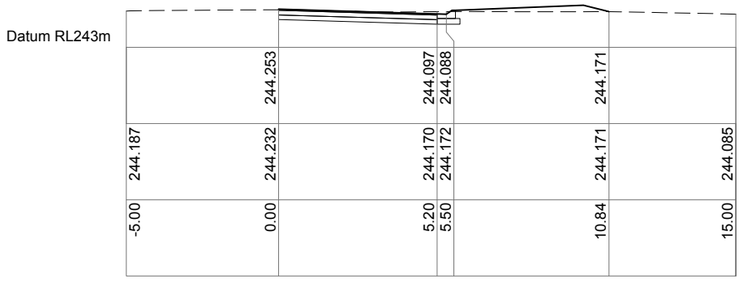
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

YORK STREET PLAN & LONGSECTION

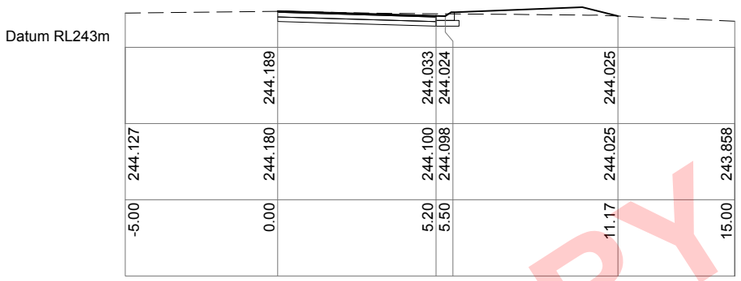
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

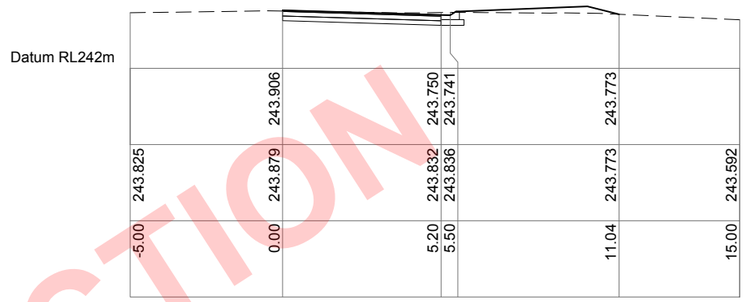
Job No. 2022.0849
DWG. No. R12 Issue A
No. in set 42



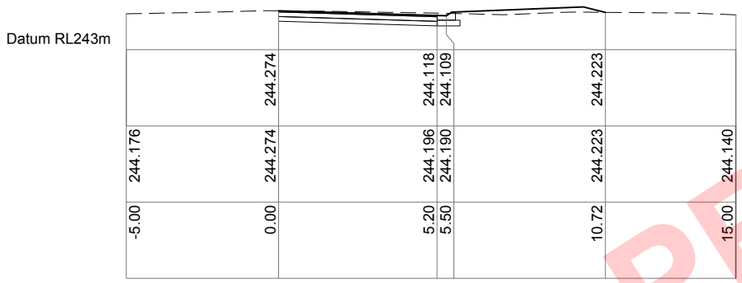
Ch 60.00 m



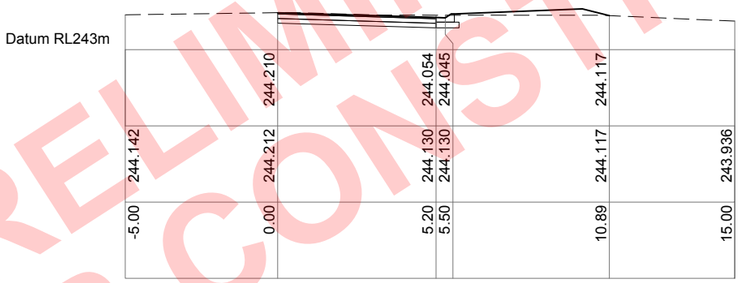
Ch 120.00 m



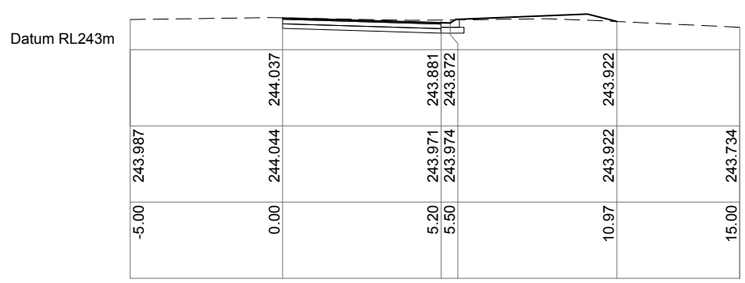
Ch 180.00 m



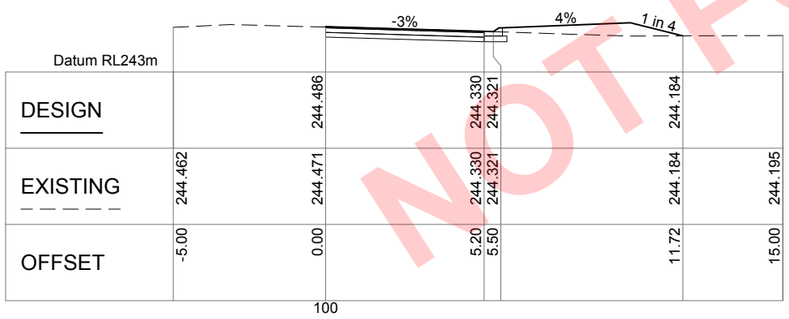
Ch 40.00 m



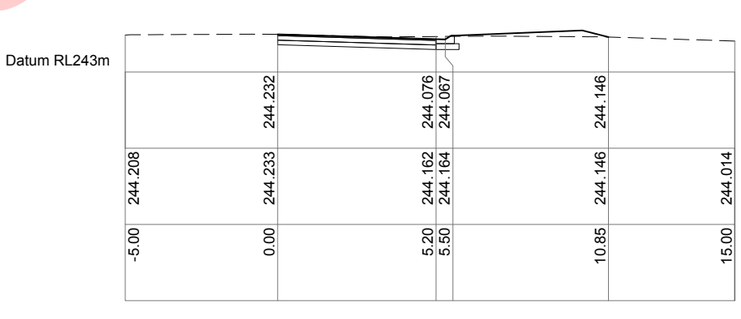
Ch 100.00 m



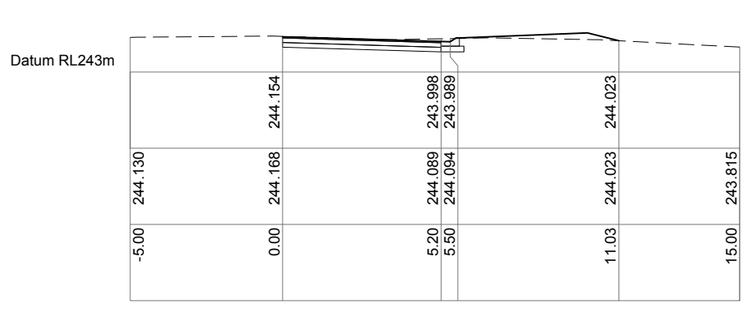
Ch 160.00 m



Ch 20.00 m



Ch 80.00 m



Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:05

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

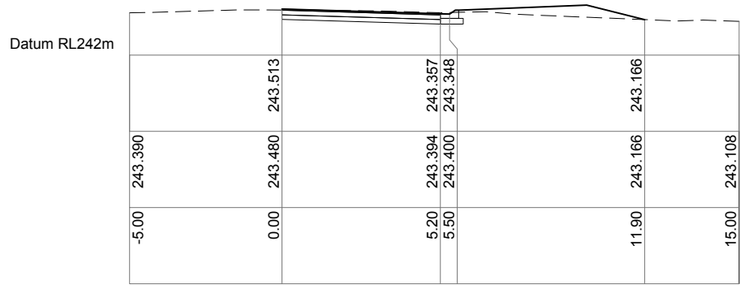
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

YORK STREET CROSS SECTIONS

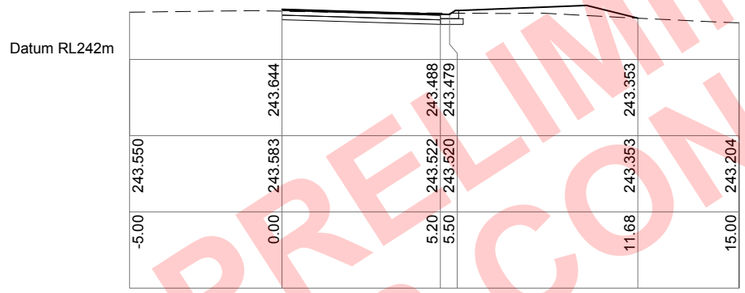
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

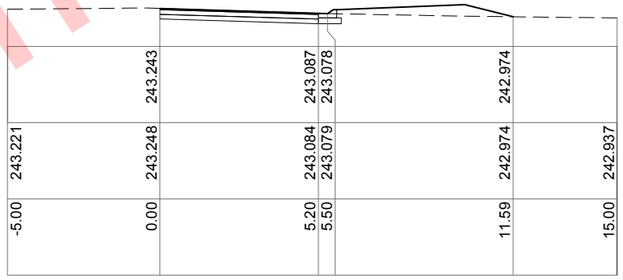
Job No. 2022.0849
DWG. No. R13
Issue A
No. in set 42



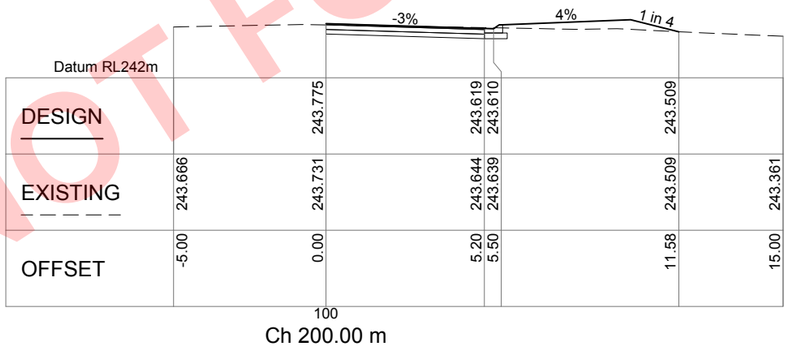
Ch 240.00 m



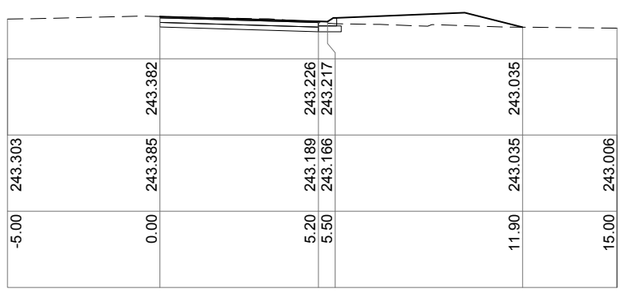
Ch 220.00 m



Ch 280.00 m



Ch 200.00 m



Ch 260.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:07

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

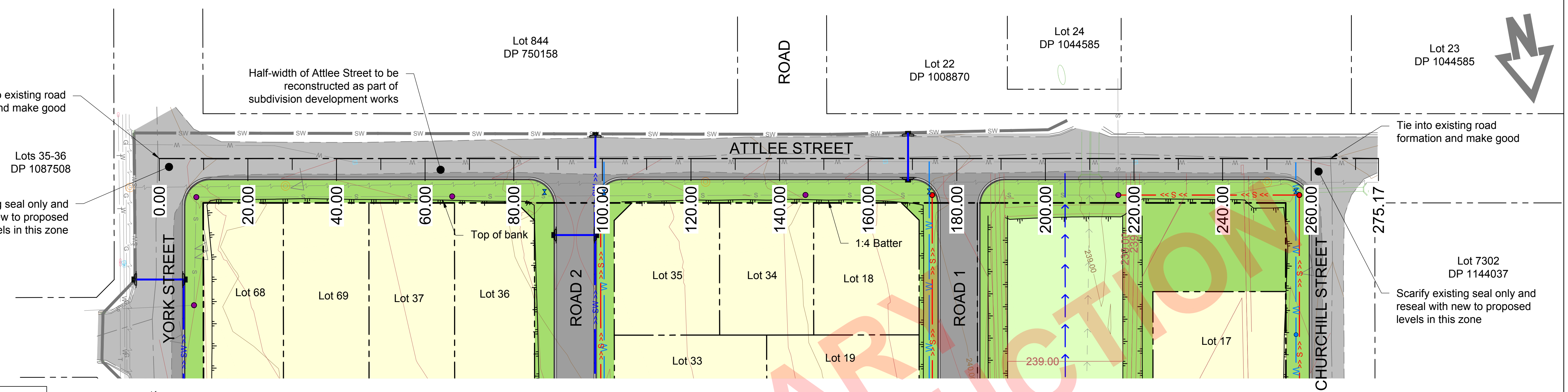
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

YORK STREET CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R14
Issue A
No. in set 42



Note:
All kerbs are to be rollover kerb and gutter to Forbes Shire Council Specifications

Chainage	0.00	5.20	5.20	15.20	20.00	25.20	40.00	60.00	65.23	75.23
Existing Surface	243.23	243.13	243.13	242.96	242.92	242.87	242.74	242.40	242.30	242.11
Design Surface	243.22	243.06	243.06	242.81	242.72	242.66	242.51	242.31	242.25	242.13
Cut (-) Fill (+)	-0.01	-0.07	-0.07	-0.15	-0.20	-0.21	-0.23	-0.09	-0.05	+0.02
Design Left Edge of Seal										
Design Right Edge of Seal										

Chainage	80.00	85.23	93.89	100.00	110.00	120.00	130.00	140.00	160.00	180.00
Existing Surface	242.03	241.94	241.82	241.73	241.56	241.39	241.18	240.94	240.48	240.06
Design Surface	242.07	241.98	241.83	241.73	241.56	241.38	241.18	240.96	240.52	240.09
Cut (-) Fill (+)	+0.04	+0.04	+0.01	+0.00	+0.00	-0.01	+0.00	+0.02	+0.04	+0.03
Design Left Edge of Seal										
Design Right Edge of Seal										

Chainage	180.50	182.75	200.00	202.75	212.52	220.00	222.75	240.00	260.00	275.17
Existing Surface	240.05	240.00	239.74	239.72	239.73	239.75	239.77	239.87	239.95	
Design Surface	240.07	240.03	239.76	239.74	239.70	239.72	239.74	239.87	240.02	240.13
Cut (-) Fill (+)	+0.02	+0.03	+0.02	+0.02	-0.03	-0.03	-0.03	+0.00	+0.07	+0.00
Design Left Edge of Seal										
Design Right Edge of Seal										

Horizontal Geometry: L=275.17 B=280°16'45"

LONGITUDINAL SECTION
SCALE 1:500 H 1:100 V

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:11

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn: JB
Designed: GBL
Checked: TM
Scale (A1): 1:500
Date: 04/10/23

PRELIMINARY
Not for construction
...\2022.0849-Civil-A.dwg

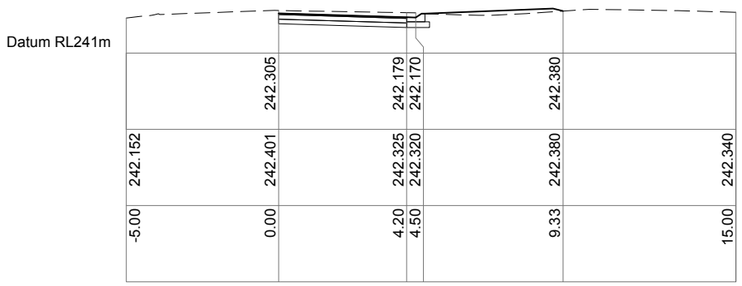
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ATTLEE STREET PLAN & LONGSECTION

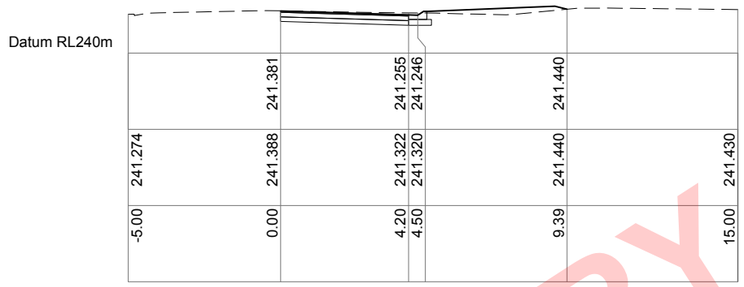
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

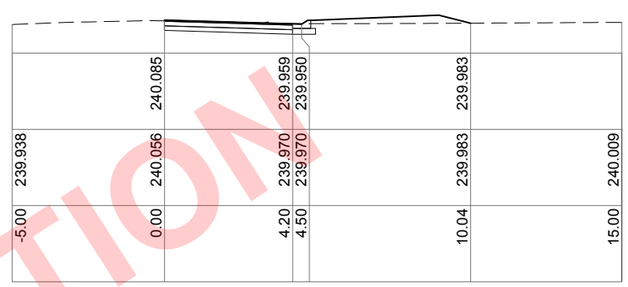
Job No. 2022.0849
DWG. No. R15 Issue A
No. in set 42



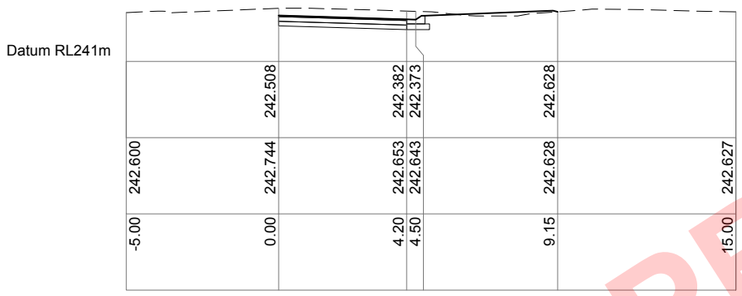
Ch 60.00 m



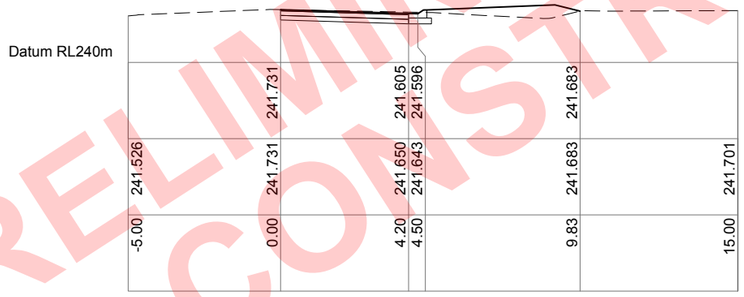
Ch 120.00 m



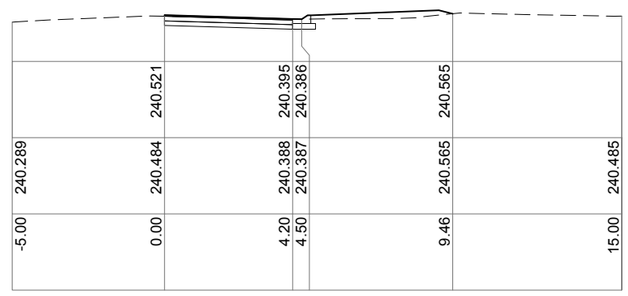
Ch 180.00 m



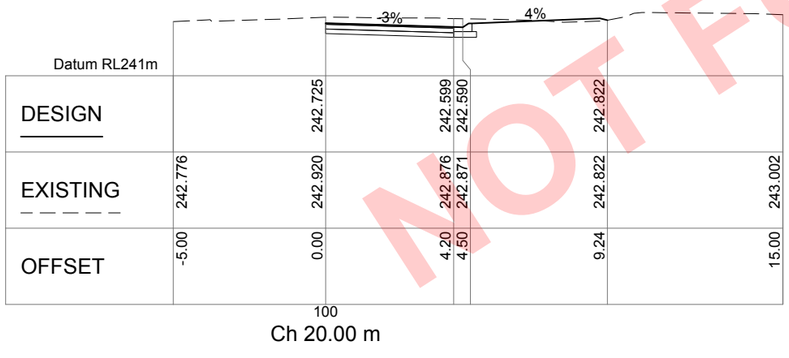
Ch 40.00 m



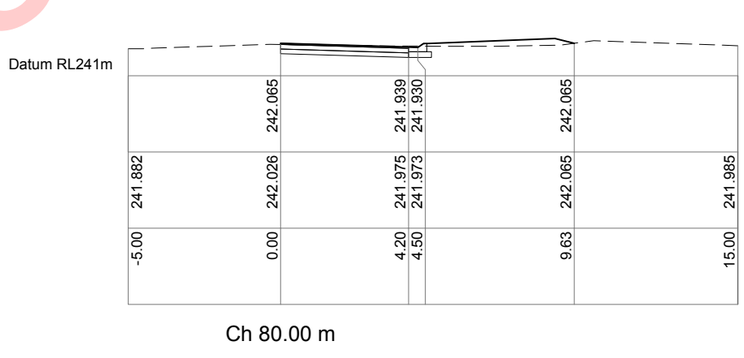
Ch 100.00 m



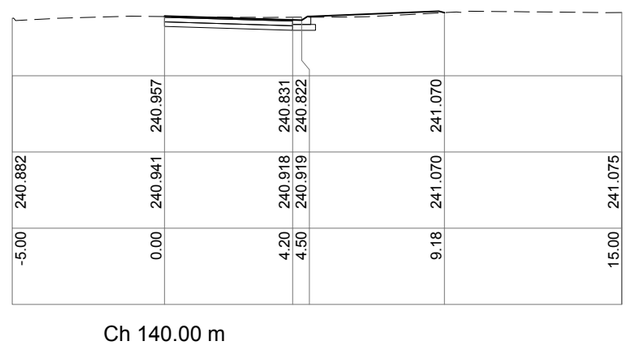
Ch 160.00 m



Ch 20.00 m



Ch 80.00 m



Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:13

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

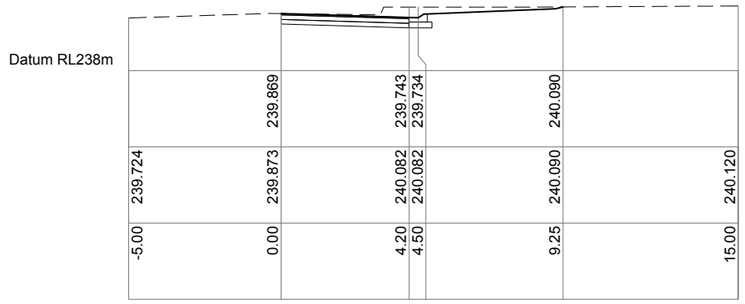
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ATTLEE STREET CROSS SECTIONS

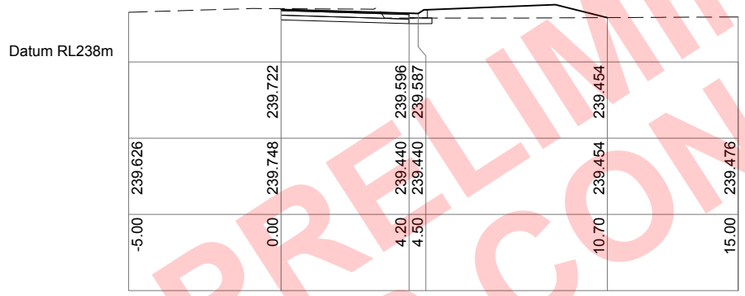
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

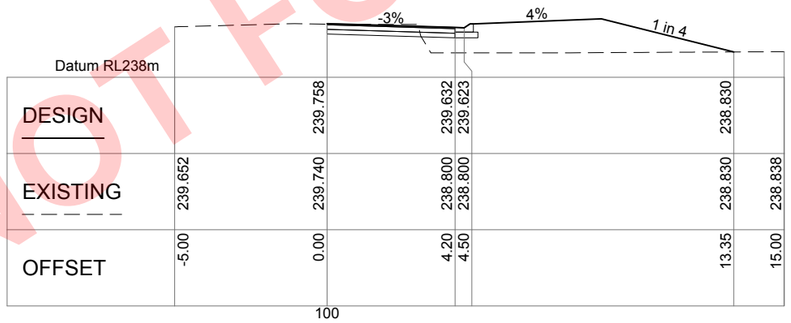
Job No. 2022.0849
DWG. No. R16
Issue A
No. in set 42



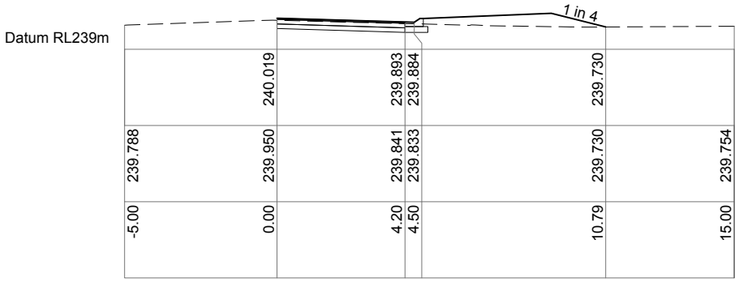
Ch 240.00 m



Ch 220.00 m



Ch 200.00 m



Ch 260.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:15

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

ATTLEE STREET CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. R17
Issue A
No. in set 42

Lot 23
DP 1044585

Lot 7302
DP 1144037

Lot 7026
DP 1023238

Stormwater to discharge into drainage channel via appropriate headwall

CHURCHILL STREET

Lot 24
DP 1044585

Existing 2 x 1800mm x 600mm RCBCs to remain

Lot 22
DP 1008870

Existing 2 x 600Ø Pipes outletting to drainage channel

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

ROAD

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

Lot 844
DP 750158

Lots 1265
DP 750158

Lots 35-38
DP 859871

Lots 6-8
DP 248297

Lots 37-45
DP 1087508

Lots 35-36
DP 1087508

Existing 600Ø Pipe

Proposed stormwater network to connect into existing pit

Provide 4x additional 1200mm x 600mm RCBC (10 Total RCBC). New RCBCs to be at the same levels as existing

Lot 01 Lot 02 Lot 03 Lot 04 Lot 05 Lot 06 Lot 07 Lot 08 Lot 09 Lot 10 Lot 11 Lot 12 Lot 13 Lot 14 Lot 15 Lot 16 Lot 17

Proposed Drainage Channel

ROAD 1

Lot 18 Lot 19 Lot 20 Lot 21 Lot 22 Lot 23 Lot 24 Lot 25 Lot 26 Lot 27 Lot 28 Lot 29 Lot 30 Lot 31 Lot 32 Lot 33 Lot 34 Lot 35

Bio-Safety Zone

ROAD 2

Lot 36 Lot 37 Lot 38 Lot 39 Lot 40 Lot 41 Lot 42 Lot 43 Lot 44 Lot 45 Lot 46 Lot 47 Lot 48 Lot 49 Lot 50 Lot 51 Lot 52 Lot 53 Lot 54 Lot 55 Lot 56 Lot 57 Lot 58 Lot 59 Lot 60 Lot 61 Lot 62 Lot 63 Lot 64 Lot 65 Lot 66 Lot 67 Lot 68 Lot 69

YORK STREET

ATTLEE STREET

HURFORD PLACE

BOGAN GATE ROAD

Note:
Stormwater to be designed for Churchill Street at DA Stage

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:18

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

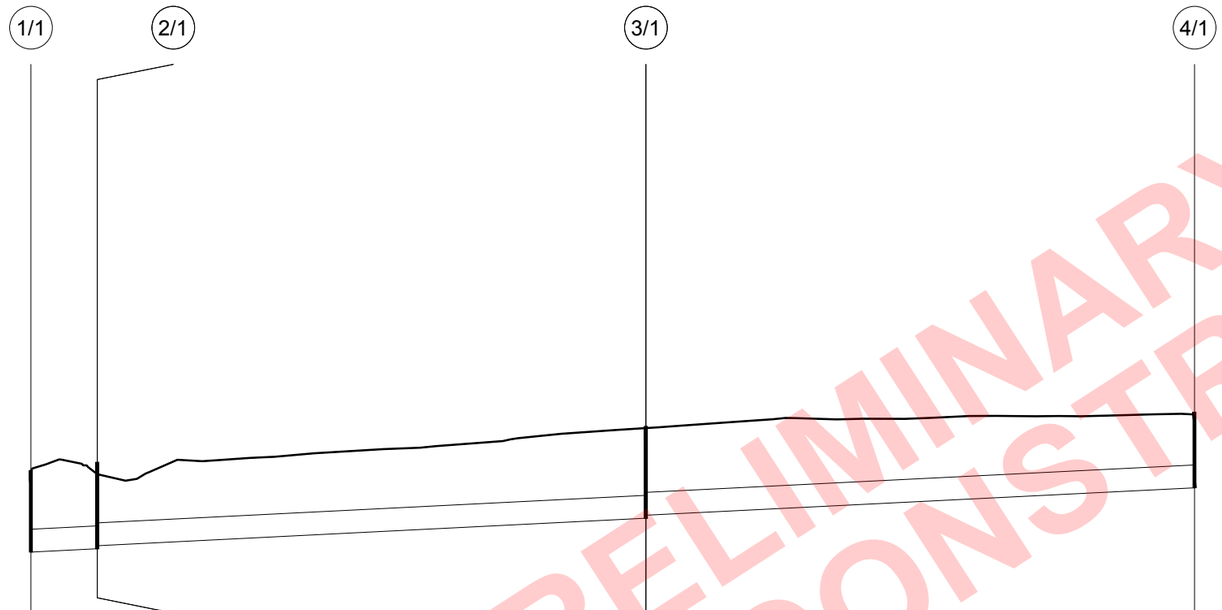
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

STORMWATER LAYOUT PLAN

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

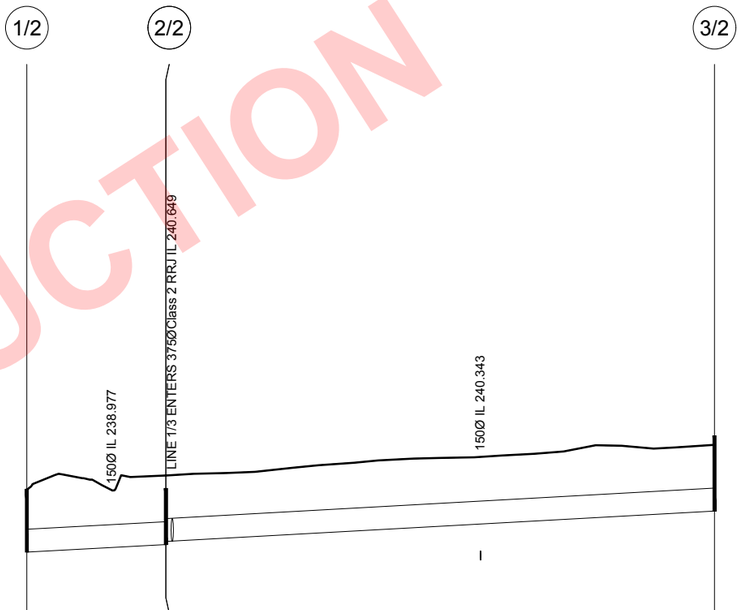
Job No. 2022.0849
DWG. No. SW01 Issue A
No. in set 42



DATUM RL 240.40			
DIAMETER (mm) CLASS	375Ø Class 2 RRJ	375Ø Class 2 RRJ	375Ø Class 2 RRJ
SLOPE/GRADE	0.51% 1:196.57	0.50% 1:200.00	0.50% 1:200.00
DEPTH (m)	1.337 1.416	1.366 1.505	1.455 1.241
INVERT LEVEL (m)	241.900 241.955	242.005 242.455	242.505 242.955
TOP OF PIT LEVEL	243.237 243.371	243.960	244.196
FINAL SURFACE LEVEL	243.237 243.179	243.934	244.157
CHAINAGE	0.000 10.887	10.887 90.000	100.887 90.000 190.887

1

SCALES: HORIZONTAL 1:500 VERTICAL 1:50



DIAMETER (mm) CLASS	375Ø Class 2 RRJ	375Ø Class 2 RRJ
SLOPE/GRADE	0.54% 1:183.92	0.56% 1:180.00
DEPTH (m)	1.032 0.919	0.869 1.234
INVERT LEVEL (m)	240.475 240.599	240.649 241.149
TOP OF PIT LEVEL	241.507 241.518	242.383
FINAL SURFACE LEVEL	241.507 241.731	242.235
CHAINAGE	0.000 22.806	22.806 90.000 112.806

2

SCALES: HORIZONTAL 1:500 VERTICAL 1:50

Note:
Design is preliminary only and subject to full hydraulic design at CC Stage.

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:50:20

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:50v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

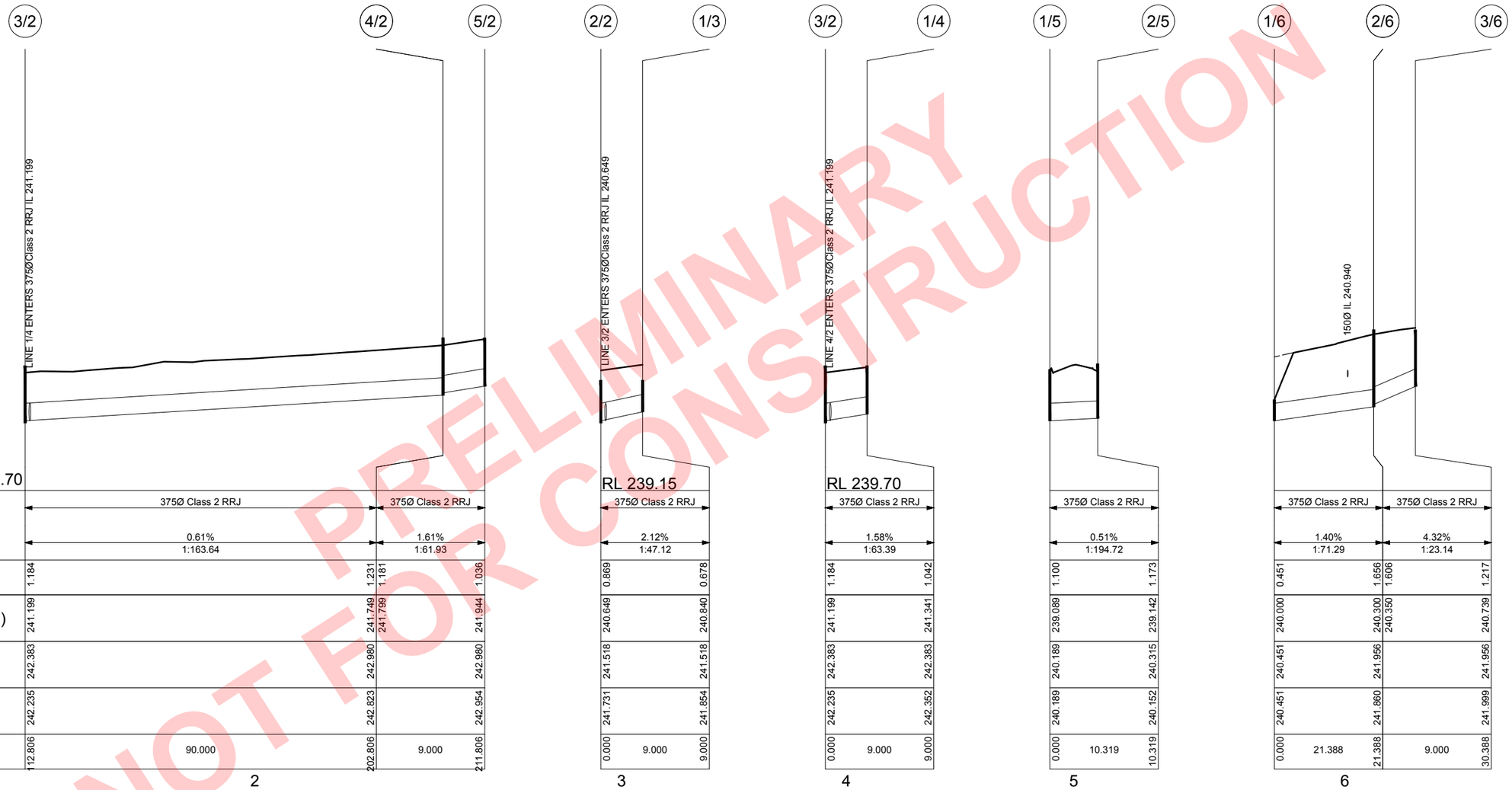
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

STORMWATER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW02 Issue A
No. in set 42



	2	3	4	5	6
DATUM RL 239.70		RL 239.15	RL 239.70		
DIAMETER (mm) CLASS	375Ø Class 2 RRJ / 375Ø Class 2 RRJ	375Ø Class 2 RRJ	375Ø Class 2 RRJ	375Ø Class 2 RRJ	375Ø Class 2 RRJ / 375Ø Class 2 RRJ
SLOPE/GRADE	0.61% 1:163.64 / 1.61% 1:61.93	2.12% 1:47.12	1.58% 1:63.39	0.51% 1:194.72	1.40% 1:71.29 / 4.32% 1:23.14
DEPTH (m)	1.184 / 1.231 / 1.181 / 1.036	0.869 / 0.678	1.184 / 1.042	1.100 / 1.173	0.451 / 1.656 / 1.606 / 1.217
INVERT LEVEL (m)	241.199 / 241.749 / 241.799 / 241.944	240.649 / 240.840	241.199 / 241.341	239.089 / 239.142	240.000 / 240.300 / 240.350 / 240.739
TOP OF PIT LEVEL	242.383 / 242.980 / 242.980	241.518 / 241.518	242.383 / 242.383	240.189 / 240.315	240.451 / 241.956 / 241.956
FINAL SURFACE LEVEL	242.235 / 242.823 / 242.954	241.731 / 241.854	242.235 / 242.352	240.189 / 240.152	240.451 / 241.860 / 241.999
CHAINAGE	112.806 / 90.000 / 202.806 / 9.000 / 211.806	0.000 / 9.000 / 9.000	0.000 / 9.000 / 9.000	0.000 / 10.319 / 10.319	0.000 / 21.388 / 21.388 / 9.000 / 30.388
	SCALES: HORIZONTAL 1:500 VERTICAL 1:50	SCALES: HORIZONTAL 1:500 VERTICAL 1:50	SCALES: HORIZONTAL 1:500 VERTICAL 1:50	SCALES: HORIZONTAL 1:500 VERTICAL 1:50	SCALES: HORIZONTAL 1:500 VERTICAL 1:50

Note:
Design is preliminary only and subject to full hydraulic design at CC Stage.

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:22

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:50v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

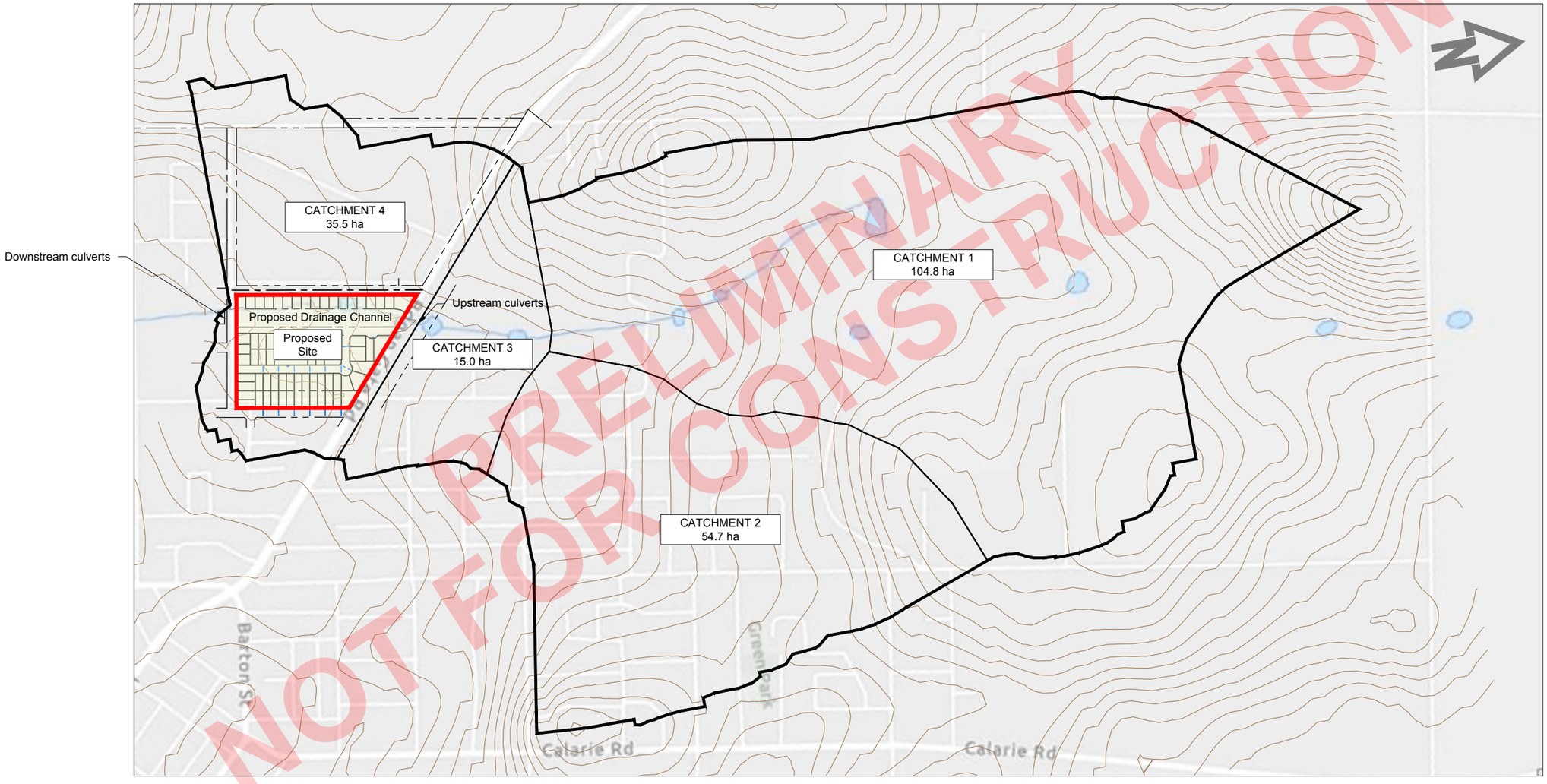
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

STORMWATER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No.	2022.0849
DWG. No.	SW03
Issue	A
No. in set	42



PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:24

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:5000
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

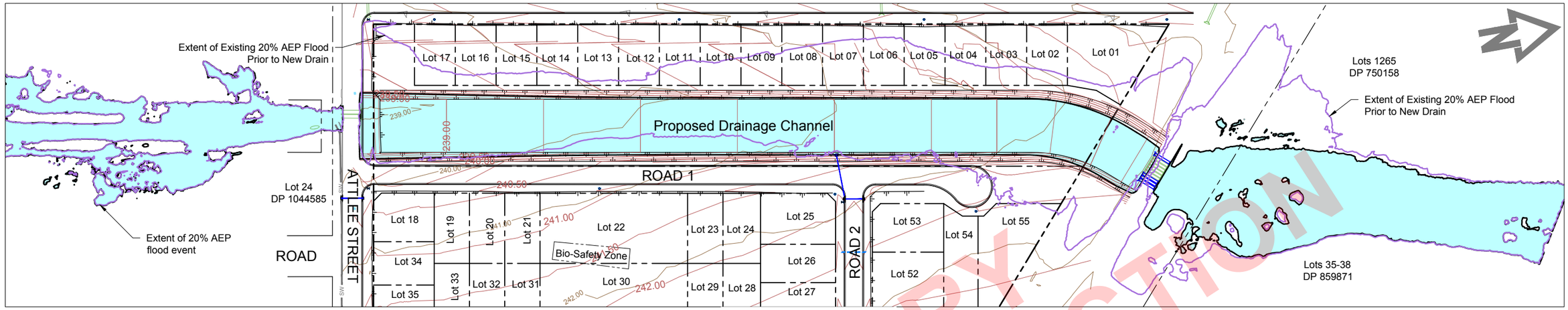
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

STORMWATER CATCHMENT PLAN

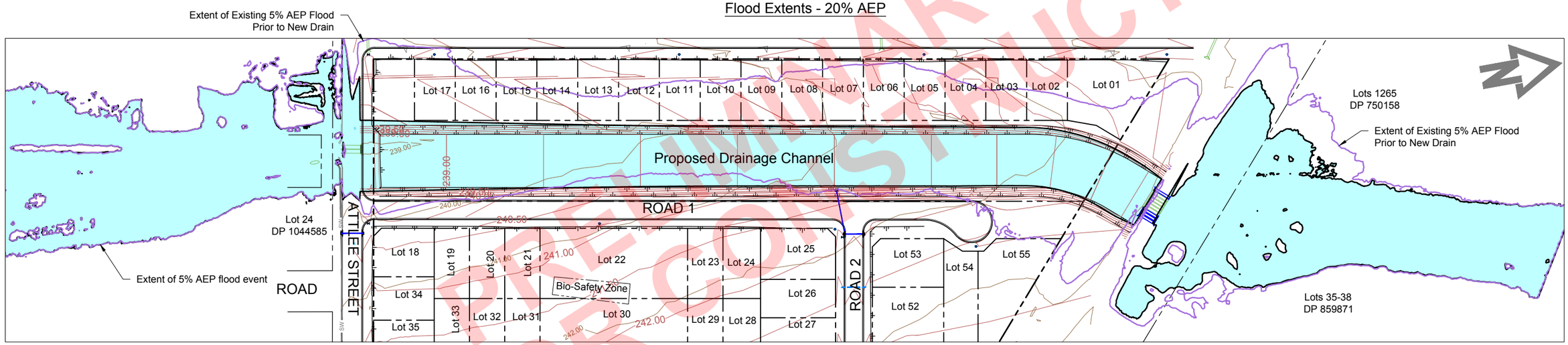
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

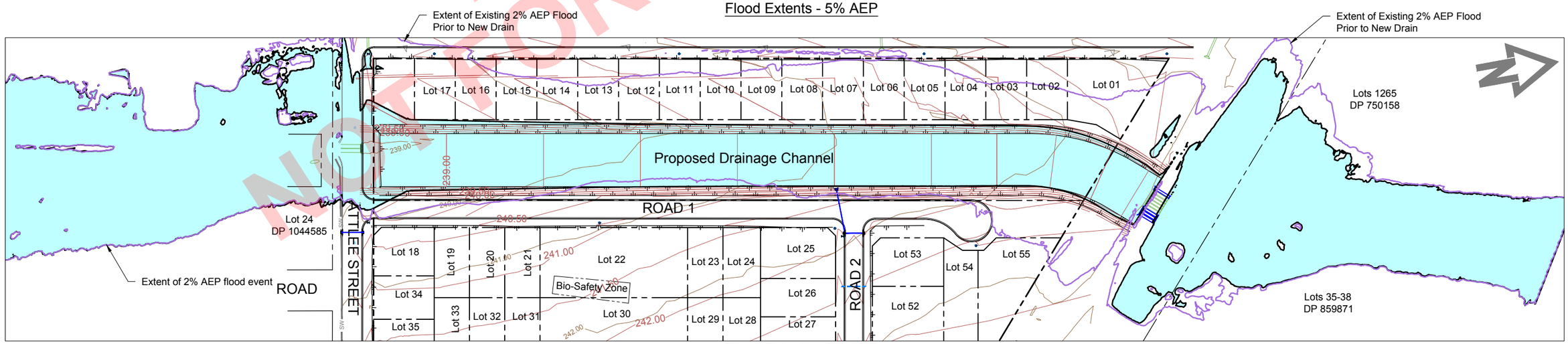
Job No. 2022.0849
DWG. No. SW04 Issue A
No. in set 42



Flood Extents - 20% AEP



Flood Extents - 5% AEP



Flood Extents - 2% AEP

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:30

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:1000
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

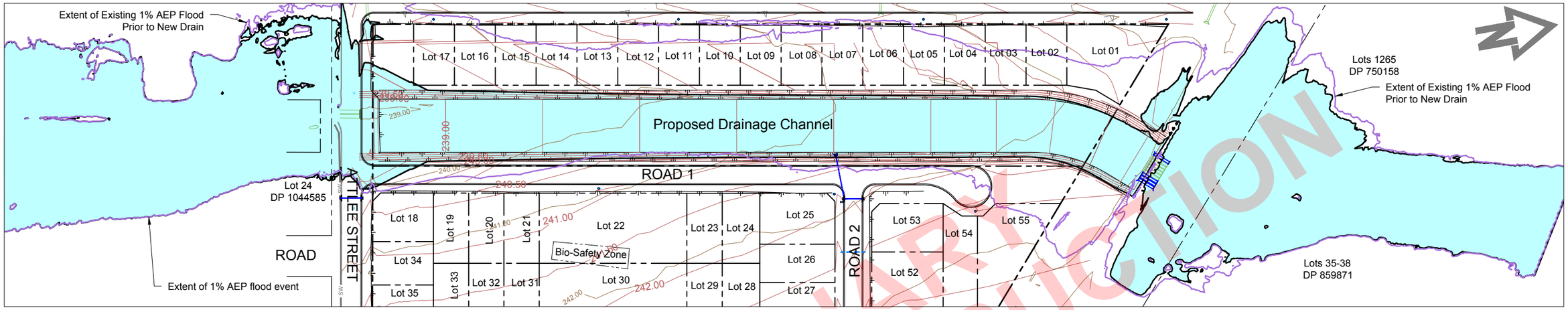
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

FLOOD LEVELS & EXTENTS

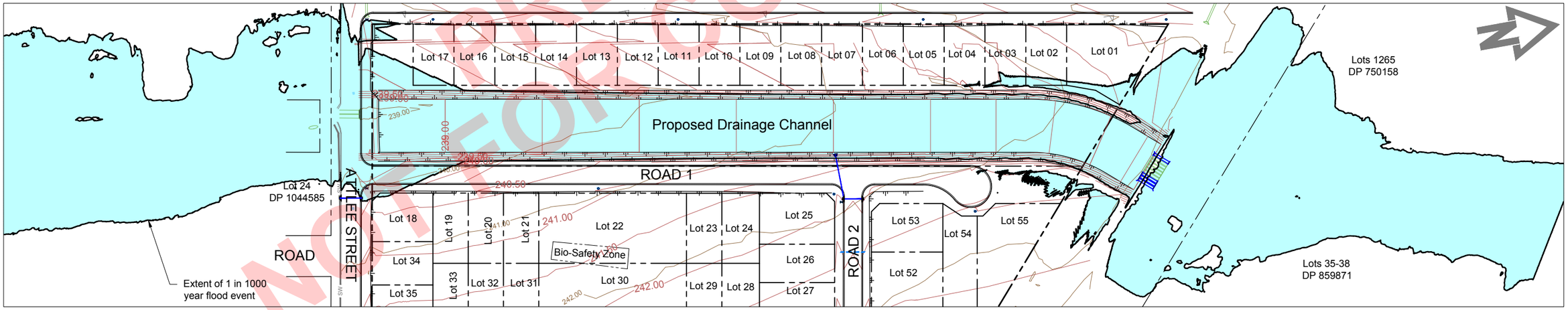
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW05 Issue A
No. in set 42



Flood Extents - 1% AEP



Flood Extents - Probable Maximum Flood (PMF)

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:50:35

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:1000
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

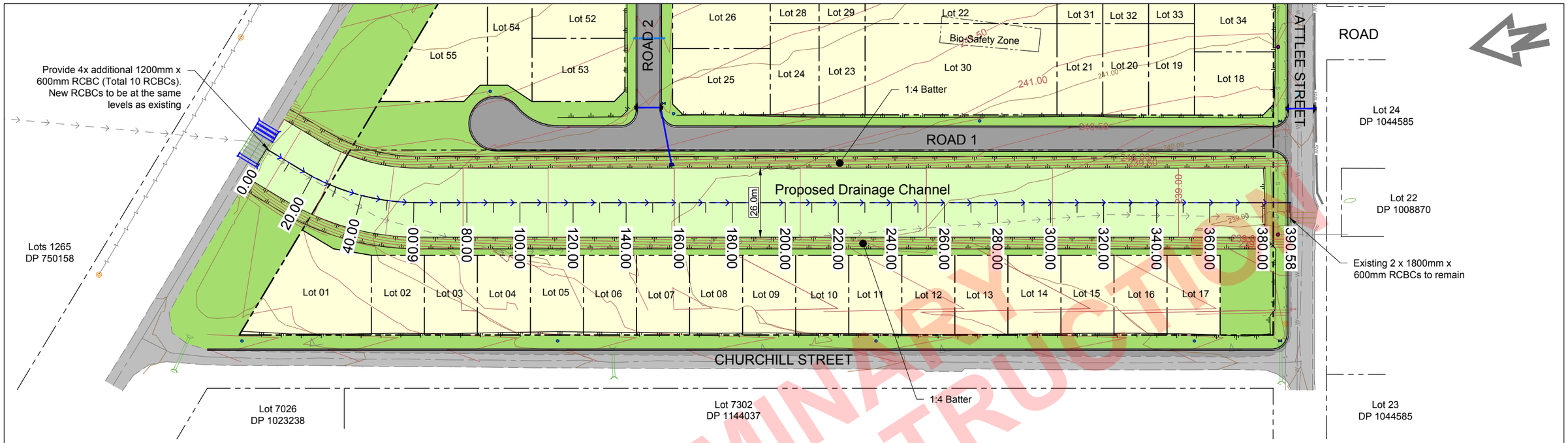
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

FLOOD LEVELS & EXTENTS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW06 Issue A
No. in set 42



Existing Surface	243.55	242.47	242.57	242.65	242.34	242.19	242.07	242.06	241.94	241.94	241.91	241.80	241.70	241.60	241.44	241.39	241.35	241.28	241.24	241.17	240.89	240.61	240.60	240.64	240.64	240.51	240.42	240.33	240.22	240.04	239.87	239.64	239.58	239.60	239.60	239.58	239.56	239.56	239.56	239.46	239.36	239.42	239.37	239.58	239.65
Design Surface	241.50	241.17	241.11	241.07	240.96	240.86	240.76	240.75	240.67	240.65	240.58	240.49	240.40	240.31	240.25	240.20	240.15	240.10	240.04	239.99	239.94	239.89	239.83	239.78	239.73	239.67	239.62	239.57	239.52	239.46	239.41	239.36	239.31	239.25	239.20	239.15	239.10	239.04	238.99	238.94	238.89	238.83	238.80	238.80	238.80
Cut (-) Fill (+)	-2.05	-1.30	-1.46	-1.58	-1.38	-1.33	-1.31	-1.31	-1.27	-1.29	-1.33	-1.31	-1.30	-1.29	-1.19	-1.19	-1.20	-1.18	-1.20	-1.18	-0.95	-0.72	-0.77	-0.86	-0.91	-0.84	-0.80	-0.76	-0.70	-0.58	-0.46	-0.28	-0.27	-0.35	-0.40	-0.43	-0.46	-0.52	-0.57	-0.52	-0.47	-0.59	-0.57	-0.78	-0.85
Chainage	0.00	10.00	15.46	20.00	30.00	40.00	50.00	50.60	60.00	61.59	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00	310.00	320.00	330.00	340.00	350.00	360.00	370.00	380.00	386.28	390.00	390.58

LONGITUDINAL SECTION
SCALE 1:750 H 1:100 V

Drainage Channel

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:40

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

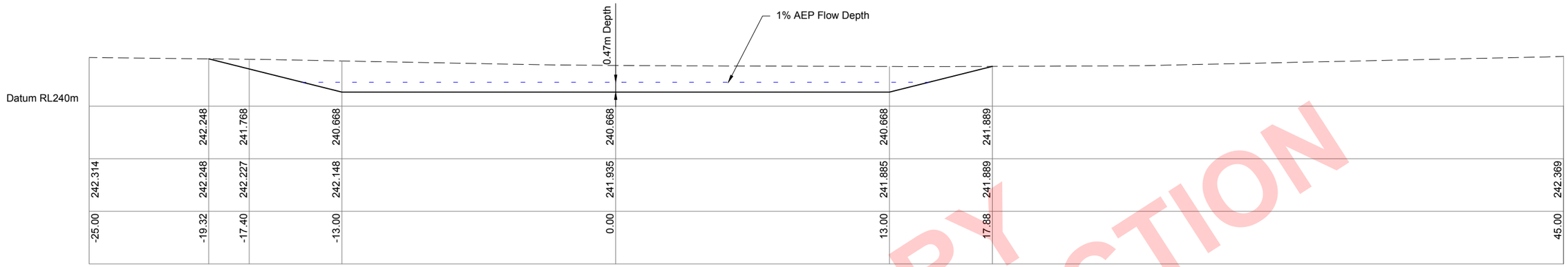
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL PLAN & LONGSECTIONS

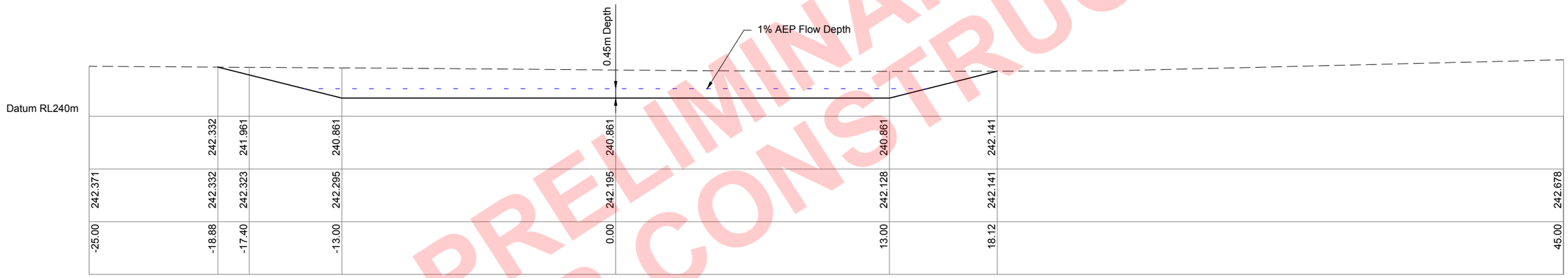
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

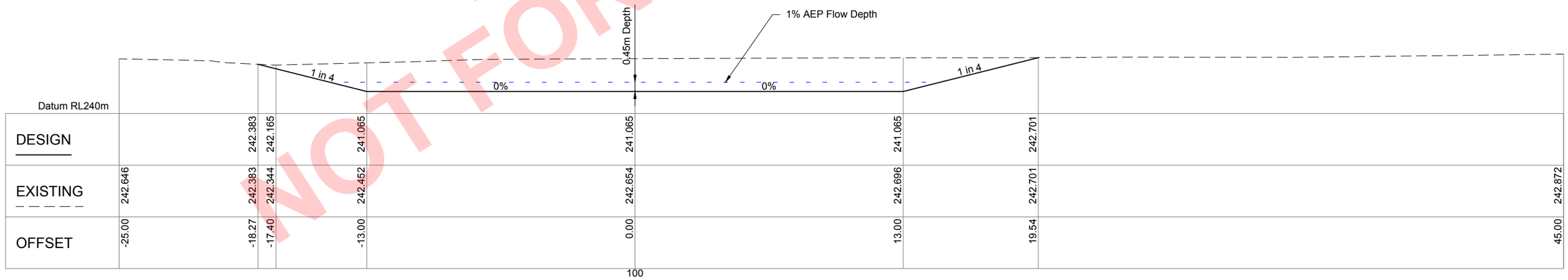
Job No. 2022.0849
DWG. No. SW07 Issue A
No. in set 42



Ch 60.00 m



Ch 40.00 m



100

Ch 20.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:42

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

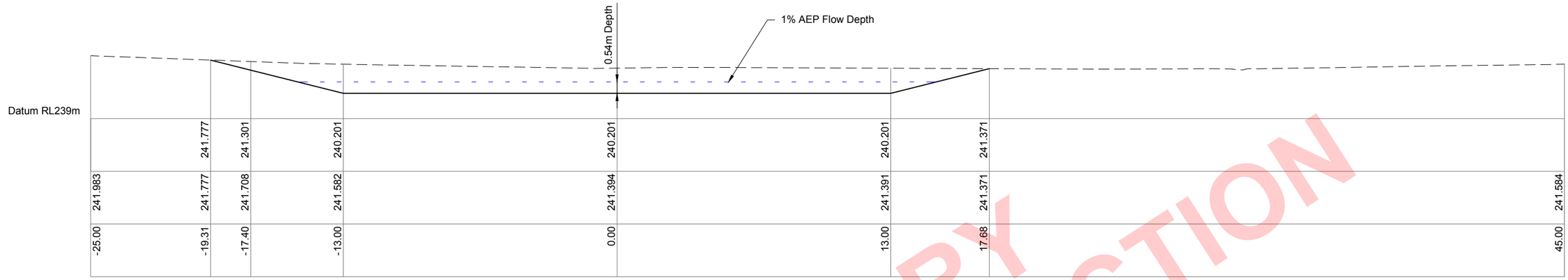
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

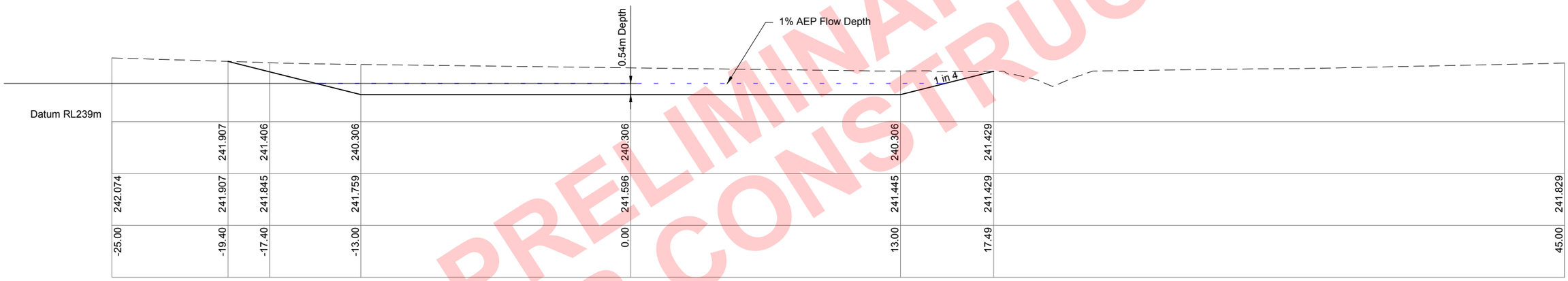
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

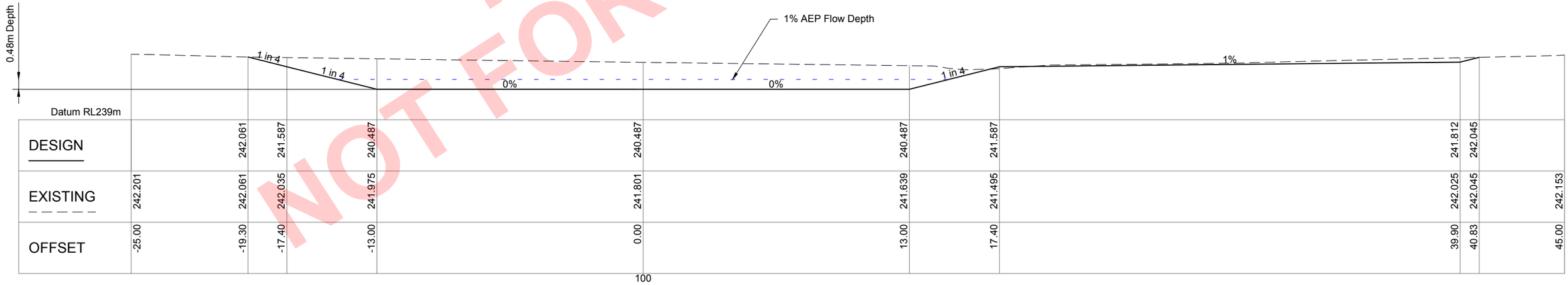
Job No. 2022.0849
DWG. No. SW08 Issue A
No. in set 42



Ch 120.00 m



Ch 100.00 m



100

Ch 80.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:50:44

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

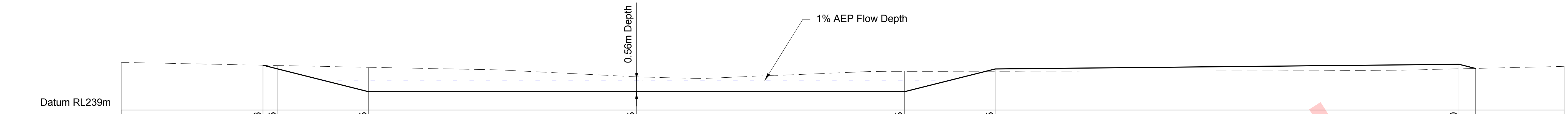
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

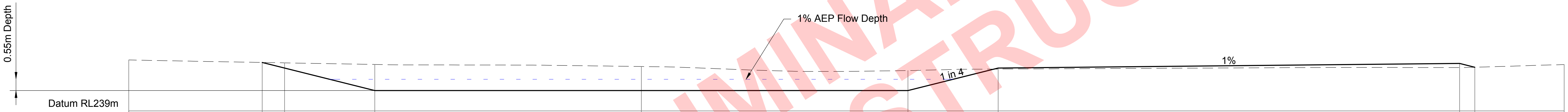
CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW09 Issue A
No. in set 42



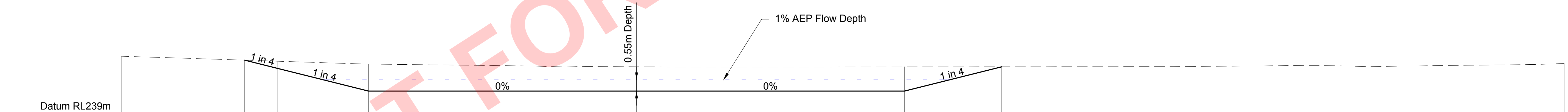
DESIGN		241.166	240.985	239.885	239.885	239.885	240.985	241.210	241.011	
EXISTING	241.305	241.166	241.151	241.064	240.605	240.868	240.874	240.993	241.011	241.111
OFFSET	-25.00	-18.12	-17.40	-13.00	0.00	13.00	17.40	39.90	40.70	45.00

Ch 180.00 m



DESIGN		241.363	241.090	239.990	239.990	239.990	241.090	241.315	241.130	
EXISTING	241.486	241.363	241.344	241.265	241.165	240.967	241.040	241.114	241.130	241.258
OFFSET	-25.00	-18.49	-17.40	-13.00	0.00	13.00	17.40	39.90	40.64	45.00

Ch 160.00 m



DESIGN		241.599	241.195	240.095	240.095	240.095	241.275	
EXISTING	241.787	241.599	241.547	241.408	241.276	241.270	241.275	241.439
OFFSET	-25.00	-19.01	-17.40	-13.00	0.00	13.00	17.72	45.00

100

Ch 140.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:46

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Amend	Date	Description	By

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

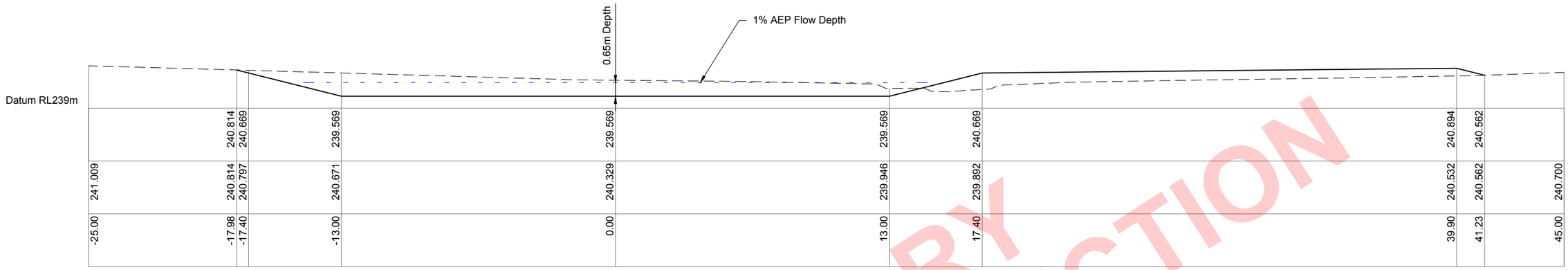
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

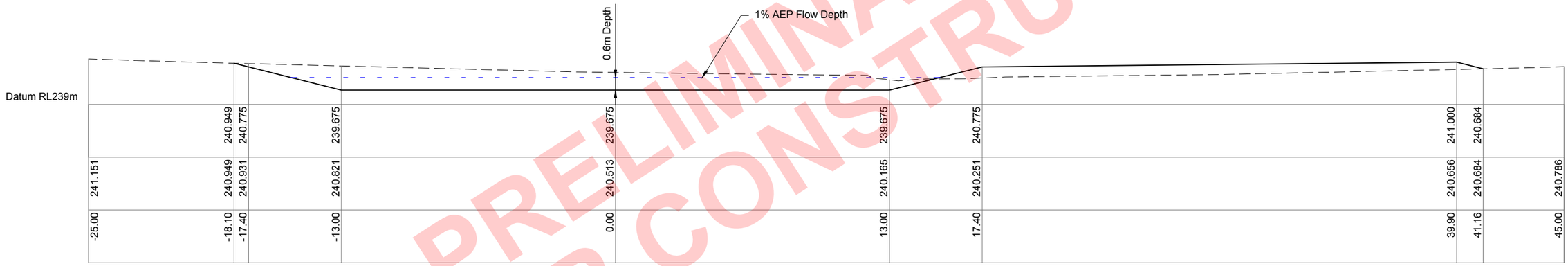
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

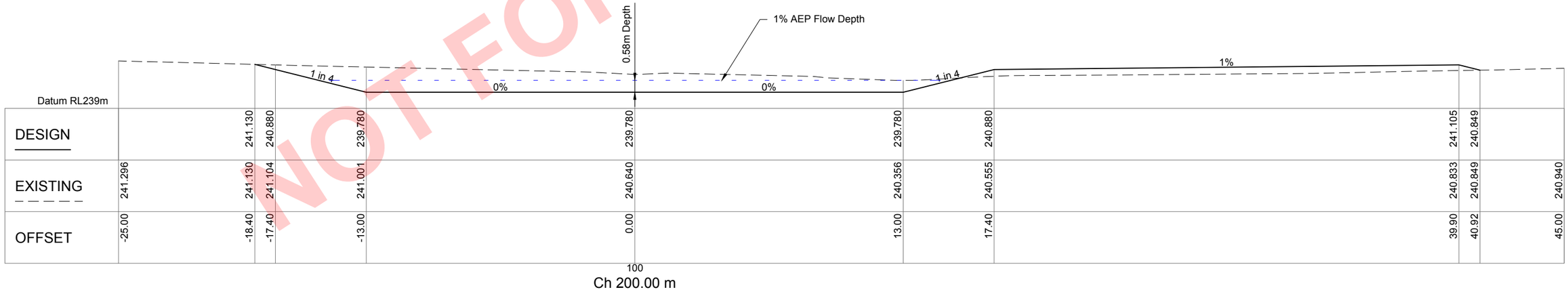
Job No. 2022.0849
DWG. No. SW10 Issue A
No. in set 42



Ch 240.00 m



Ch 220.00 m



Ch 200.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:48

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

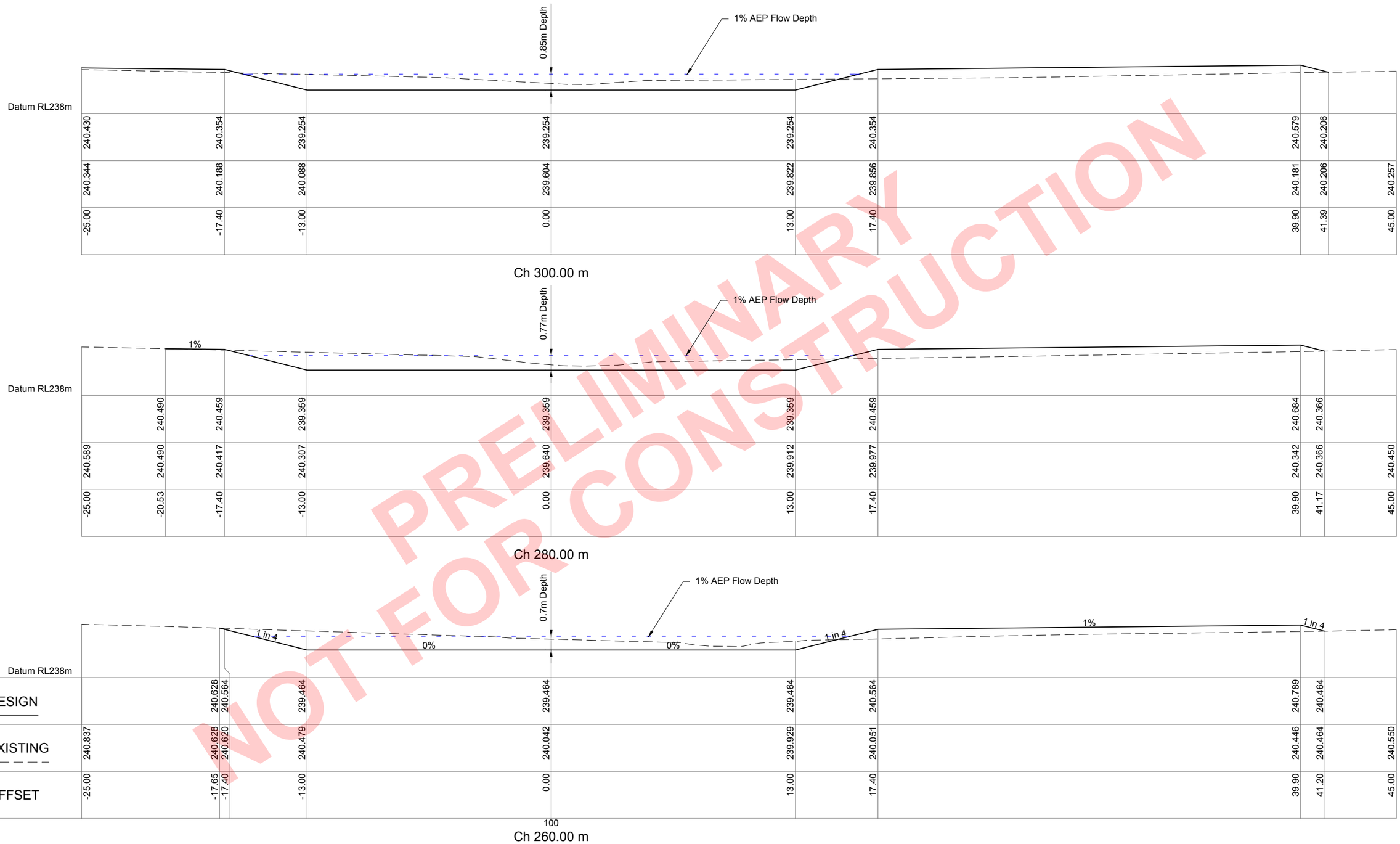
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW11 Issue A
No. in set 42



PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:50

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

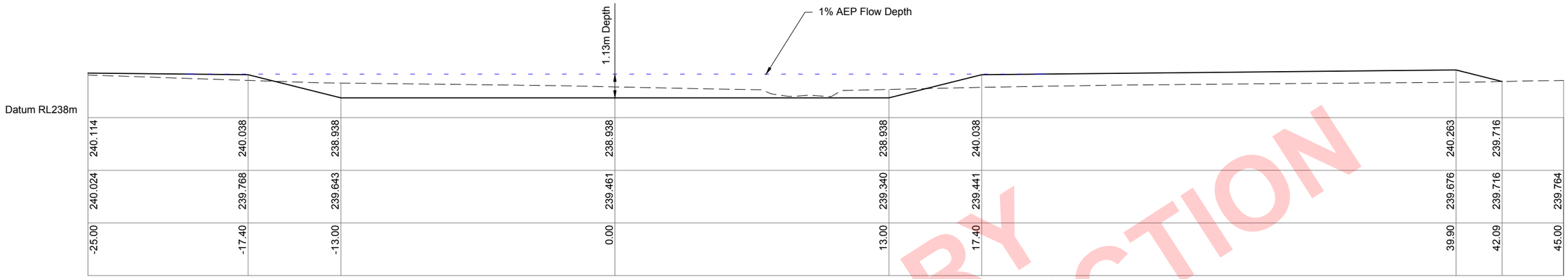
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

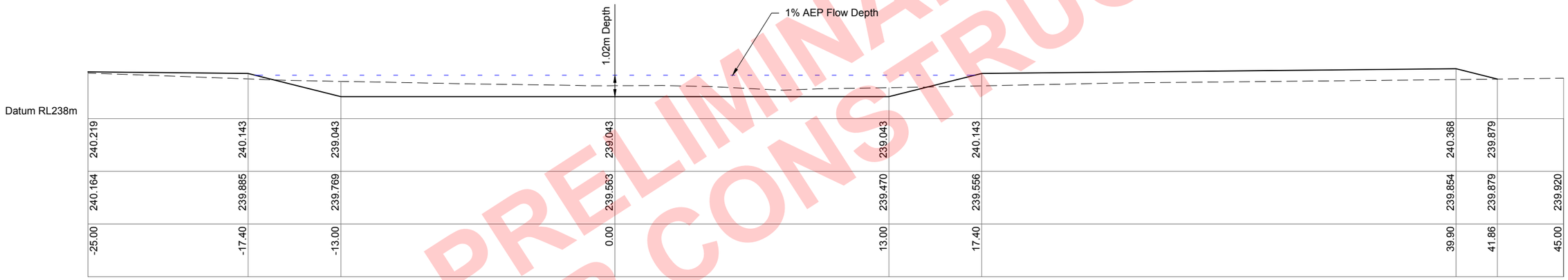
M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

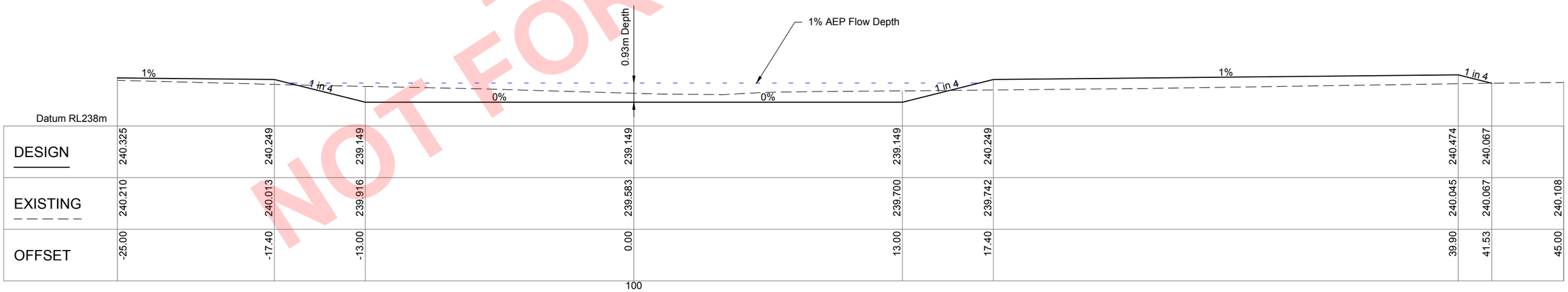
Job No. 2022.0849
DWG. No. SW12 Issue A
No. in set 42



Ch 360.00 m



Ch 340.00 m



Ch 320.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:52

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

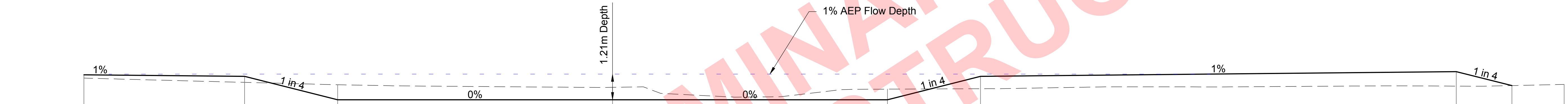
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SW13 Issue A
No. in set 42



Datum RL238m

DESIGN	240.009	239.933	238.833	238.833	238.833	239.933	240.158	239.500	
EXISTING	239.855	239.653	239.540	239.418	239.333	239.353	239.476	239.500	239.555
OFFSET	-25.00	-17.40	-13.00	0.00	13.00	17.40	39.90	42.53	45.00

100

Ch 380.00 m

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:54

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:100
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

DRAINAGE CHANNEL CROSS SECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849

DWG. No. SW14 Issue A

No. in set 42

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:57

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

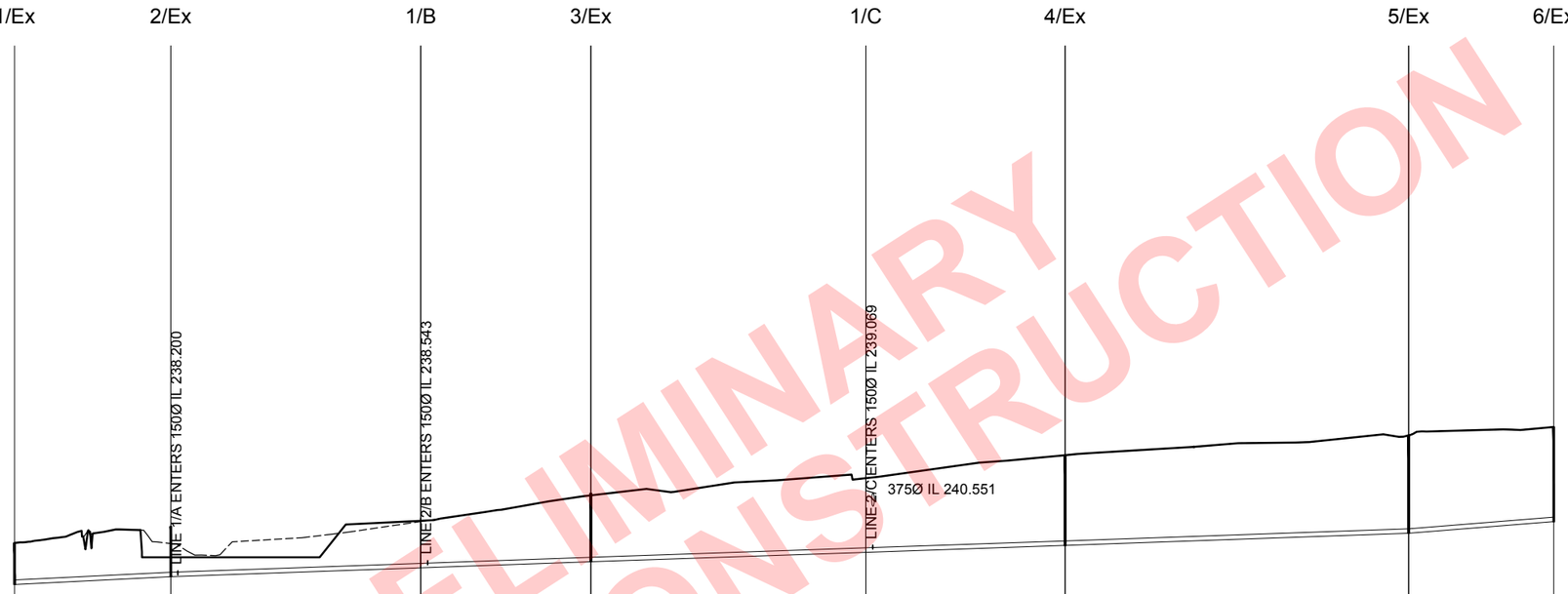
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LAYOUT PLAN

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No.	
2022.0849	
DWG. No.	Issue
SS01	A
No. in set	42



PIPE DETAILS SLOPE/GRADE DATUM RL 233.00	150Ø PVC RRJ 1:100.0 1.0%				150Ø PVC RRJ 1:141.2 0.7%				150Ø PVC RRJ 1:141.2 0.7%				150Ø PVC RRJ 1:145.0 0.7%				150Ø PVC RRJ 1:145.0 0.7%				150Ø PVC RRJ 1:140.9 0.7%				150Ø PVC RRJ 1:62.5 1.6%			
DEPTH TO INVERT	1.397			1.685				1.672				2.300				2.614				3.036				3.294				3.185
INVERT LEVEL	237.887			238.150				238.447				238.650				238.969				239.200				239.610				240.000
FINISHED SURFACE	239.284			238.803				240.029				240.884				241.461				242.236				242.904				243.185
EXISTING SURFACE				239.263				240.005				240.884				241.461				242.236				242.904				243.185
CHAINAGE	0.000			26.293	26.293			68.303	42.010			96.912	28.609			143.144	46.232			176.648	33.504			234.398	57.750			258.789	24.391

LINE Ex

SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:50:59

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:100v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

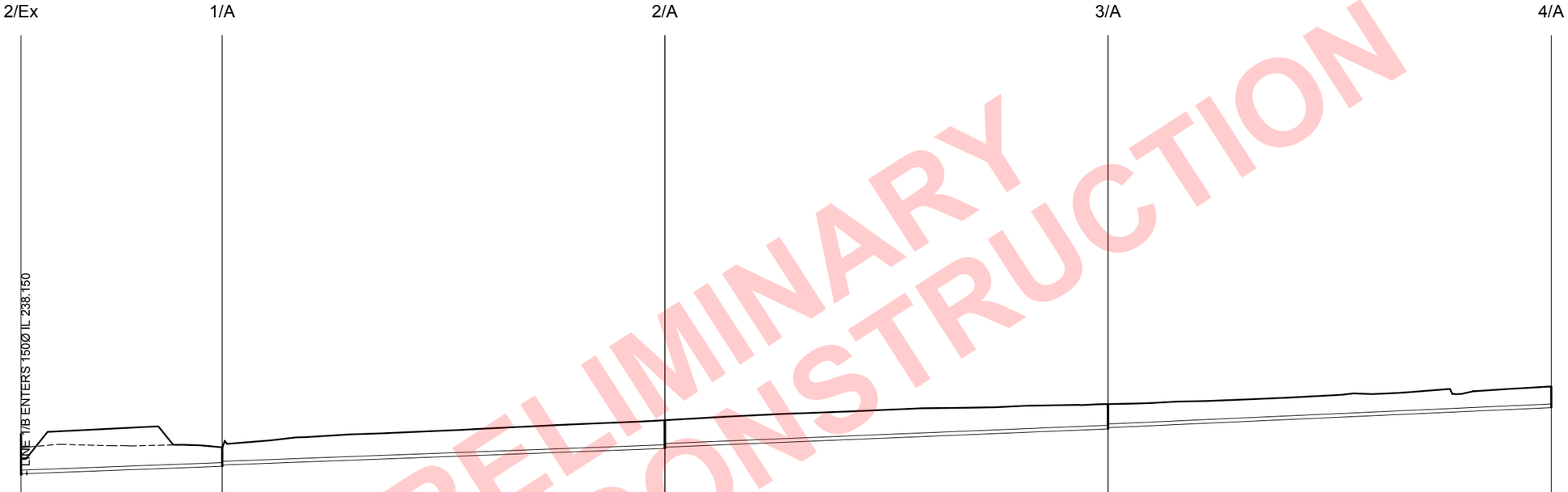
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SS02 Issue A
No. in set 42



PIPE DETAILS SLOPE/GRADE	150Ø PVC RRJ 1:133.3 0.7%		150Ø PVC RRJ 1:133.4 0.7%		150Ø PVC RRJ 1:121.1 0.8%	150Ø PVC RRJ 1:110.4 0.9%
DATUM RL 233.00						
DEPTH TO INVERT	1.635	0.770 / 0.720	1.148 / 1.098	1.009 / 0.959		0.859
INVERT LEVEL	238.200	238.506 / 238.556	239.230 / 239.280	240.023 / 240.073		240.888
FINISHED SURFACE	238.803	239.276	240.378	241.032		241.747
EXISTING SURFACE	239.263	239.276	240.378	241.032		241.747
CHAINAGE	0.000	40.846 / 40.846	130.754	220.754		310.754
	40.846	89.908		90.000		90.000

LINE A
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:51:01

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:100v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
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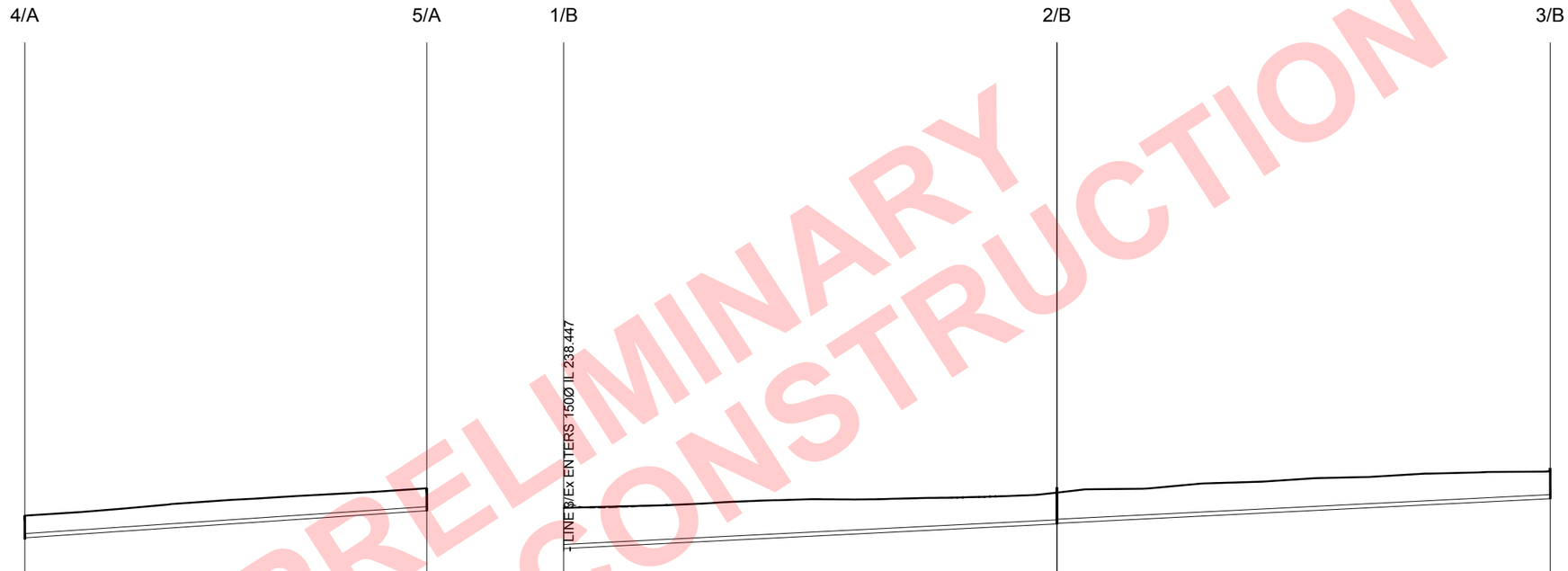
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SS03
Issue A
No. in set 42



PIPE DETAILS SLOPE/GRADE	150Ø PVC RRJ 1:74.4 1.3%		150Ø PVC RRJ 1:100.0 1.0%		150Ø PVC RRJ 1:100.0 1.0%	
DATUM RL 236.00			RL 234.00			
DEPTH TO INVERT	0.809	0.818	1.577	1.321	1.302	1.113
INVERT LEVEL	240.938	241.924	238.543	239.443	239.462	240.362
FINISHED SURFACE	241.747	242.741	240.029	240.586		241.364
EXISTING SURFACE	241.747	242.741	240.005	240.586		241.364
CHAINAGE	310.754	384.096	0.000	90.000	90.000	180.000
	73.342		90.000		90.000	

LINE A
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

LINE B
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:51:03

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:100v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
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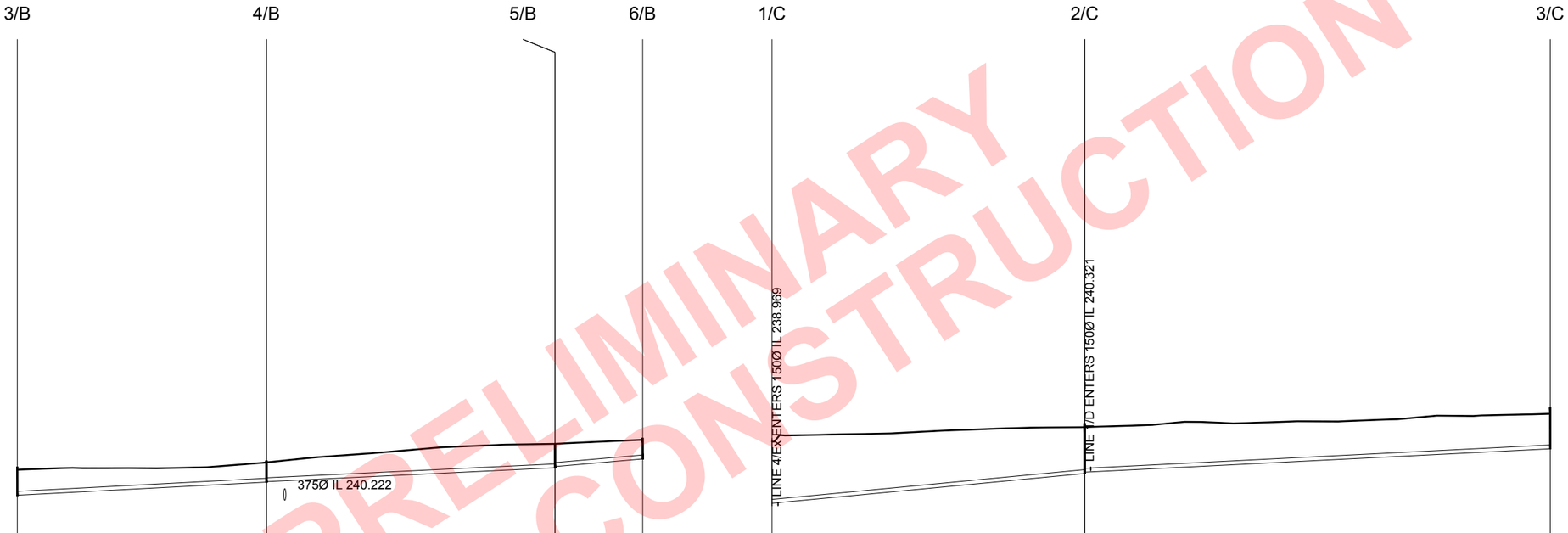
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No.	2022.0849
DWG. No.	SS04
Issue	A
No. in set	42



PIPE DETAILS SLOPE/GRADE	150Ø PVC RRJ 1:95.3 1.0%		150Ø PVC RRJ 1:104.4 1.0%		150Ø PVC RRJ 1:57.7 1.7%	
DATUM RL 235.00						
DEPTH TO INVERT	1.094	0.825	0.806	0.928	0.878	0.803
INVERT LEVEL	240.382	240.887	240.906	241.441	241.491	241.785
FINISHED SURFACE	241.364	241.650		242.368		242.522
EXISTING SURFACE	241.364	241.650		242.368		242.522
CHAINAGE	180.000	228.163		283.956		300.904
	48.163		55.793		16.949	

LINE B
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

	150Ø PVC RRJ 1:52.5 1.9%		150Ø PVC RRJ 1:99.8 1.0%	
RL 234.00				
	2.514	1.934	1.884	1.595
	239.069	240.221	240.271	241.173
	241.461	242.015		242.531
	241.461	242.015		242.531
	0.000	60.466		150.466
	60.466		90.000	

LINE C
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:51:06

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB	PRELIMINARY Not for construction
Designed:	GBL	
Checked:	TM	
Scale (A1):	1:500h 1:100v	
Date:	04/10/23	...\2022.0849-Civil-A.dwg

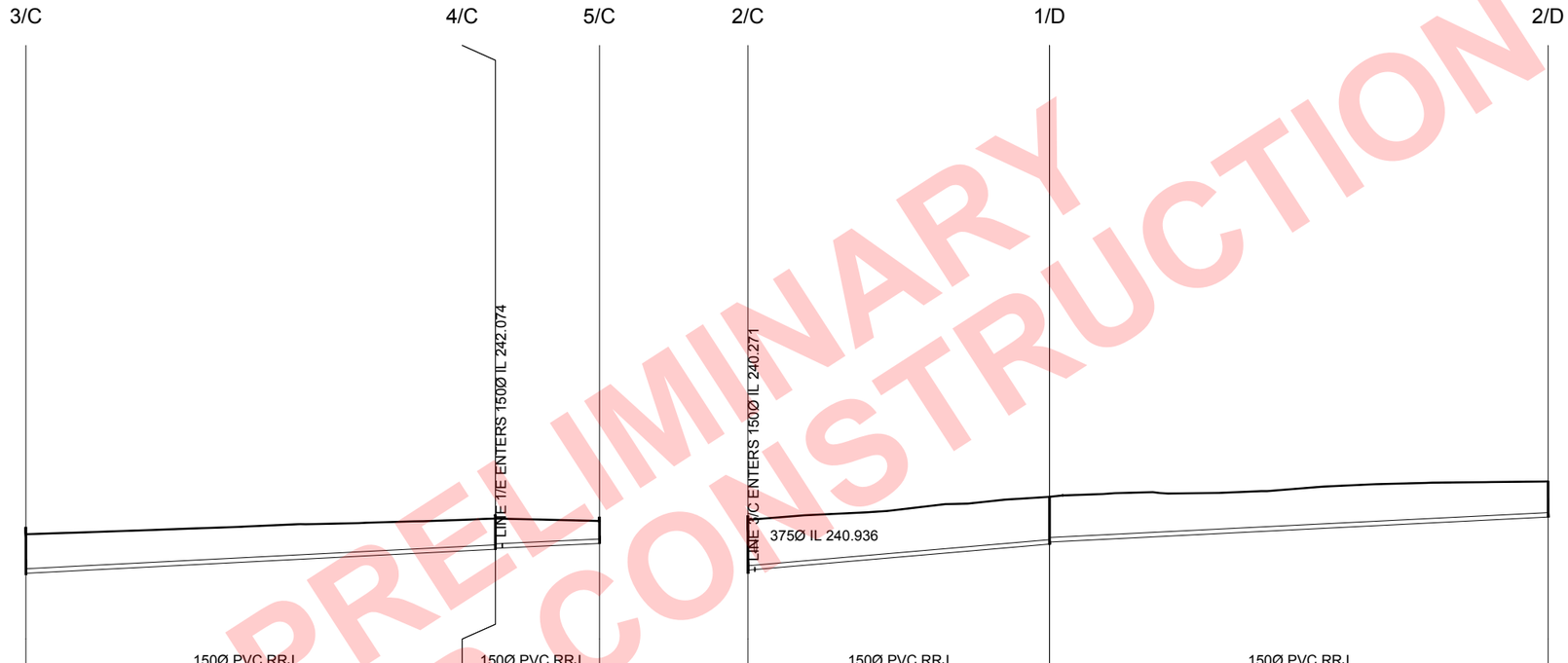
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No.	2022.0849
DWG. No.	SS05
Issue	A
No. in set	42



PIPE DETAILS SLOPE/GRADE		150Ø PVC RRJ 1:98.0 1.0%			150Ø PVC RRJ 1:107.5 0.9%		
DATUM RL 236.00							
DEPTH TO INVERT	1.552			1.170	1.135		0.889
INVERT LEVEL	241.217			242.024	242.059		242.222
FINISHED SURFACE	242.531			243.060			242.979
EXISTING SURFACE	242.531			243.060			242.979
CHAINAGE	150.466		79.089	229.554	17.524		247.078

LINE C
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

		150Ø PVC RRJ 1:57.9 1.7%			150Ø PVC RRJ 1:100.0 1.0%		
RL 235.00							
	1.834			1.595	1.525		1.204
	240.321			241.199	241.269		242.109
	242.015			242.794			243.313
	242.015			242.794			243.313
	0.000		50.799	50.799	84.000		134.799

LINE D
SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:51:08

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER
APEC Engineer IntPE (Aus) RBP
(Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:100v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

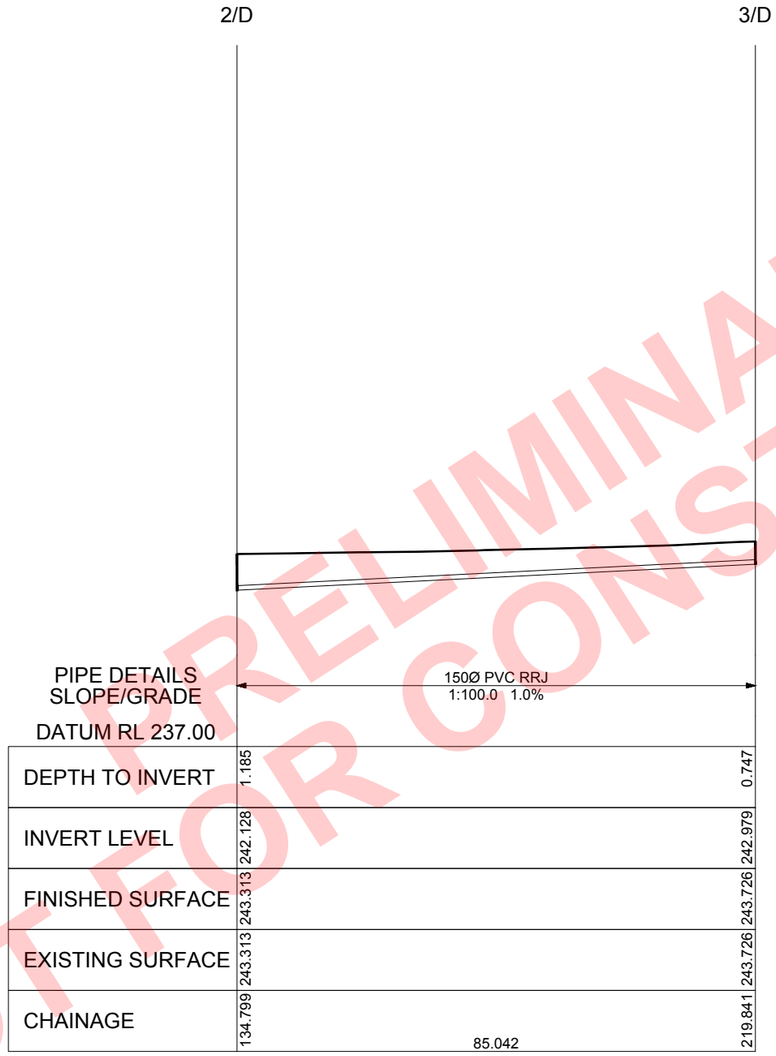
PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SS06 Issue A
No. in set 42

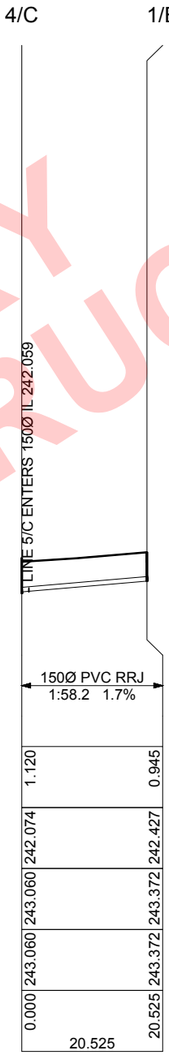


PIPE DETAILS		
SLOPE/GRADE	150Ø PVC RRJ 1:100.0 1.0%	
DATUM RL 237.00		
DEPTH TO INVERT	1.185	0.747
INVERT LEVEL	242.128	242.979
FINISHED SURFACE	243.313	243.726
EXISTING SURFACE	243.313	243.726
CHAINAGE	134.799	219.841

85.042

LINE D

SCALES: HORIZONTAL 1:500 VERTICAL 1:100



150Ø PVC RRJ 1:58.2 1.7%		
1.120		0.945
242.074		242.427
243.060		243.372
243.060		243.372
0.000		20.525

20.525

LINE E

SCALES: HORIZONTAL 1:500 VERTICAL 1:100

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:51:10

Amend	Date	Description	By	Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL				
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB				

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:500h 1:100v
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

SEWER LONGSECTIONS

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
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BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. SS07
Issue A
No. in set 42

Notes:
- Watermains are to be 100Ø Class 12 mPVC
- Watermain around cul-de-sac head to be 100Ø SDR11 PN16
- Each lot is to be provided with a watermeter to Forbes Shire Council specifications.
- Stop valves are to be clockwise closing.

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31.2023 - 12:51:12

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

WATER LAYOUT PLAN

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. W01
Issue A
No. in set 42

Appendix B. Draft Plan of Proposed Subdivision

PREPARED BY CALARE CIVIL

PROJECT
Planning Proposal

SITE
Bogan Gate Road, Forbes NSW

LANDOWNER
M G O'Keeffe Constructions Pty Ltd

APPLICANT
Currajong Pty Ltd

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Lot 23
DP 1044585

Lot 7302
DP 1144037

Lot 7026
DP 1023238

Existing drainage channel to be re-shaped to convey flow in 1% AEP event.
Refer to SW07-SW14 for details

Existing culvert

Half-width of Churchill Street to be reconstructed as part of subdivision development works.
Stormwater drainage design to be confirmed at DA Stage

Stormwater to discharge into drainage channel via appropriate headwall

Existing culvert

Existing dam to be filled

Existing culvert

CHURCHILL STREET

Proposed connection into existing watermain

Proposed sewer to discharge into existing manhole

Existing culverts

Lot 17 Lot 16 Lot 15 Lot 14 Lot 13 Lot 12 Lot 11 Lot 10 Lot 09 Lot 08 Lot 07 Lot 06 Lot 05 Lot 04 Lot 03 Lot 02 Lot 01

Lots 1265
DP 750158

Lot 22
DP 1008870

Proposed Drainage Channel

6.4m 34.8m 26.0m

Proposed sewer network to connect into existing main via new manhole

Proposed connection into existing watermain

Lot 24
DP 1044585

ROAD 1

9.3m

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

Lot 18 Lot 19 Lot 20 Lot 21 Lot 22 Lot 23 Lot 24 Lot 25

4.3m

Existing culverts

ROAD

Bio-Safety Zone

Lot 34 Lot 26 Lot 53 Lot 55 Lot 54

ROAD 2

Lot 33 Lot 32 Lot 31 Lot 30 Lot 29 Lot 28 Lot 27 Lot 52

4.3m 9.3m 4.3m

Lots 35-38
DP 859871

Half-width of Attlee Street to be reconstructed as part of subdivision development works

Lot 35

Proposed connection into existing watermain

Proposed stormwater line to discharge into proposed stormwater pit straddling existing line

ROAD 2

9.3m

Lot 51

Proposed sewer network to connect into existing main via new manhole

Lot 36 Lot 50

4.3m

Lot 38 Lot 39 Lot 40 Lot 41 Lot 42 Lot 43 Lot 44 Lot 45 Lot 46 Lot 47 Lot 48 Lot 49

Proposed connection into existing watermain

Lot 37

ATTLEE STREET

Lot 844
DP 750158

Lot 69

Lot 67 Lot 66 Lot 65 Lot 64 Lot 63 Lot 62 Lot 61 Lot 60 Lot 59 Lot 58 Lot 57 Lot 56

Lot 68

Lots 6-8
DP 248297

YORK STREET

Lots 35-36
DP 1087508

Proposed stormwater line to discharge into existing pit

HURFORD PLACE

Proposed connection into existing watermain

Lots 37-45
DP 1087508

Half-width of York Street to be reconstructed as part of subdivision development works

Proposed connection into existing watermain

PLOT INFO: ...\2022.0849-Civil-A.dwg, DATE: Oct 31,2023 - 12:49:37

Amend	Date	Description	By
A	30/10/23	Minor alterations	GBL
P1	04/10/23	PRE-DA CONCEPT ISSUE	JB

Approved for Construction:

Garth Dean
B.E. GDSTT FIEAust CPEng NER APEC Engineer IntPE (Aus) RBP (Vic/NT)

Drawn:	JB
Designed:	GBL
Checked:	TM
Scale (A1):	1:750
Date:	04/10/23

PRELIMINARY
Not for construction

...\2022.0849-Civil-A.dwg

PROPOSED SUBDIVSION
LOT 796 BOGAN GATE ROAD
FORBES, NSW 2871

GENERAL ARRANGEMENT PLAN

M G O'KEEFFE CONSTRUCTIONS

CALARE CIVIL
CONSULTING ENGINEERS
170 RANKIN STREET,
BATHURST, N.S.W. 2795
Tel: (02) 63323343 Fax: (02) 63318210

Job No. 2022.0849
DWG. No. G03
Issue A
No. in set 42

Appendix C.

Site Microbial Investigation (Anthrax), and Environmental Management Plan

PREPARED BY PREMISE

PROJECT
Planning Proposal

SITE
Bogan Gate Road, Forbes NSW

LANDOWNER
M G O'Keeffe Constructions Pty Ltd

APPLICANT
Currajong Pty Ltd

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

Premise

MICHAEL O'TOOLE

Site Microbial Investigation, Anthrax

BOGAN GATE ROAD, FORBES

Report No: 221306_REP_001B
Rev: B
20 December 2021

DOCUMENT AUTHORISATION			
Revision	**Revision Date**	**Report Details**	
A	16/12/21	Site Microbial Investigation, Anthrax - DRAFT	
B	20/12/21	Site Microbial Investigation, Anthrax - FINAL	
Prepared By		**Reviewed By**	**Authorised By**
Brendan Stuart		Andrew Brownlow	Brendan Stuart

CONTENTS

FIGURES

TABLES

APPENDICES

1. INTRODUCTION

1.1 Background

Premise was engaged Michael O'Toole (c/- Elders Forbes) to conduct a Site Microbial Investigation (SMI) targeting potential anthrax impacted soil at the site at Bogan Gate Road NSW 2871 (the site), defined by the Lots 796 and 1046 to 1055 in deposited plan (DP) 750158.

Schedule 6 of the Forbes 1986 Local Environment Plan (LEP) identifies "*Portions 1053 and 1054, Parish of Forbes, County of Ashburnham, Bogan Gate Road, Forbes*" as a "*disposal site for anthrax infected animals*". These portions correspond to Lots 1053 and 1054 of DP 750158, which are the two most south-western lots. Correspondence with the Planning Department of Forbes Shire Council could not confirm that the disposal site was within these two lots with confidence, and could only confirm its location as being east of the drainage easement. Accordingly the investigation area was established to include the majority of the block bounded by Bogan Gate Road, Churchill Street, York Street and Atlee Street, with the portion of this area west of the drainage easement excluded from the investigation.

This SMI has been conducted with consideration of the Managing Land Contamination – Planning Guidelines 1998 under the NSW State Environmental Planning Policy (SEPP) No 55 – Remediation of Land 1998.

Clause 7 of SEPP 55 requires that a consent authority must consider contamination and remediation in determining a development application and must not grant consent unless:

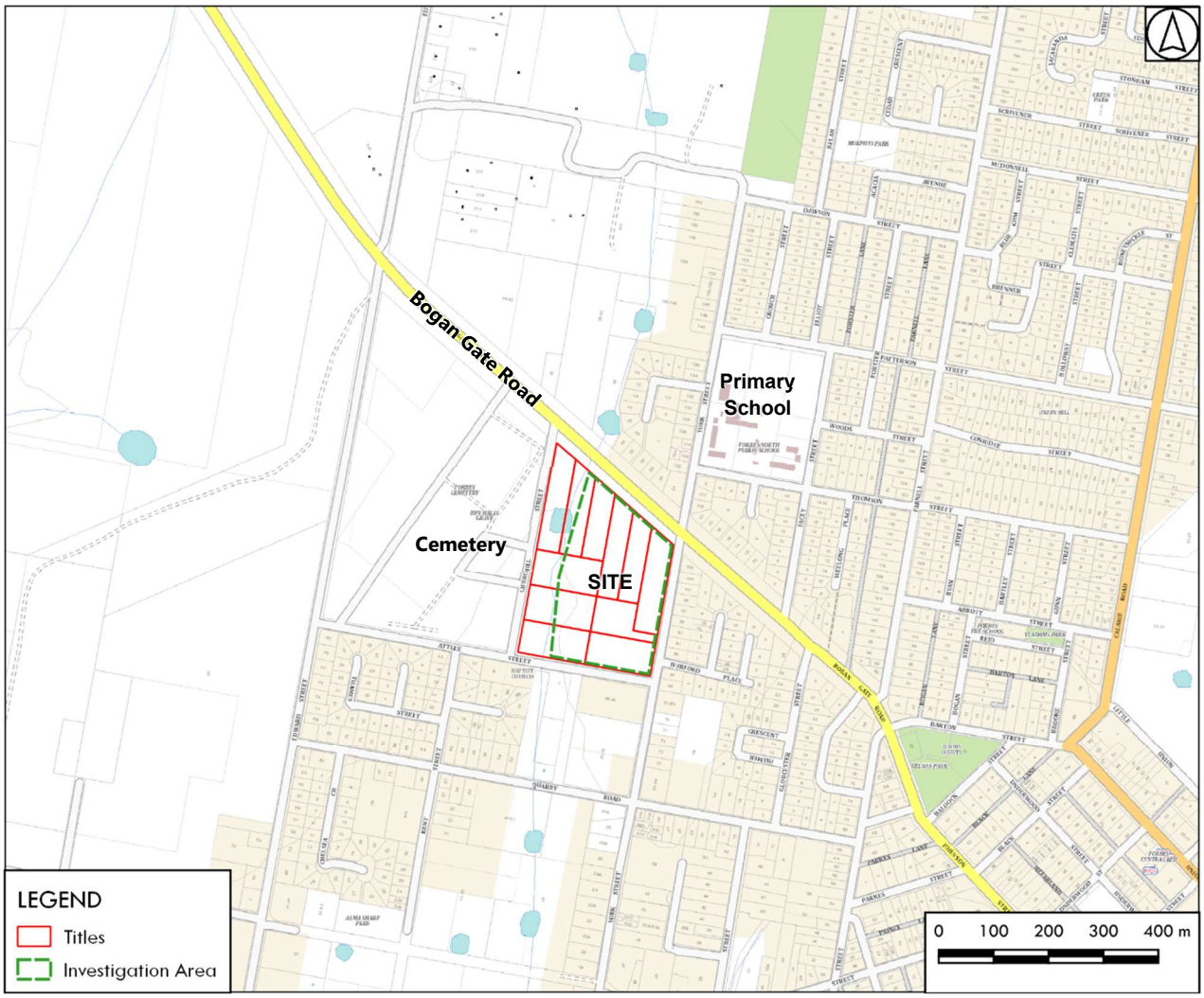
> *(a) it has considered whether the land is contaminated, and*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.*

The area subject to the SMI (i.e. the *Investigation Area*) is shown on **Figure 1**.

This SMI has been prepared in general accordance with the NSW EPA publication *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land* (EPA, April 2020). The overall objective is to identify the potential for land contamination at the site. Where land is not considered to be suitable for proposed land uses, recommendations for management and/or remediation to minimise risk to the environment, future occupants and contractors would be included.

The investigation area covers an area of approximately 5.3 hectares (ha) with approximate dimensions of 240 m to 340 m north-south and 190 m east west. The site does not border any other lots.

Figure 1 – Site Locality



This SMI is based on a desktop review of available information, a site walkover reconnaissance including ground-penetrating radar (GPR), analysis of targeted soil samples and a search of historical records.

1.2 Scope of Work

The scope of work for this investigation consisted of the following components:

- Review of the following third party documents:
  - Published topographical, geological and soil maps of the area;
  - Aerial photographs – selected historical aerial photographs of the site available for review to provide evidence of potential location(s) of carcass burial;
  - Historic information relating to anthrax management at the land titles, available from Forbes Shire Council.
- Site inspection – A site inspection by Premise personnel of the site was undertaken to provide further information, via visual inspection, of potential carcass burial location(s). The site inspection incorporated

the use of ground-penetrating radar (GPR), to identify areas of inconsistent soil density to a maximum depth of 2.0 m, targeted at locations with greatest potential for carcass burial to have occurred.

- Collection of soil samples from paddock grazing areas, cover material, and test pits adjacent to identified carcass burial area(s), and laboratory analysis for anthrax presence (spores or vegetative cells) and anthrax survivability parameters, including pH, organic carbon and exchangeable calcium) to establish potential for anthrax health risks.
- Collection of soil samples from background site with no known history of anthrax impacts to establish comparison of anthrax presence and anthrax survivability parameters results.
- Preparation of this factual report detailing the assessment findings in general accordance, as appropriate, with the NSW EPA publication *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Land* (EPA, 2020).

2. SITE DESCRIPTION

2.1 Site Definition

Table 2.1 – Summary of Property Description Details

Feature	Details
Site Address[1]	Bogan Gate Road, Forbes NSW
Title Identification Details[1]	• Lot 796 in DP 750158 • Lots 1046 to 1055 in DP 750158
Current Ownership	Mr Michael O'Toole
Current Site Use and Zoning[2]	Land Use: Rural (Grazing Pasture) Zoning: Lots 1053 & 1054: Environmental Management (E3) Drainage Easement: Public Recreation (RE1) Remainder: General Residential (R1)
Future Site Use	Residential Subdivision
Previous Environmental Reports	Nil
Site Area[1]	5.3 hectares (approximately)
Sources: 1: SIX Maps Website developed by NSW Government, Land and Property Information. http://maps.six.nsw.gov.au/ (accessed October 2021). 2: Forbes Local Environmental Plan, 2013, under the Environmental Planning and Assessment Act 1979.	

2.2 Site Setting

2.2.1 REGIONAL SETTING

The site is located in the north-western outskirts of Forbes, with residential land uses to the north, south and east. Forbes Cemetery is located to the west of the site.

The site is approximately 1.6 kilometres north-west of the Forbes central business district and 1 km north of Lake Forbes.

The following sensitive receptors are located within the vicinity of the site:

- Drainage channel forming the western boundary of the investigation area;
- Residents of dwellings to the north, south and east the site;
- Staff and students of Forbes North Public School, approximately 180 m north-east of the site;
- Livestock currently grazing on the site;
- Future residents of on-site dwellings on the site;

2.2.2 LOCAL SETTING

No permanent structures are present on the site. Derelict sheds in various stages of collapse are present.

Land uses and properties adjacent to the site, including those across adjacent roads were obtained from the site inspection conducted by Premise personnel in September 2021. The local area surrounding the site is displayed in **Figure 1**. Identified adjacent land uses are summarised in **Table 2.2**:

Table 2.2 – Adjacent Properties Descriptions

Direction from Site	Site Use (Nature of Activity)
North	Residential dwellings of Bogan Gate Road and John Girdham Place
South	Residential dwellings of Atlee Street and Forbes Baptist Church
East	Residential dwellings of York Street and Hurford Place
West	Drainage channel and Churchill Street, Forbes Cemetery beyond

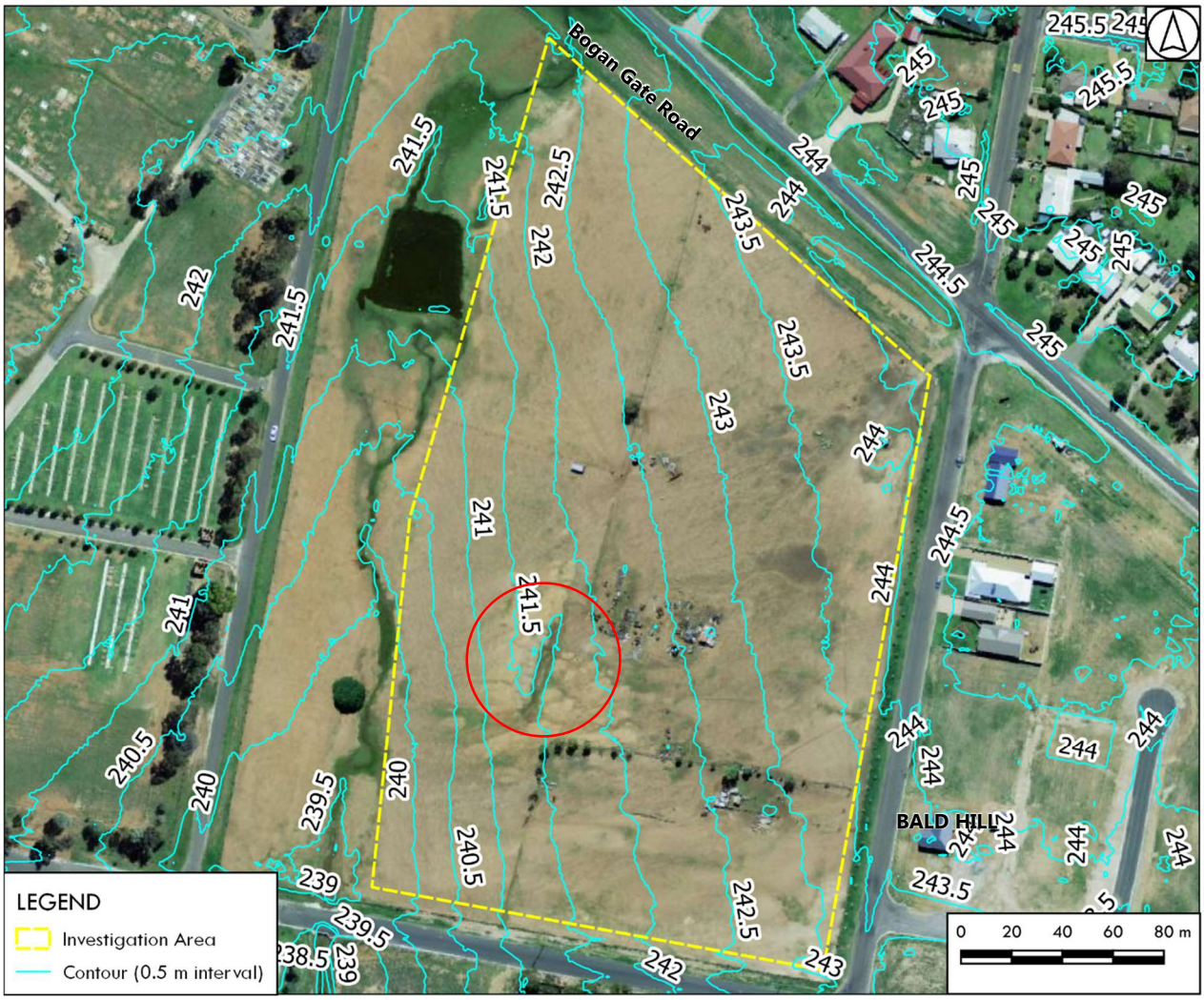
2.3 Topography and Surface Water

Topographical site information was obtained from the:

- Forbes 8531-S, 1:50,000 Scale, Topographic Map, (New South Wales Spatial Services, 2017); and
- Site visits in September and October 2021

The site consists of a generally flat landscape with the most elevated point being the north-eastern extent (approximate elevation 244 metres Australian Height Datum – mAHD). The slope of the site is slight, to the south-west, as shown in **Figure 2**.

Figure 2 – Site Topography, 0.5 m Contours



An inconsistency was identified at the 241.5 mAHD contour (red circle, above) where an incision or gully feature was noted, without corresponding to any larger drainage features.

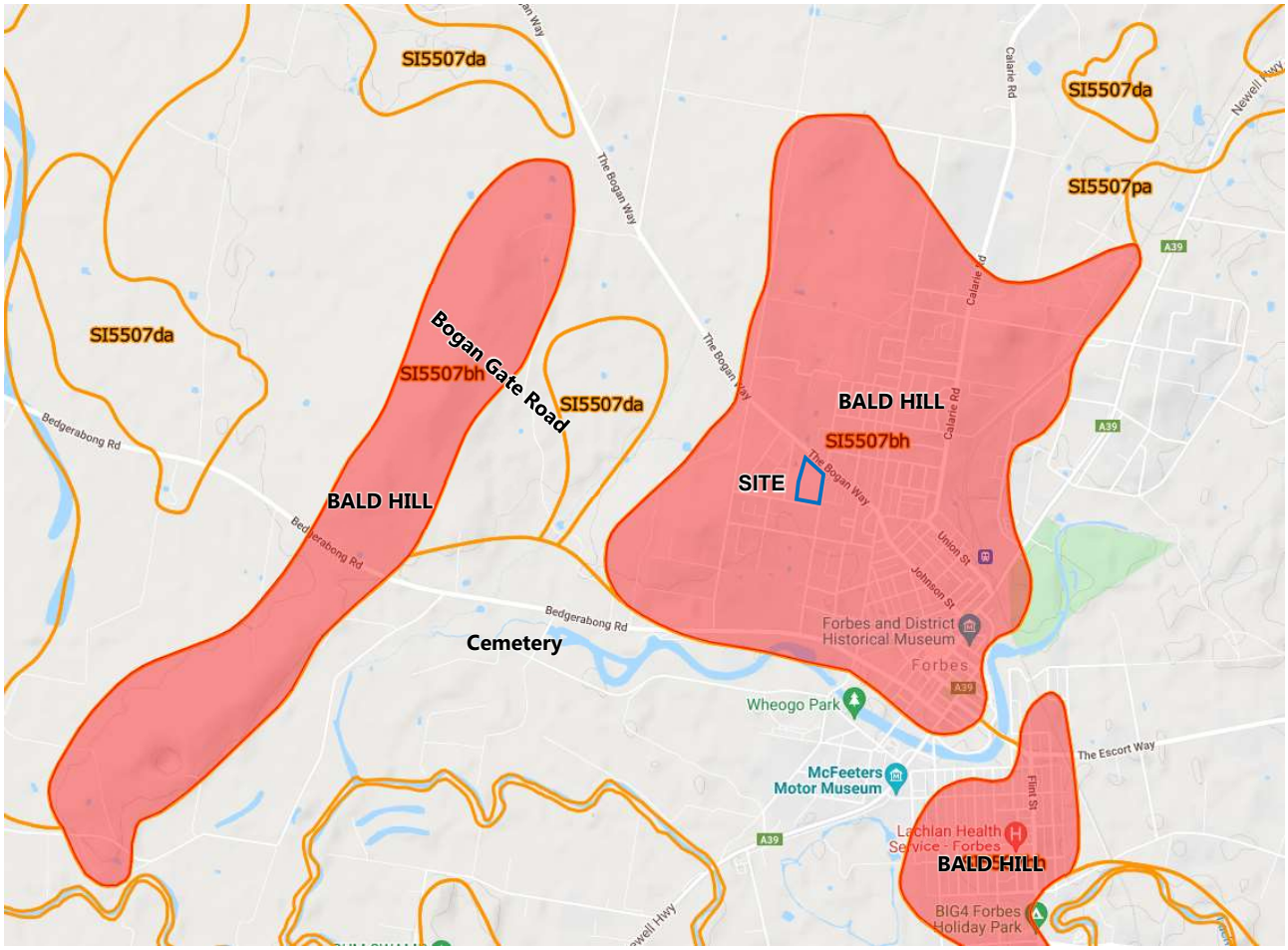
No defined drainage pathways exist on the investigation area,, and overland surface flow would be directed to the drainage channel that defines the investigation area's western boundary. The catchment of surface waters at the site includes urban areas beyond the site's northern and eastern boundaries.

2.4 Regional and Site Geology

Mapped soil landscapes around the site are shown on **Figure 2**. The site lies entirely on the 'Bald Hill' soil landscape. During the site inspection the soils were identified to be 'red podzolic soil'.

Red podzolic soils of the Bald Hill soil landscape consists of "*dark reddish brown sandy clay loam topsoil with a clear boundary at 15 cm to a reddish brown sandy clay loam. A clear boundary at 30 cm to reddish brown medium clay subsoil, extends to 50 cm depth*".

Figure 3 – Extent of 'Bald Hill' Soil Landscape Group



Rock outcrops were not observed at the site.

3. SITE HISTORICAL REVIEW

A review of the site history was undertaken to assess historical use of the site, and in particular to identify the nature and location(s) of carcass burial areas at the site.

3.1 NSW EPA Records

3.1.1 SCHEDULED ACTIVITIES AND/OR ENVIRONMENTAL NOTICES

A search of the NSW EPA on-line register (https://www.epa.nsw.gov.au/prpoeoapp/) was undertaken in October 2021 for clean-up notices issued under the Protection of the Environment Operations Act (POEO) 1997. The search indicated that no clean-up notices relating to the site or surrounding properties have been issued by the NSW EPA.

3.1.2 CONTAMINATED SITES REGISTER

A search of the NSW EPA on-line register (https://app.epa.nsw.gov.au/prclmapp/searchregister.aspx) was undertaken in October 2021 for contaminated land notices issued or regulated under the Contaminated Land Management Act 1997. The search indicated that the NSW EPA holds no contaminated land notices relating to the site or properties within 500 m of the site.

3.2 Forbes Shire Council Records

Property information held by Forbes Shire Council was provided to Premise for review, as attached in **Appendix A**. The following timeline of activities in **Table 3.1** was subsequently compiled:

Table 3.1 – Site History, Forbes Shire Council Records

Document	Date	Information
Timeline Notes	8 November 1988	Sheep from 'Kybu Station' near Hillston are transported to Forbes Saleyards. 50 to 100 sheep are later reported as dying at the Hillston site.
	-	Approximately four (4) dead sheep are collected by Arthur Finn of Bogan Gate Road (site owner)
	12 November 1988	Twelve (12) pigs reported dead after sheep being fed to pigs
	-	Dead pigs disposed (buried on-site)
	15 November 1988	Four (4) more pigs reported as dying at Arthur Finn's Bogan Road site (i.e. the Bogan Gate Rd site)
Officer Notes	18 November 1988	All pigs (approximately 100) at Arthur Finn's Bogan Road site have been destroyed (shot)
	19 November 1988	Plan developed to mitigate impacts: • Scrape and bury soil from stye areas • Chlorination of all water / drainage

Document	Date	Information
Photographic Log	Not Determined	• Pigs carcasses transferred to single burial pit, approximate depth 2.5 m • Carcasses in pit treated with chemical disinfectant (lime) • Topsoil from areas around styes scraped and filled into burial pit • Burial pit filled and capped (source of material was not established)

3.3 Historic Aerial Photography

An historical aerial photography survey was undertaken for the site, with a total of three (3) photographs identified and reviewed. The historical aerial photographs that were reviewed spanned a period of approximately 11 years, with the earliest in 1983 and the latest from 1993. Aerial photographs, as attached in **Appendix B**, were reviewed to identify areas of ground disturbance that may be indicative of burial areas. Key observations made during the review of aerial photos are summarised in **Table 3.2** as follows:

Table 3.2 – Summary of Aerial Photo Information

Date	Observations
1983	Structures are present in the central-south section of the site
1989	No structures are present on the site. Potential ground disturbance has occurred at area proximal to former location of structures
1993	Water appears to be pooling in the area to the west of where structures were formerly located, indicative of excavation or subsidence

3.4 Summary of Site History Information

Available evidence indicates a burial of pig carcasses occurred at the site subsequent to a mass animal death event occurring in November 1988, consisting of sheep at a site near Hillston and at the Forbes Saleyards, and pigs at the Bogan Gate Road site. A single burial pit with approximate depth of 2.5 m was excavated and animal carcasses were buried at the base. Site photographs indicated topsoil from other potentially impacted areas of the site was also buried in this pit, however the source of any additional capping material, if utilised, is not apparent.

Historic aerial photography from 1989 indicated livestock housing structures had been demolished, and an area of potential excavation or subsidence was observed to be present to the immediate west of the former location of these structures. Premise notes that this area corresponds to an incision or gully feature identified as a topographic inconsistency in **Section 2.3**. This area was established to be the most likely location of the burial pit.

4. SITE RECONNAISSANCE

Observations from the site inspection conducted on 24 September 2021 are summarised below.

4.1 Landfilling

Uneven ground consistent with subsidence following settlement of a filled area was apparent at the suspected burial pit area, which was recorded to be approximately 38 m in a north-south direction, and 8 m in an east-west direction. Pooled water was evident, and small soil stockpiles, approximately 0.4 m in height, were located to the immediate west of this area.

Site photographs are attached to this report as **Plates**.

4.2 Ground-Penetrating Radar Survey

A ground-penetrating radar (GPR) survey of the suspected burial pit area was conducted in September 2021 using microwave band radio reflection pulses. The GPR survey identified an area of inconsistent density with a footprint of approximately 34 m north-south and 5 m east-west within the aforementioned subsided area. The soil density profile was recorded as follows:

- 0.0 m to 0.9 m depth – similar density to surrounds
- 0.9 m to 1.6 m depth – low density (uncompacted)
- 1.6 m to 1.9 m depth (extent) – density profile consistent with saturated material

Based on the results of the GPR survey, the profile of the burial pit was considered to consist of an upper portion of soil (capping) which had been compacted, overlying a layer of uncompacted soil. Below this was a saturated layer which may correspond to animal carcasses, or uncompacted soil that had become saturated due to surface water infiltration.

5. MICROBIAL INVESTIGATION

5.1 Potential Biohazard Issues

Based on the historic evidence of anthrax impacted livestock (pigs) and potentially soil at the site, a microbial investigation was performed to establish the current and future risks to occupants and livestock at the site.

Anthrax (*Bacillus anthracis*) predominantly exists in the soil in a 'spore reservoir stage' in a state of dormancy. Environmental factors such as moisture content, organic carbon and exchangeable calcium in soil can result in increased propagation of *B. anthracis* spores and/or vegetative cells. Once the presence of *B. anthracis* exceeds the 'Minimal Infective Dose' (MID), a risk to larger organisms through inhalation or ingestion exists. Upon exposure, the spores and/or vegetative cells will reproduce within the host animal and cause an infectious outbreak of the disease.

The survivability of *B. anthracis* spores in soil is of concern. The NSW Department of Primary Industries (DPI) considers *B. anthracis* spores to widely be endemic to soil in a large tract of land ranging from Moree and Bourke in the state's north, to Albury and Deniliquin in the state's south. Premise notes that soil of the Forbes area may be included in this risk area, and dormant *B. anthracis* spores may exist in the soil at the site, irrespective of the site's history.

5.2 Literature Review

To better understand environmental factors that may influence survivability of anthrax spores and vegetative cells in soil, and establish criteria for somewhat quantifying the risk of infection in the event of *B. anthracis* being detected in the soil of the investigation area, a review of available literature was conducted as summarised in **Table 5.1**.

Table 5.1 – Review of Literature, Anthrax Survivability Factors

Document	Summary
Germination and Amplification of Anthrax Spores by Soil-Dwelling Amoebas Rafik Dey,a Paul S. Hoffman,a,b and Ian J. Glomskib Journal of Applied and Environmental Microbiology, Nov 2012, Vol. 78, No. 22	*Bacillus anthracis* is endemic in many soils, frequently alkaline, which are typically rich in organic matter and calcium that promote survival of resilient spores. 'Incubator areas' are described as depressions which collect water, dead vegetation, calcium, minerals, and salts washed from the surrounding areas following rainfall. Spores are likely carried in runoff that collects and concentrates them in depressions.
Anthrax and the Geochemistry of Soils in the Contiguous United States Dale W. Griffin, Erin E. Silvestri, Charlena Y. Bowling, Timothy Boe, David B. Smith, Tonya L. Nichols Geosciences, August 2014, Vol. 4	Calcium has been recognised as an element influencing the growth and/or virulence of *Bacillus anthracis.*

Document	Summary
Environmental determinants influencing anthrax distribution in Queen Elizabeth Protected Area, Western Uganda Margaret Driciru, Innocent B. Rwego, Sood A. Ndimuligo, Dominic A. Travis, Elibariki R. Mwakapeje, Meggan Craft, Benon Asiimwe, Julio Alvarez, Samuel Ayebare, Katharine Pelican 'PLOS One' Open Source Journal, August 2020	Viability and longevity of spores in the soil is reported to be influenced by levels of soil calcium, moisture, and alkalinity; hot-dry weather, mean annual temperatures, annual precipitation; elevation, and vegetation types. Bacterial spores contain a significant amount of calcium, which plays an essential role in spore preservation, viability, and germination.
Linking Geospatial and Laboratory Sciences to Define Mechanisms behind Landscape Level Drivers of Anthrax Outbreaks Michael H. Norris, Jason K. Blackburn International Journal of Environmental Research and Public Health, October 2019, Vol. 16, Iss. 19	Short-term bacterial growth and longer-term bacterial survival were altered by pH and calcium. Rainfall induced cycling of pH and calcium in soils plays a role in amplifying spore load and persistence in endemic anthrax zones. Observed evidence of *B. anthracis* favouring soil alkalinity and high soil calcium levels in the environment were linked to physiological conditions that promote bacterial growth, survival, toxin secretion and spore formation.

5.3 Investigation Criteria

The soil investigation levels utilised for this investigation have been established as follows:

- Nil detection of *B. anthracis* spores or vegetative cells (by PCR Analysis) in soil samples.

As quantification of anthrax levels (live specimens and spores) is not possible with current laboratory methods, this presence / absence testing for anthrax in soil can potentially result in reporting of 'false-positives', where *B. anthracis* may be present below the MID, and not necessarily indicative of an infection risk at the time of sampling.

Accordingly, a relative assessment of the anthrax exposure risk at the Bogan Gate Road site was performed by comparison of *B. anthracis* detections and survivability factors to a control (i.e. background) site with no known history of anthrax infection or contamination. For the purposes of this assessment, a property at South Lead Road, Forbes, was identified as an adequate background site based on similar lithology (red podzolic soil) and past land uses (livestock grazing).

The criteria for the relative assessment of anthrax exposure risk, based on survivability findings of the literature review (**Section 5.2**) were adopted as:

- Anthrax detection rate in soil samples at Bogan Gate Rd site to be less than 10% greater than background site detection rate; and

- Upper confidence limits (UCLs) of anthrax survivability risk factors (moisture content, pH, calcium and organic matter) statistically undifferentiated from levels at background site at 95% significance level, or specific criteria as follows:
  - Exchangeable calcium levels in the range of low to moderate (less than 10 meq/100g)
  - Soil pH tending towards acidic (pH of 6.5 or less)
  - Organic carbon content of soil ranging from low to moderate (less than 1.8 %)

5.4 Methodology

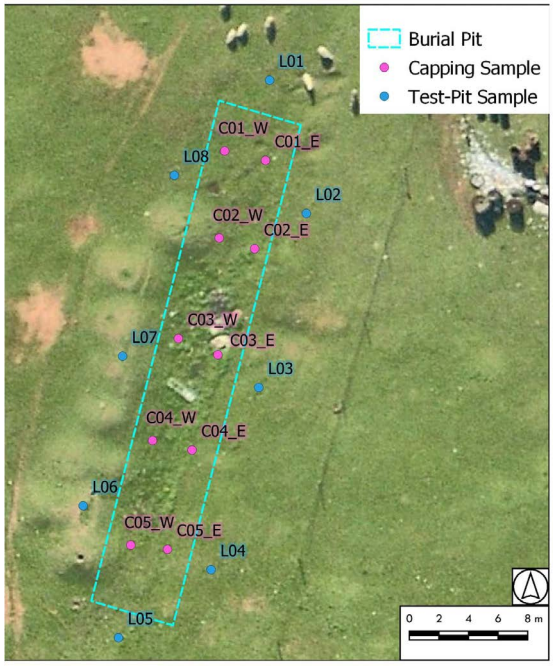
The following table outlines the scope and method of the assessment.

Table 5.2 – Assessment Methodology Summary

Activity / Item	Details
Date of Field Activities	Background Site: Investigation Works – 24 September 2021 Bogan Gate Rd Site: Site Inspection – 24 September 2021 Investigation Works – 20 October 2021
Samples Collected	Sample locations for the Bogan Gate Rd site are shown on **Figure 3** • 10 topsoil samples were collected in a combined systematic / judgemental sampling pattern from across the site. • 10 capping material samples were collected from 5 east-west aligned transects across the burial pit area • 16 subsoil samples were collected from 8 test-pits excavated approximately 2 m laterally from the inferred edge of the burial pit, based on observations and GPR survey. 8 samples were collected at 1.2 m depth, and 8 samples were collected at 2.5 m depth At the background site (South Lead Rd, Forbes), 20 topsoil samples were collected in a combined systematic / judgemental sampling pattern
Methodology	Soil samples were collected by back-hoe excavation with hand-sampling from the bucket using single use nitrile gloves. All samples were placed in clean, laboratory-supplied acid washed solvent rinsed glass jars with Teflon® lids.
Sample Preservation	Samples were stored on ice in an esky whilst on-site and in transit to the laboratory.
Decontamination	Re-usable sampling equipment (e.g. hand trowel) was decontaminated before each use using an alcohol based decontamination solution, then rinsed in potable water. Dedicated single-use items were not decontaminated, but were disposed following use. Nitrile gloves used for sampling were changed between each sample.

Figure 4 – Investigation Sample Locations

Investigation Area



Burial Pit

5.5 Sample Analysis

36 soil samples from the Bogan Gate Rd site and 20 soil samples from the background site (South Lead Rd, Forbes) were submitted to the NSW DPI Elizabeth Macarthur Agricultural Institute (EMAI) in Menangle NSW for detection analysis of *B. anthracis* spores or vegetative cells by polymerase chain reaction (PCR).

19 soil samples from the Bogan Gate Rd site and 14 soil samples from the background site were submitted to ALS Laboratories (ALS) for analysis of *B. anthracis* survivability parameters, including pH, organic carbon and exchangeable calcium, to establish potential for anthrax health risks. ALS is NATA (National Association of Testing Authorities) certified for the analyses performed.

Soil samples were analysed COPC described in **Section 5.1.2**, as appropriate.

5.6 Analytical Results

Soil descriptions at the Bogan Gate Rd site were logged as follows:

- 0.0 m to 0.4 m – loamy CLAY, brown, soft to firm, moist; overlying
- 0.4 m to 0.8 m – CLAY, red-brown, firm to stiff, dry; overlying
- 0.8 m to 2.5 m – CLAY, red, stiff, dry

Soil analytical results are presented in the laboratory certificates in **Appendix C**. *B. anthracis* survivability parameters for the Bogan Gate Rd site and the background site are respectively summarised in **Tables 1** and **2** (attached). *B. anthracis* PCR analysis results are summarised in **Table 3** (attached).

Analysis of *B. anthracis* survivability parameters by ALS indicated marginally higher results at the Bogan Gate Rd site compared to the background site, as follows:

- pH of topsoil averaged 7.1 at the Bogan Gate Rd site, compared to 6.4 at the background site. Neutral to alkaline soil (pH > 6.5) is considered optimal for *B. anthracis* survival (see 'Literature Review', **Section 5.2**)
- Exchangeable calcium in topsoil averaged 12.6 meq/100g at the Bogan Gate Rd site, compared to 5.2 meq/100g at the background site. Exchangeable calcium of greater than 10 meq/100g is considered optimal for *B. anthracis* survival
- Total organic carbon (TOC) in topsoil averaged 2.1 % at the Bogan Gate Rd site, compared to 1.3 % at the background site. TOC of greater than 1.8 % is considered optimal for *B. anthracis* survival

No detections of *B. anthracis* spores or vegetative cells by PCR analysis were recorded in any of the soil samples submitted for analysis at EMAI.

Laboratory quality control results and chain of custody (COC) documentation are provided in **Appendix D**.

5.7 Discussion

A comparison of **Table 1** and **Table 2** indicates a marginally greater risk of anthrax survivability at the Bogan Gate Road site due to topsoil samples (including pit capping material) indicating relatively elevated moisture content, TOC and exchangeable calcium and higher alkalinity.

No detections of anthrax spores or vegetative cells were recorded at either site.

Premise considers that residential receptors, construction workers and/or livestock, would not be at any greater risk of anthrax exposure at the Bogan Gate Rd site than that at the background site, provided the capping material of the animal burial pit is maintained and not disturbed.

6. CONCLUSIONS

Premise make the following conclusions regarding the potential risk of anthrax exposure at the site, based on a desktop review of available information, a review of historical records, site walkover reconnaissance including GPR survey, and analytical results of collected samples.

- The area comprising the investigation area, consisting of the majority of the block bounded by Bogan Gate Road, Churchill Street, York Street and Atlee Street (excluding the portion west of the drainage easement), has been characterised insofar as the potential presence of *B. anthracis* spores or vegetative cells in soil.
- A single animal burial pit of approximate dimensions 34 m north-south and 5 m east-west has been identified on the site within land titles Lots 1053 and 1054 of DP 750158, as indicated on **Figure 3**. The inferred depth of this burial pit is approximately 3 m, based on historic site photography (**Appendix A**). A spatial survey of this area has been completed and is available upon request.
- Based on the findings of this investigation, no significant routes of exposure by receptors (current or future) to anthrax impacts exist outside of a 2 m lateral buffer beyond the footprint of the burial pit. Similarly, no significant routes of exposure by receptors (current or future) to anthrax impacts exist in the burial pit capping material to a depth of 0.5 m.
- On the basis of the capping material of the animal burial pit being maintained and not disturbed, and no excavation occurring within 2 m of the identified lateral extents of the animal burial pit, Premise considers the area of the site to be suitable for residential land uses.

7. STATEMENT OF LIMITATIONS

Premise Australia Pty Ltd (Premise) has prepared this Site Microbial Investigation in accordance with the usual care and thoroughness of the consulting profession for the use of Mr Michael O'Toole and only those third parties who have been authorised in writing by Premise to rely on the Site Microbial Investigation.

The Site Microbial Investigation is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Site Microbial Investigation.

The Site Microbial Investigation is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 29 July 2021.

This Site Microbial Investigation should be read in full. No responsibility is accepted for use of any part of this Site Microbial Investigation in any other context or for any other purpose or by third parties.

The methodology adopted and sources of information used by Premise are outlined in the Site Microbial Investigation.

Where this Site Microbial Investigation indicates that information has been provided to Premise by third parties, Premise has made no independent verification of this information unless required as part of the agreed scope of work. Premise assumes no liability for any inaccuracies in or omissions to that information.

This Site Microbial Investigation was prepared between 15 November 2021 and 20 December 2021.The information in this Site Microbial Investigation is considered to be accurate at the date of issue and is in accordance with conditions at the site at the dates sampled. Opinions and recommendations presented herein apply to the site existing at the time of our investigation and cannot necessarily apply to site changes of which Premise is not aware and has not had the opportunity to evaluate. This document and the information contained herein should only be regarded as validly representing the site conditions at the time of the investigation unless otherwise explicitly stated in a preceding section of this Site Microbial Investigation. Premise disclaims responsibility for any changes that may have occurred after this time.

Except as required by law, no third party may use or rely on, this Site Microbial Investigation unless otherwise agreed by Premise in writing. Where such agreement is provided, Premise will provide a letter of reliance to the agreed third party in the form required by Premise.

To the extent permitted by law, Premise expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Site Microbial Investigation. Premise does not admit that any action, liability or claim may exist or be available to any third party.

Premise does not represent that this Site Microbial Investigation is suitable for use by any third party.

Except as specifically stated in this section, Premise does not authorise the use of this Site Microbial Investigation by any third party.

It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the relevant property.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Site Microbial Investigation. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

DATA TABLES

TABLE 1: Bogan Gate Road Site Investigation: Risk Parameters (Anthrax Suvivability Factors), Soil Sampling Analytical Results
OCTOBER 2021

					Paddocks							
				Sample ID	FBR_P01	FBR_P02	FBR_p03	FBR_P04	FBR_P06	FBR_P07	FBR_P08	FBR_P09
				Sample Date	20/10/2021	20/10/2021	20/10/2021	20/10/2021	20/10/2021	20/10/2021	20/10/2021	20/10/2021
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS
Physical Parameters	Moisture Content	0.1	%	-	**12.1**	**10.3**	**16.1**	**13.8**	**14.6**	**16.5**	**16.2**	**16.5**
	pH (Lab)	0.1	pH Unit	6.5	**8.5**	**7.8**	**7**	**7.3**	**7.2**	**6.3**	**6.3**	**7.3**
Forms of Carbon	Total Organic Carbon	0.02	%	1.8	**0.6**	**1**	**0.9**	**1.2**	**1**	**1.5**	**1.9**	**1**
Exchangeable Cations	Exchangeable Sodium Percent	0.1	%	-	**1.9**	**7.3**	**6.5**	**9.6**	**2.9**	**2.8**	**1.2**	**3.9**
	Exchangeable Calcium	0.1	meq/100g	10	**17.4**	**7.3**	**8**	**7.6**	**10.6**	**7.6**	**9.6**	**9.5**
	Exchangeable Magnesium	0.1	meq/100g	-	**3.7**	**5.1**	**9.5**	**8.7**	**7.5**	**4.4**	**6.8**	**8.8**
	Exchangeable Potassium	0.1	meq/100g	-	**1.4**	**0.8**	**1.8**	**0.6**	**1.7**	**2.3**	**1.3**	**1.2**
	Exchangeable Sodium	0.1	meq/100g	-	**0.4**	**1**	**1.3**	**1.8**	**0.6**	**0.4**	**0.2**	**0.8**
	Cation Exchange Capacity	0.1	meq/100g	-	**22.9**	**14.2**	**20.6**	**18.7**	**20.4**	**14.7**	**17.9**	**20.4**

mg/kg	milligrams per kilogram
meq/100g	milliequivalents per 100 g
LOR	limit of reporting
PS	primary sample
Criteria	Anthrax Survivability Risk Factors adopted as Criteria

within criteria
criteria exceeded

TABLE 1: Bogan Gate Road Site Investigation: Risk Parameters (Anthrax Suvivability Factors), Soil Sampling Analytical Results
OCTOBER 2021

					Burial Pit Surrounds						Burial Pit Cover				
				Sample ID	FBR_L01_1.2	FBR_L02_2.5	FBR_L03_1.2	FBR_L05_2.5	FBR_L06_1.2	FBR_L07 2.5	FBR_C01_E	FBR_C02_W	FBR_C03_E	FBR_C04_W	FBR_C05_E
				Sample Date	20/10/2021	20/10/2021	20/10/2021	20/10/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
Physical Parameters	Moisture Content	0.1	%	-	**19.6**	**15.3**	**16.3**	**16.4**	**20.9**	**15.2**	**34.7**	**34.6**	**35.7**	**19.7**	**25.2**
	pH (Lab)	0.1	pH Unit	6.5	**8.2**	**4.9**	**8.1**	**5.8**	**7.9**	**5**	**7.3**	**6.6**	**6.3**	**7.1**	**7.5**
Forms of Carbon	Total Organic Carbon	0.02	%	1.8	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**4.5**	**3.9**	**4.4**	**2.4**	**3**
Exchangeable Cations	Exchangeable Sodium Percent	0.1	%	-	**18**	**24.2**	**24.7**	**20**	**18.3**	**23.4**	**0.4**	**0.5**	**1**	**0.8**	< 0.2
	Exchangeable Calcium	0.1	meq/100g	10	**12.5**	**2.8**	**7.7**	**4.4**	**7.9**	**3.4**	**23.9**	**16.4**	**16.2**	**16.9**	**12.9**
	Exchangeable Magnesium	0.1	meq/100g	-	**8.3**	**6.6**	**7.4**	**8.3**	**7.2**	**7.4**	**5.5**	**4.4**	**4.9**	**5.9**	**3.3**
	Exchangeable Potassium	0.1	meq/100g	-	**0.5**	**0.2**	**0.4**	**0.3**	**0.3**	**0.3**	**2.2**	**1.5**	**2.2**	**1.6**	**1.9**
	Exchangeable Sodium	0.1	meq/100g	-	**4.7**	**3.1**	**5.1**	**3.2**	**3.4**	**3.4**	**0.1**	**0.1**	**0.2**	**0.2**	< 0.2
	Cation Exchange Capacity	0.1	meq/100g	-	**26**	**12.7**	**20.6**	**16.2**	**18.8**	**14.6**	**31.8**	**22.4**	**23.6**	**24.6**	**18.1**

mg/kg	milligrams per kilogram
meq/100g	milliequivalents per 100 g
LOR	limit of reporting
PS	primary sample
Criteria	Anthrax Survivability Risk Factors adopted as Criteria

within criteria
criteria exceeded

TABLE 2: Background Road Site Investigation: Risk Parameters (Anthrax Suvivability Factors), Soil Sampling Analytical Results
OCTOBER 2021

					Paddocks													
				Sample ID	FBS02_0.1	FBS03_0.1	FBS04_0.1	FBS05_0.1	FBS07_0.1	FBS08_0.1	FBS10_0.1	FBS12_0.1	FBS13_0.1	FBS14_0.1	FBS15_0.1	FBS17_0.1	FBS19_0.1	FBS20_0.1
				Sample Date	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021	24/09/2021
Group	**Analyte**	**LOR**	**Units**	**Criteria**	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS	PS
Physical Parameters	Moisture Content	0.1	%	-	**14.5**	**14.4**	**11**	**10.2**	**11.2**	**11.9**	**14.1**	**11.6**	**13.4**	**10.9**	**12.6**	**9.6**	**11.6**	**8.6**
	pH (Lab)	0.1	pH Unit	6.5	**6.5**	**6.1**	**6.4**	**6.7**	**6.7**	**6.4**	**6.2**	**6**	**6**	**6.9**	**6.9**	**6.6**	**6.3**	**6**
Forms of Carbon	Total Organic Carbon	0.02	%	1.8	**0.31**	**1.35**	**1.03**	**1.14**	**0.98**	**1.25**	**2.26**	**1.32**	**1.96**	**1.15**	**1.27**	**1.33**	**0.92**	**2.35**
Exchangeable Cations	Exchangeable Sodium Percent	0.1	%	-	**1.6**	**1**	**0.5**	**4**	**2.2**	**0.5**	**0.1**	**0.2**	**0.3**	**1.6**	**3.4**	**5**	**0.6**	**0.2**
	Exchangeable Calcium	0.1	meq/100g	10	**9.8**	**3.7**	**4.4**	**4.3**	**5.4**	**4.4**	**5.4**	**4.6**	**5.3**	**5.8**	**5.8**	**4.4**	**4.5**	**4.8**
	Exchangeable Magnesium	0.1	meq/100g	-	**4**	**1.4**	**1.7**	**5.1**	**3.8**	**1.8**	**1.4**	**1.4**	**1.4**	**4.6**	**6.2**	**4.2**	**1.8**	**1.5**
	Exchangeable Potassium	0.1	meq/100g	-	**1**	**0.8**	**0.8**	**1**	**1.2**	**0.9**	**1.2**	**0.9**	**1.7**	**1.2**	**0.8**	**0.9**	**0.8**	**1**
	Exchangeable Sodium	0.1	meq/100g	-	**0.2**	< 0.1	< 0.1	**0.4**	**0.2**	< 0.1	< 0.1	< 0.1	< 0.1	**0.2**	**0.4**	**0.5**	< 0.1	< 0.1
	Cation Exchange Capacity	0.1	meq/100g	-	**15**	**6**	**6.8**	**10.8**	**10.5**	**7.1**	**8.1**	**6.9**	**8.4**	**11.9**	**13.4**	**9.9**	**7.1**	**7.3**

mg/kg	milligrams per kilogram
meq/100g	milliequivalents per 100 g
LOR	limit of reporting
PS	primary sample
Criteria	Anthrax Survivability Risk Factors adopted as Criteria

within criteria
criteria exceeded

TABLE 3: Laboratory PCR *Bacillus anthracis* Test, Soil Sampling Analytical Results
SEPTEMBER - OCTOBER 2021

Sampling Date	Site	Sample ID	Sample Description	Depth (mbgl)	Area	PCR Result
20/10/2021	Bogan Rd Site	FBR_P01	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P02	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P03	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P04	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P05	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P06	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P07	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P08	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P09	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_P10	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L01_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L01_2.2	Subsoil	2.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L02_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L02_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L03_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L03_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L04_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L04_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L05_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L05_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L06_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L06_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L07_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L07_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L08_1.2	Subsoil	1.2	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_L08_2.5	Subsoil	2.5	Burial Pit Surrounds	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C01_E	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C01_W	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C02_E	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C02_W	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C03_E	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C03_W	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C04_E	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C04_W	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C05_E	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
20/10/2021	Bogan Rd Site	FBR_C05_W	Capping Soil	0.1	Burial Pit Cover	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS01_0.2	Topsoil	0.2	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS02_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS03_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS04_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS05_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS06_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS07_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS08_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS09_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS10_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS11_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS12_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS13_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS14_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS15_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS16_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS17_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS18_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS19_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected
24/09/2021	Background Site	FBS20_0.1	Topsoil	0.1	Paddock	No *Bacillus anthracis* detected

mbgl	metres below ground level		within criteria
PCR	polymerase chain reaction		criteria exceeded
Criteria	Laboratory PCR *Bacillus anthracis* detection (presence / absence) adopted as criteria		

PLATES

Plate 1 – Animal Burial Pit Area, South-East Aspect

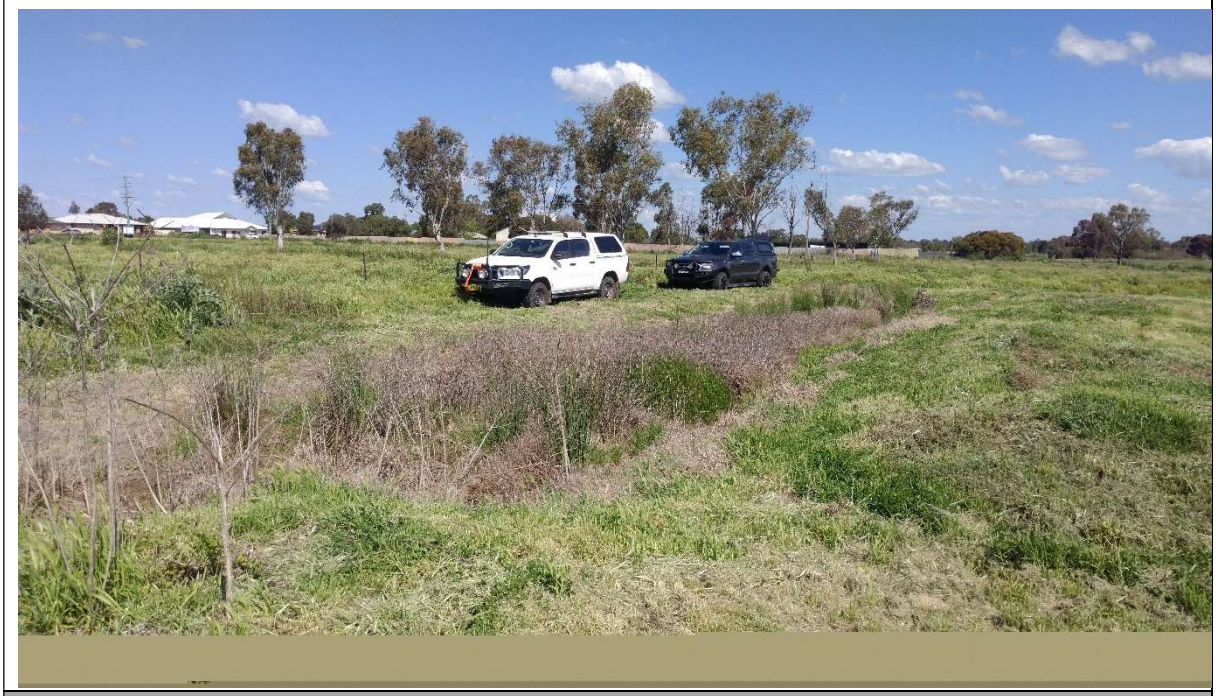


Plate 2 – Animal Burial Pit Area, North Aspect

Plate 3 – Test-Pit, Animal Burial Pit Surrounds

Plate 4 – Animal Burial Pit Cover Material

Plate 5 – Animal Burial Pit, Extents Marked

Plate 6 – Background Site (South Lead Road), Soil Investigation

APPENDIX A

FORBES SHIRE COUNCIL RECORDS

18/11/88
10.30

Phone call from Wayne Reid - re potential for Team to sell the pigs at the end of the quarantine period

He feels that provided the DOA clears the pigs there will be no problem to them being sold for market price unless there is a "scare".

19/11/88 11am

Spoke to AF - He shot the last remaining sick pig yesterday He is not a returned Serviceman. He says he feels OK & doesn't need any help at the moment (counsellor)

He has $1400 in bank & owes $1000 rates. He feels he has about 100 pigs & depending on the market in 6 week may return about $40 average ($4000) Cost $100 per week for feed.

I asked him about cost of decontam & what he planned to do - He doesn't have anybody to help

I said that council may be able to pay the expenses & you repay them at the sale of the pigs or a charge on the land.

Told him to get a drum of chlorine & to put on the drainage from the piggery. He seemed to be resigned to the destruction of the pigs at the end of quarantine. Barry Kemp had told him earlier about the position re

19/11/88 9am

Clive Lang - Told him about Wayne Reid & present position at Swan's,

He agreed we will have to do something positive during the week he suggested a roll of $ wire & paint for those that have been vaccinated to make it certain all are done

We got 2PK to put over several public address announcements about dogs in the area - may be destroyed.

PLAN

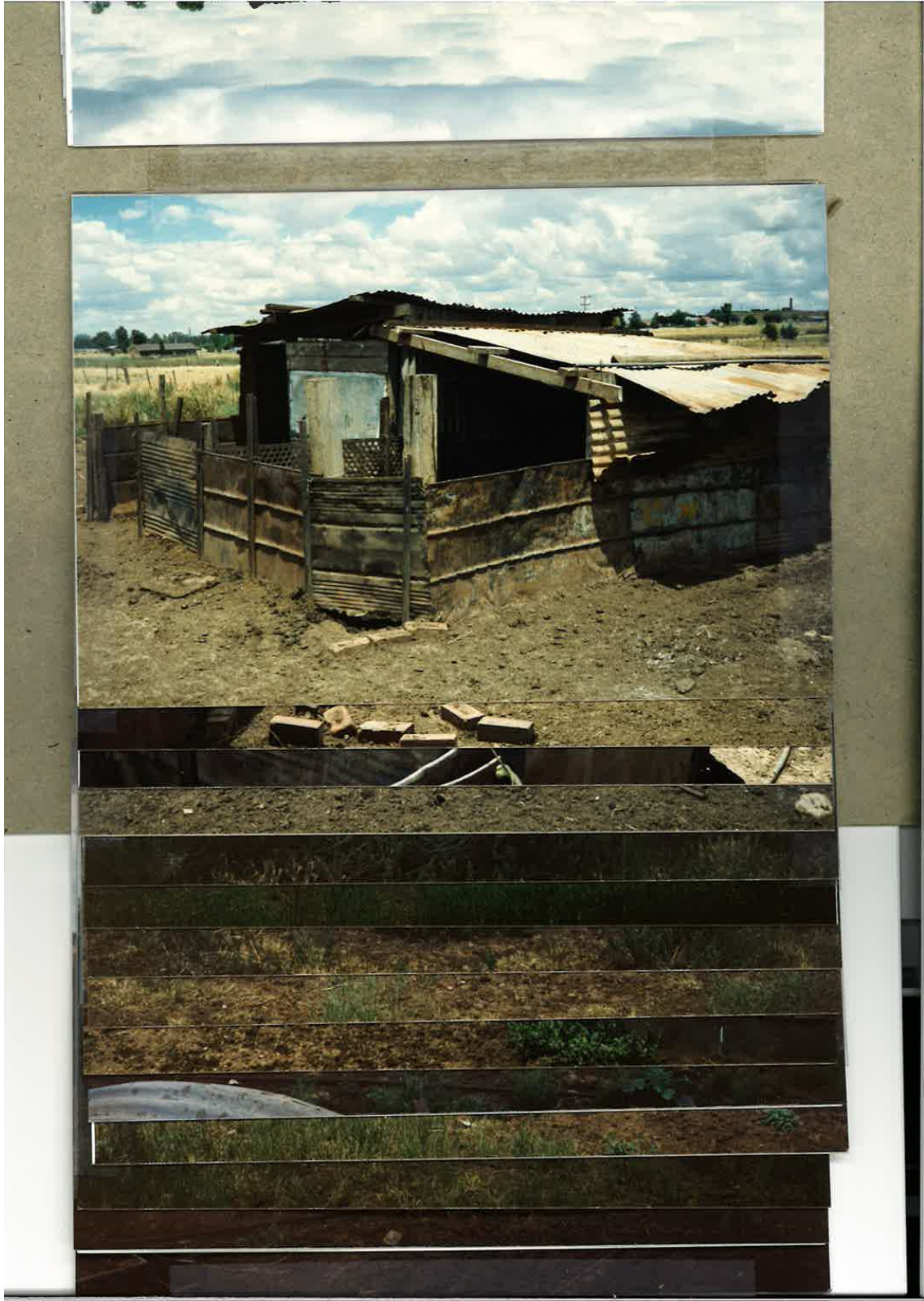
1. VACCINATE — Jan
   — PPB / Dept of Ag
   — Arthur — Durham / Crisp / A McConnell
2. STYES — clean
   — spray
3. SURROUNDS — Scrape up & burn
4. Other contam areas — Scrape up & burn } G. Heinz.
5. Chlorination of water / drainage

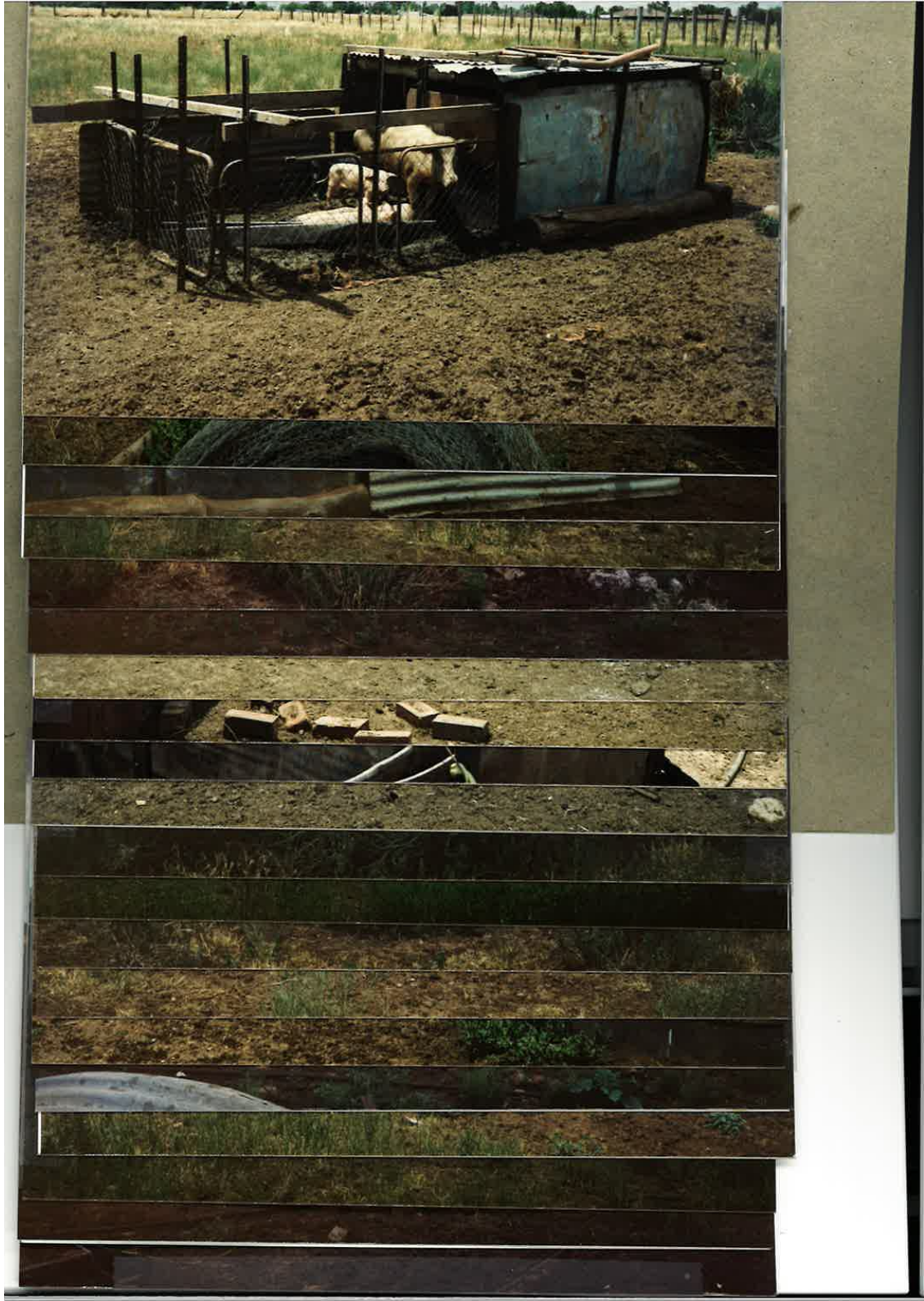
Valuation No. 2328

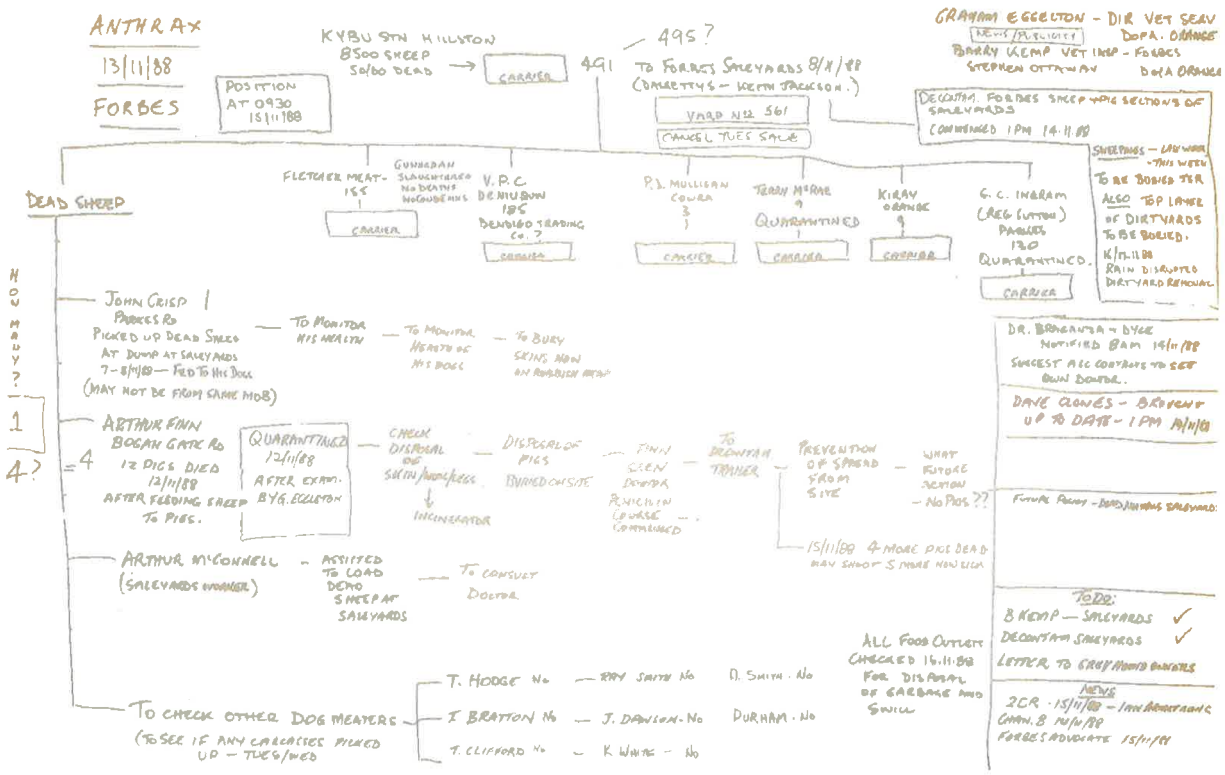
Valuation No. 2328

CATERPILLAR

FILM PHOTOS
PHOTOS FOR SIMON

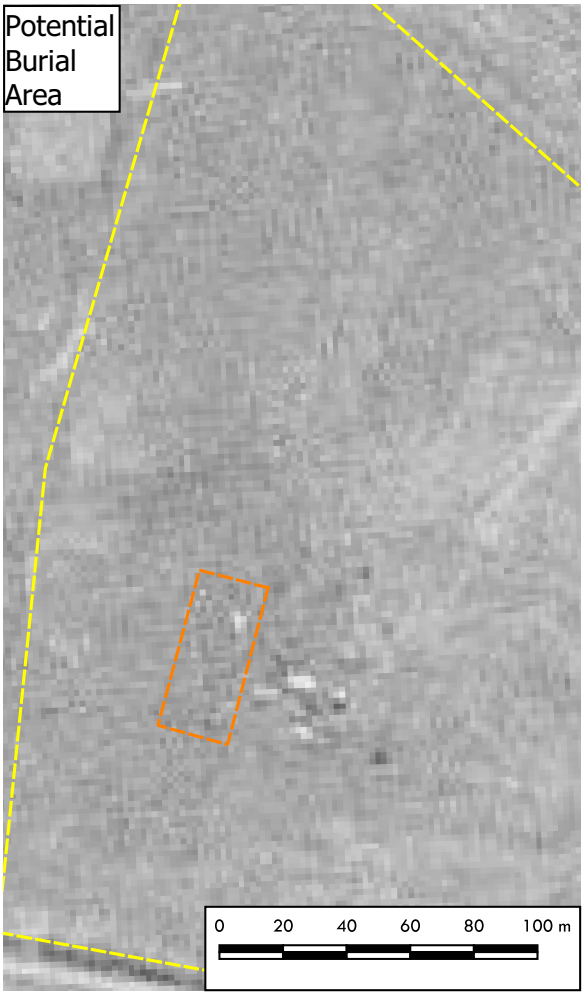





ANTHRAX
13/11/88
FORBES
POSITION AT 0930 15/11/88
KYBU STN HILLSTON
8500 SHEEP
50/80 DEAD
CARRIER
491
495?
TO FORBES SALEYARDS 8/11/88
(DALGETTYS – KEITH JACKSON.)
VNAD N12 561
CANCEL TUES SALE
GRAHAM EGGLETON – DIR VET SERV
NEWS/PUBLICITY
DOPA. DUBBO
BARRY KEMP VET INSP – FORBES
STEPHEN OTTAWAY
DOPA DUBBO
DECONTAM. FORBES SHEEP/PIG SECTIONS OF SALEYARDS
COMMENCED 1PM 14.11.88
SHEEPYARDS – LAID WASTE – THIS WEEK
TO BE BOILED TER
ALSO TOP LAYER OF DIRTYARDS TO BE BOILED.
K/15.11.88
RAIN DISRUPTED DIRTYARD REMOVAL
DEAD SHEEP
FLETCHER MEAT- 155
GUNNEDAH SLAUGHTERED NO DEATHS NOTED/SEEN
V.P.C. DENILIQUIN 185
DENDIGO TRADING Co. 7
P.J. MULLIGAN COOMA 3 1
TERRY McRAE 9
QUARANTINED
KIRAY ORANGE 9
G.C. INGRAM (REG SUTTON) PARKES 130
QUARANTINED.
CARRIER
HOW MANY? 1 4? =4
JOHN CRISP
PARKES RD
PICKED UP DEAD SHEEP AT DUMP AT SALEYARDS 7-8/11/88 – FED TO HIS DOG
(MAY NOT BE FROM SAME MOB)
– TO MONITOR HIS HEALTH
– TO MONITOR HEARTS OF HIS DOGS
– TO BURY SKINS NOW ON ROADSIDE HEAP
DR. BRAGANZA – DYCE NOTIFIED 8am 14/11/88
SUGGEST ALL CONTACTS TO SEE OWN DOCTOR.
DAVE JONES – BROKEN UP TO DATE – 1PM 15/11/88
ARTHUR FINN
BOGAN GATE RD
12 DIGS DIED 12/11/88
AFTER FEEDING SHEEP TO PIGS.
QUARANTINED 12/11/88
AFTER EXAM. BY G. EGGLETON
– CHECK DISPOSAL OF SKIN/HOOF/FLESH
INCINERATOR
– DISPOSAL OF PIGS
BURNED ON SITE
– FINN SEEN DOCTOR
PENICILLIN COURSE COMMENCED
– TO BROKEN TRAINER
– PREVENTION OF SPREAD FROM SITE
– WHAT FUTURE ACTION – NO PIGS??
15/11/88 4 MORE PIGS DEAD MAY SHOOT 5 MORE NOW SICK
FUTURE POLICY – DISPOSAL/BURNING SALEYARDS
ARTHUR McCONNELL
(SALEYARDS MANAGER)
– ASSISTED TO LOAD DEAD SHEEP AT SALEYARDS
– TO CONSULT DOCTOR
To Do:
B KEMP – SALEYARDS ✓
DECONTAM SALEYARDS ✓
LETTER TO GREY HOUND OWNERS
ALL FOOD OUTLETS CHECKED 16.11.88 FOR DISPOSAL OF GARBAGE AND SWILL
NEWS
2CR · 15/11/88 – INNE ADVERTISING
CHAN. 8 16/11/88
FORBES ADVOCATE 15/11/88
TO CHECK OTHER DOG MEATERS
(TO SEE IF ANY CARCASSES PICKED UP – TUES/WED
T. HODGE No – RAY SMITH No
D. SMITH · No
I BRATTON No – J. DAWSON · No
DURHAM · No
T. CLIFFORD No – K WHITE – No

APPENDIX B

HISTORIC AERIAL PHOTOGRAPHY



Premise

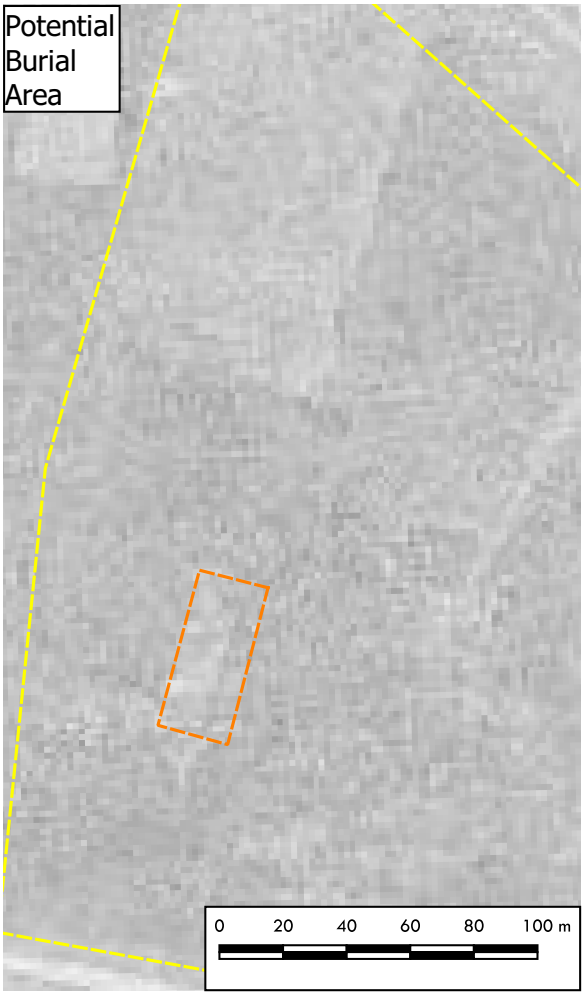
Bogan Gate Road, Forbes

Historic Aerial Imagery

1983

Source: NSW SixMap (Imagery); NSW LPI (Cadastre)

EPSG:7855 Prepared by: Melissa Wells Date: 16/12/2021 Directory: \\orange\Orange\Synergy\Projects\221\221306\Forbes Bogan\GIS\221306 Maps.qgz



Premise

Bogan Gate Road, Forbes

Historic Aerial Imagery

1989

Source: NSW SixMap (Imagery); NSW LPI (Cadastre)

EPSG:7855 Prepared by: Melissa Wells Date: 16/12/2021 Directory: \\orange\Orange\Synergy\Projects\221\221306\Forbes Bogan\GIS\221306 Maps.qgz

Premise

Bogan Gate Road, Forbes

Historic Aerial Imagery

1993

Source: NSW SixMap (Imagery); NSW LPI (Cadastre)

EPSG:7855 Prepared by: Melissa Wells Date: 16/12/2021 Directory: \\orange\Orange\Synergy\Projects\221\221306\Forbes Bogan\GIS\221306 Maps.qgz

APPENDIX C

ANALYTICAL CERTIFICATES

Department of Primary Industries
Elizabeth Macarthur Agricultural Institute
Woodbridge Rd Menangle

Our Ref: M21-16308
Your Ref: 221306
Prev. Ref:
Laboratory Enquires: 1800 675 623
Invoice Enquires: 1300 720 773

LABORATORY REPORT

To: PREMISE AUSTRALIA
154 PEISLEY STREET
ORANGE
2800 NSW AU
Attn: BRENDAN STUART

Owner: C/- PREMISE AUSTRALIA
Property:
FORBES 2871

Job Type: Soil

Job Manager: Anne Jordan
Date Sampled: 20 Oct 2021
Date Sent: 21 Oct 2021
Date Received: 22 Oct 2021

Submitter Subject: ANTHRAX
Samples Received: 36 X SOIL

Anne Jordan
Veterinary Pathologist

EMAI Molecular Biology

Lab No.	Sample ID	Sample Desc	Bacillus anthracis PCR
0001	FBR_L01_1.2	Subsoil	Not Detected
0002	FBR_L01_2.2	Subsoil	Not Detected
0003	FBR_L02_1.2	Subsoil	Not Detected
0004	FBR_L02_2.5	Subsoil	Not Detected
0005	FBR_L03_1.2	Subsoil	Not Detected
0006	FBR_L03_2.5	Subsoil	Not Detected
0007	FBR_L04_1.2	Subsoil	Not Detected
0008	FBR_L04_2.5	Subsoil	Not Detected
0009	FBR_L05_1.2	Subsoil	Not Detected
0010	FBR_L05_2.5	Subsoil	Not Detected
0011	FBR_L06_1.2	Subsoil	Not Detected
0012	FBR_L06_2.5	Subsoil	Not Detected
0013	FBR_L07_1.2	Subsoil	Not Detected
0014	FBR_L07_2.5	Subsoil	Not Detected
0015	FBR_L08_1.2	Subsoil	Not Detected
0016	FBR_L08_2.5	Subsoil	Not Detected
0017	FBR_P01	Topsoil	Not Detected
0018	FBR_P02	Topsoil	Not Detected
0019	FBR_P03	Topsoil	Not Detected
0020	FBR_P04 (LABELLED FBS - P04)	Topsoil	Not Detected
0021	FBR_P05 (LABELLED FBS - P05)	Topsoil	Not Detected
0022	FBR_P06	Topsoil	Not Detected
0023	FBR_P07	Topsoil	Not Detected
0024	FBR_P08	Topsoil	Not Detected
0025	FBR_P09	Topsoil	Not Detected
0026	FBR_P10	Topsoil	Not Detected
0027	FBR_C01_E	Capping Soil	Not Detected
0028	FBR_C01_W	Capping Soil	Not Detected
0029	FBR_C02_E	Capping Soil	Not Detected
0030	FBR_C02_W	Capping Soil	Not Detected
0031	FBR_C03_E	Capping Soil	Not Detected
0032	FBR_C03_W	Capping Soil	Not Detected
0033	FBR_C04_E	Capping Soil	Not Detected
0034	FBR_C04_W	Capping Soil	Not Detected
0035	FBR_C05_E	Capping Soil	Not Detected
0036	FBR_C05_W	Capping Soil	Not Detected

Comment(s):

Molecular Biology Laboratory Comment:
Please note: *Bacillus anthracis* PCR is not validated on soil samples and therefore loses its status as a NATA accredited test. Validated sample types include: un-clotted blood, tissues, blood smears and colonies. KE 26/10/2021

Copies
LLS DV DUBBO (email: cw.lab.reports@lls.nsw.gov.au)

Date Issued: **07 Oct 2021** **Final Report** Report Number: **M21-14986-F-V1**

Department of Primary Industries
Elizabeth Macarthur Agricultural Institute
Woodbridge Rd Menangle

Our Ref: M21-14986
Your Ref: 221306
Prev. Ref:
Laboratory Enquires: 1800 675 623
Invoice Enquires: 1300 720 773

LABORATORY REPORT

To: PREMISE AUSTRALIA
154 PEISLEY STREET
ORANGE
2800 NSW AU
Attn: BRENDAN STUART

Owner: PREMISE AUSTRALIA
Property:
FORBES 2871

Job Type: Soil

Job Manager: Pedro Pinczowski
Date Sampled:
Date Sent: 27 Sep 2021
Date Received: 29 Sep 2021

Submitter Subject: ANTHRAX
Samples Received: 36 X SOIL

Pedro Pinczowski
Veterinary Pathologist

NATA Accreditation Numbers

14173 Environmental Laboratory Wollongbar
14488 Orange Agricultural Institute
14495 Elizabeth Macarthur Agricultural Institute
14949 Wagga Wagga Chemistry Services Laboratory

Accredited for compliance with ISO/IEC 17025 - Testing. Specimens tested as received

EMAI Molecular Biology

Lab No.	Sample ID	Sample Desc	Bacillus anthracis PCR
0001	FBS01_0.2	Topsoil 1	Not Detected
0004	FBS02_0.1	Topsoil 4	Not Detected
0005	FBS03_0.1	Topsoil 5	Not Detected
0008	FBS04_0.1	Topsoil 8	Not Detected
0009	FBS05_0.1	Topsoil 9	Not Detected
0010	FBS06_0.1	Topsoil 10	Not Detected
0013	FBS07_0.1	Topsoil 13	Not Detected
0014	FBS08_0.1	Topsoil 14	Not Detected
0015	FBS09_0.1	Topsoil 15	Not Detected
0018	FBS10_0.1	Topsoil 18	Not Detected
0019	FBS11_0.1	Topsoil 19	Not Detected
0022	FBS12_0.1	Topsoil 22	Not Detected
0023	FBS13_0.1	Topsoil 23	Not Detected
0024	FBS14_0.1	Topsoil 24	Not Detected
0027	FBS15_0.1	Topsoil 27	Not Detected
0028	FBS16_0.1	Topsoil 28	Not Detected
0031	FBS17_0.1	Topsoil 31	Not Detected
0032	FBS18_0.1	Topsoil 32	Not Detected
0035	FBS19_0.1	Topsoil 35	Not Detected
0036	FBS20_0.1	Topsoil 36	Not Detected

Comment(s):

Molecular Biology Laboratory Comment:

Please note: *Bacillus anthracis* PCR is not validated on soil samples and therefore loses its status as a NATA accredited test. Validated sample types include: un-clotted blood, tissues, blood smears and colonies. KE 07/10/2021

Copies
CVO NSW (email: cvo.labresults@dpi.nsw.gov.au)
LLS DV DUBBO (email: cw.lab.reports@lls.nsw.gov.au)
NOTIFIABLE (email: notifiable.labresults@dpi.nsw.gov.au)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES2138170**	Page	: 1 of 6
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Contact	: Customer Services ES
Address	: 154 Peisley St, Orange NSW 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 0263935000	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 22-Oct-2021 08:45
Order number	: ----	Date Analysis Commenced	: 26-Oct-2021
C-O-C number	: ----	Issue Date	: 01-Nov-2021 15:27
Sampler	: BRENDAN STUART		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 19		
No. of samples analysed	: 19		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Sample ID	FBR_P01	FBR_P02	FBR_p03	FBR_P04	FBR_P06
				Sampling date / time	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00
					ES2138170-001	ES2138170-002	ES2138170-003	ES2138170-004	ES2138170-005
					Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**8.5**	**7.8**	**7.0**	**7.3**	**7.2**
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**12.1**	**10.3**	**16.1**	**13.8**	**14.6**
ED006: Exchangeable Cations on Alkaline Soils									
Exchangeable Calcium	----	0.2	meq/100g		**17.4**	**7.3**	----	----	----
Exchangeable Magnesium	----	0.2	meq/100g		**3.7**	**5.1**	----	----	----
Exchangeable Potassium	----	0.2	meq/100g		**1.4**	**0.8**	----	----	----
Exchangeable Sodium	----	0.2	meq/100g		**0.4**	**1.0**	----	----	----
Cation Exchange Capacity	----	0.2	meq/100g		**22.9**	**14.2**	----	----	----
Exchangeable Sodium Percent	----	0.2	%		**1.9**	**7.3**	----	----	----
ED007: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		----	----	**8.0**	**7.6**	**10.6**
Exchangeable Magnesium	----	0.1	meq/100g		----	----	**9.5**	**8.7**	**7.5**
Exchangeable Potassium	----	0.1	meq/100g		----	----	**1.8**	**0.6**	**1.7**
Exchangeable Sodium	----	0.1	meq/100g		----	----	**1.3**	**1.8**	**0.6**
Cation Exchange Capacity	----	0.1	meq/100g		----	----	**20.6**	**18.7**	**20.4**
Exchangeable Sodium Percent	----	0.1	%		----	----	**6.5**	**9.6**	**2.9**
EP004: Organic Matter									
Total Organic Carbon	----	0.5	%		**0.6**	**1.0**	**0.9**	**1.2**	**1.0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBR_P07	FBR_P08	FBR_P09	FBR_L01_1.2	FBR_L02_2.5
			Sampling date / time	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00	20-Oct-2021 00:00
Compound	CAS Number	LOR	Unit	ES2138170-006	ES2138170-007	ES2138170-008	ES2138170-009	ES2138170-010
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.3	6.3	7.3	8.2	4.9
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	16.5	16.2	16.5	19.6	15.3
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	12.5	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	8.3	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	0.5	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	4.7	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	26.0	----
Exchangeable Sodium Percent	----	0.2	%	----	----	----	18.0	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	7.6	9.6	9.5	----	----
Exchangeable Magnesium	----	0.1	meq/100g	4.4	6.8	8.8	----	----
Exchangeable Potassium	----	0.1	meq/100g	2.3	1.3	1.2	----	----
Exchangeable Sodium	----	0.1	meq/100g	0.4	0.2	0.8	----	----
Cation Exchange Capacity	----	0.1	meq/100g	14.7	17.9	20.4	----	----
Exchangeable Sodium Percent	----	0.1	%	2.8	1.2	3.9	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	2.8
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	6.6
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	0.2
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	3.1
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	12.7
Exchangeable Sodium Percent	----	0.1	%	----	----	----	----	24.2
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	1.5	1.9	1.0	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBR_L03_1.2	FBR_L05_2.5	FBR_L06_1.2	FBR_L07 2.5	FBR_C01_E
			Sampling date / time	20-Oct-2021 00:00	20-Oct-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	ES2138170-011	ES2138170-012	ES2138170-013	ES2138170-014	ES2138170-015
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	8.1	5.8	7.9	5.0	7.3
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	16.3	16.4	20.9	15.2	34.7
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	7.7	----	7.9	----	----
Exchangeable Magnesium	----	0.2	meq/100g	7.4	----	7.2	----	----
Exchangeable Potassium	----	0.2	meq/100g	0.4	----	0.3	----	----
Exchangeable Sodium	----	0.2	meq/100g	5.1	----	3.4	----	----
Cation Exchange Capacity	----	0.2	meq/100g	20.6	----	18.8	----	----
Exchangeable Sodium Percent	----	0.2	%	24.7	----	18.3	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	23.9
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	5.5
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	2.2
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	0.1
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	31.8
Exchangeable Sodium Percent	----	0.1	%	----	----	----	----	0.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	4.4	----	3.4	----
Exchangeable Magnesium	----	0.1	meq/100g	----	8.3	----	7.4	----
Exchangeable Potassium	----	0.1	meq/100g	----	0.3	----	0.3	----
Exchangeable Sodium	----	0.1	meq/100g	----	3.2	----	3.4	----
Cation Exchange Capacity	----	0.1	meq/100g	----	16.2	----	14.6	----
Exchangeable Sodium Percent	----	0.1	%	----	20.0	----	23.4	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	<0.5	<0.5	<0.5	<0.5	4.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBR_C02_W	FBR_C03_E	FBR_C04_W	FBR_C05_E	----
			Sampling date / time	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	----
Compound	CAS Number	LOR	Unit	ES2138170-016	ES2138170-017	ES2138170-018	ES2138170-019	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.6	6.3	7.1	7.5	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	34.6	35.7	19.7	25.2	----
ED006: Exchangeable Cations on Alkaline Soils								
Exchangeable Calcium	----	0.2	meq/100g	----	----	----	12.9	----
Exchangeable Magnesium	----	0.2	meq/100g	----	----	----	3.3	----
Exchangeable Potassium	----	0.2	meq/100g	----	----	----	1.9	----
Exchangeable Sodium	----	0.2	meq/100g	----	----	----	<0.2	----
Cation Exchange Capacity	----	0.2	meq/100g	----	----	----	18.1	----
Exchangeable Sodium Percent	----	0.2	%	----	----	----	<0.2	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	16.4	16.2	16.9	----	----
Exchangeable Magnesium	----	0.1	meq/100g	4.4	4.9	5.9	----	----
Exchangeable Potassium	----	0.1	meq/100g	1.5	2.2	1.6	----	----
Exchangeable Sodium	----	0.1	meq/100g	0.1	0.2	0.2	----	----
Cation Exchange Capacity	----	0.1	meq/100g	22.4	23.6	24.6	----	----
Exchangeable Sodium Percent	----	0.1	%	0.5	1.0	0.8	----	----
EP004: Organic Matter								
Total Organic Carbon	----	0.5	%	3.9	4.4	2.4	3.0	----

CERTIFICATE OF ANALYSIS

Work Order	: **ES2135059**	Page	: 1 of 5
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Contact	: Customer Services ES
Address	: 154 Peisley St, Orange NSW 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 0263935000	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 29-Sep-2021 08:10
Order number	: ----	Date Analysis Commenced	: 01-Oct-2021
C-O-C number	: ----	Issue Date	: 13-Oct-2021 17:52
Sampler	: B STUART		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 20		
No. of samples analysed	: 14		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

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Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBS02_0.1	FBS03_0.1	FBS04_0.1	FBS05_0.1	FBS07_0.1
			Sampling date / time	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	ES2135059-002	ES2135059-003	ES2135059-004	ES2135059-005	ES2135059-007
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.5	6.1	6.4	6.7	6.7
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	14.5	14.4	11.0	10.2	11.2
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	9.8	3.7	4.4	4.3	5.4
Exchangeable Magnesium	----	0.1	meq/100g	4.0	1.4	1.7	5.1	3.8
Exchangeable Potassium	----	0.1	meq/100g	1.0	0.8	0.8	1.0	1.2
Exchangeable Sodium	----	0.1	meq/100g	0.2	<0.1	<0.1	0.4	0.2
Cation Exchange Capacity	----	0.1	meq/100g	15.0	6.0	6.8	10.8	10.5
Exchangeable Sodium Percent	----	0.1	%	1.6	1.0	0.5	4.0	2.2
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.31	1.35	1.03	1.14	0.98

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBS08_0.1	FBS10_0.1	FBS12_0.1	FBS13_0.1	FBS14_0.1
			Sampling date / time	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00
Compound	CAS Number	LOR	Unit	ES2135059-008	ES2135059-010	ES2135059-012	ES2135059-013	ES2135059-014
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.4	6.2	6.0	6.0	6.9
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	11.9	14.1	11.6	13.4	10.9
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	4.4	5.4	4.6	5.3	5.8
Exchangeable Magnesium	----	0.1	meq/100g	1.8	1.4	1.4	1.4	4.6
Exchangeable Potassium	----	0.1	meq/100g	0.9	1.2	0.9	1.7	1.2
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	0.2
Cation Exchange Capacity	----	0.1	meq/100g	7.1	8.1	6.9	8.4	11.9
Exchangeable Sodium Percent	----	0.1	%	0.5	0.1	0.2	0.3	1.6
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	1.25	2.26	1.32	1.96	1.15

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	FBS15_0.1	FBS17_0.1	FBS19_0.1	FBS20_0.1	----
			Sampling date / time	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	24-Sep-2021 00:00	----
Compound	CAS Number	LOR	Unit	ES2135059-015	ES2135059-017	ES2135059-019	ES2135059-020	--------
				Result	Result	Result	Result	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.9	6.6	6.3	6.0	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	12.6	9.6	11.6	8.6	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	5.8	4.4	4.5	4.8	----
Exchangeable Magnesium	----	0.1	meq/100g	6.2	4.2	1.8	1.5	----
Exchangeable Potassium	----	0.1	meq/100g	0.8	0.9	0.8	1.0	----
Exchangeable Sodium	----	0.1	meq/100g	0.4	0.5	<0.1	<0.1	----
Cation Exchange Capacity	----	0.1	meq/100g	13.4	9.9	7.1	7.3	----
Exchangeable Sodium Percent	----	0.1	%	3.4	5.0	0.6	0.2	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	1.27	1.33	0.92	2.35	----

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) EP003: Total Organic Carbon (TOC) in Soil

APPENDIX D

ANALYTICAL LABORATORY QA/QC & CHAIN OF CUSTODY DOCUMENTS

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2135059**	Page	: 1 of 5
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 29-Sep-2021
Site	: ----	Issue Date	: 13-Oct-2021
Sampler	: B STUART	No. of samples received	: 20
Order number	: ----	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
FBS02_0.1,	FBS03_0.1,	**24-Sep-2021**	**01-Oct-2021**	01-Oct-2021	✓	**01-Oct-2021**	02-Oct-2021	✓
FBS04_0.1,	FBS05_0.1,							
FBS07_0.1,	FBS08_0.1,							
FBS10_0.1,	FBS12_0.1,							
FBS13_0.1,	FBS14_0.1,							
FBS15_0.1,	FBS17_0.1,							
FBS19_0.1,	FBS20_0.1							
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
FBS02_0.1,	FBS03_0.1,	**24-Sep-2021**	**----**	----	----	**01-Oct-2021**	08-Oct-2021	✓
FBS04_0.1,	FBS05_0.1,							
FBS07_0.1,	FBS08_0.1,							
FBS10_0.1,	FBS12_0.1,							
FBS13_0.1,	FBS14_0.1,							
FBS15_0.1,	FBS17_0.1,							
FBS19_0.1,	FBS20_0.1							
ED007: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED007)								
FBS02_0.1,	FBS03_0.1,	**24-Sep-2021**	**11-Oct-2021**	22-Oct-2021	✓	**11-Oct-2021**	22-Oct-2021	✓
FBS04_0.1,	FBS05_0.1,							
FBS07_0.1,	FBS08_0.1,							
FBS10_0.1,	FBS12_0.1,							
FBS13_0.1,	FBS14_0.1,							
FBS15_0.1,	FBS17_0.1,							
FBS19_0.1,	FBS20_0.1							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP003: Total Organic Carbon (TOC) in Soil								
Soil Glass Jar - Unpreserved (EP003)								
FBS02_0.1,	FBS03_0.1,	**24-Sep-2021**	**11-Oct-2021**	22-Oct-2021	✓	**11-Oct-2021**	22-Oct-2021	✓
FBS04_0.1,	FBS05_0.1,							
FBS07_0.1,	FBS08_0.1,							
FBS10_0.1,	FBS12_0.1,							
FBS13_0.1,	FBS14_0.1,							
FBS15_0.1,	FBS17_0.1,							
FBS19_0.1,	FBS20_0.1							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Exchangeable Cations	ED007	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	3	27	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Exchangeable Cations	ED007	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	4	27	**14.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Exchangeable Cations	ED007	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP003	2	27	**7.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Total Organic Carbon	EP003	SOIL	In house C-IR17. Dried and pulverised sample is reacted with acid to remove inorganic Carbonates, then combusted in a furnace in the presence of strong oxidants / catalysts. The evolved (Organic) Carbon (as CO2) is automatically measured by infra-red detector.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

QUALITY CONTROL REPORT

Work Order	: **ES2138170**	Page	: 1 of 4
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Contact	: Customer Services ES
Address	: 154 Peisley St, Orange NSW 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 0263935000	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 22-Oct-2021
Order number	: ----	Date Analysis Commenced	: 26-Oct-2021
C-O-C number	: ----	Issue Date	: 01-Nov-2021
Sampler	: BRENDAN STUART		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 19		
No. of samples analysed	: 19		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA002: pH 1:5 (Soils) (QC Lot: 3977843)									
ES2138170-001	FBR_P01	EA002: pH Value	----	0.1	pH Unit	8.5	8.5	0.0	0% - 20%
ES2138170-011	FBR_L03_1.2	EA002: pH Value	----	0.1	pH Unit	8.1	8.3	2.2	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3977844)									
ES2138170-003	FBR_p03	EA055: Moisture Content	----	0.1	%	16.1	16.3	1.4	0% - 20%
ES2138170-014	FBR_L07 2.5	EA055: Moisture Content	----	0.1	%	15.2	13.6	11.5	0% - 20%
ED006: Exchangeable Cations on Alkaline Soils (QC Lot: 3986535)									
ES2137806-002	Anonymous	ED006: Exchangeable Sodium Percent	----	0.2	%	<0.2	<0.2	0.0	No Limit
		ED006: Exchangeable Calcium	----	0.2	meq/100g	1.2	1.2	0.0	No Limit
		ED006: Exchangeable Magnesium	----	0.2	meq/100g	<0.2	<0.2	0.0	No Limit
		ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	<0.2	0.0	No Limit
		ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	<0.2	0.0	No Limit
		ED006: Cation Exchange Capacity	----	0.2	meq/100g	1.2	1.2	0.0	No Limit
ED007: Exchangeable Cations (QC Lot: 3984909)									
ES2138170-003	FBR_p03	ED007: Exchangeable Sodium Percent	----	0.1	%	6.5	6.3	3.2	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	8.0	8.4	4.4	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	9.5	9.6	1.2	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	1.8	1.8	0.0	0% - 50%
		ED007: Exchangeable Sodium	----	0.1	meq/100g	1.3	1.3	0.0	0% - 50%
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	20.6	21.0	2.3	0% - 20%
ES2138170-018	FBR_C04_W	ED007: Exchangeable Sodium Percent	----	0.1	%	0.8	0.8	0.0	No Limit
		ED007: Exchangeable Calcium	----	0.1	meq/100g	16.9	17.0	0.9	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	5.9	6.0	0.0	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	1.6	1.6	0.0	0% - 50%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED007: Exchangeable Cations (QC Lot: 3984909) - continued									
ES2138170-018	FBR_C04_W	ED007: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	24.6	24.7	0.7	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3986552)									
ES2138170-010	FBR_L02_2.5	ED008: Exchangeable Sodium Percent	----	0.1	%	24.2	24.0	0.5	0% - 20%
		ED008: Exchangeable Calcium	----	0.1	meq/100g	2.8	3.0	9.0	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	6.6	6.8	3.3	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.0	0% - 20%
		ED008: Exchangeable Sodium	----	0.1	meq/100g	3.1	3.2	4.1	0% - 20%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	12.7	13.3	4.6	0% - 20%
EP004: Organic Matter (QC Lot: 3979277)									
ES2138170-001	FBR_P01	EP004: Total Organic Carbon	----	0.5	%	0.6	0.7	0.0	No Limit
ES2138170-011	FBR_L03_1.2	EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	0.0	No Limit

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED006: Exchangeable Cations on Alkaline Soils (QCLot: 3986535)								
ED006: Exchangeable Calcium	----	0.2	meq/100g	<0.2	2.5 meq/100g	104	80.0	110
ED006: Exchangeable Magnesium	----	0.2	meq/100g	<0.2	4.17 meq/100g	98.6	80.0	110
ED006: Exchangeable Potassium	----	0.2	meq/100g	<0.2	1.28 meq/100g	103	80.0	110
ED006: Exchangeable Sodium	----	0.2	meq/100g	<0.2	2.17 meq/100g	106	80.0	110
ED006: Cation Exchange Capacity	----	0.2	meq/100g	<0.2	----	----	----	----
ED006: Exchangeable Sodium Percent	----	0.2	%	<0.2	----	----	----	----
ED007: Exchangeable Cations (QCLot: 3984909)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	95.0	75.8	120
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	95.2	74.9	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	108	80.0	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	94.2	80.0	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Exchangeable Cations (QCLot: 3986552)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	109	82.0	128
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	93.4	82.0	120
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	104	70.0	140
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	94.2	78.0	136
ED008: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
EP004: Organic Matter (QCLot: 3979277)								
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	89.0	81.0	99.0

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP004: Organic Matter (QCLot: 3979277)							
ES2138170-001	FBR_P01	EP004: Total Organic Carbon	----	0.6 %	78.5	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES2138170**	Page	: 1 of 6
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 22-Oct-2021
Site	: ----	Issue Date	: 01-Nov-2021
Sampler	: BRENDAN STUART	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002: pH 1:5 (Soils)							
Soil Glass Jar - Unpreserved							
FBR_P01,	FBR_P02,	----	----	----	27-Oct-2021	26-Oct-2021	**1**
FBR_p03,	FBR_P04,						
FBR_P06,	FBR_P07,						
FBR_P08,	FBR_P09,						
FBR_L01_1.2,	FBR_L02_2.5,						
FBR_L03_1.2,	FBR_L05_2.5						
Soil Glass Jar - Unpreserved							
FBR_L06_1.2,	FBR_L07 2.5,	26-Oct-2021	01-Oct-2021	**25**	27-Oct-2021	26-Oct-2021	**1**
FBR_C01_E,	FBR_C02_W,						
FBR_C03_E,	FBR_C04_W,						
FBR_C05_E							
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved							
FBR_L06_1.2,	FBR_L07 2.5,	----	----	----	26-Oct-2021	08-Oct-2021	**18**
FBR_C01_E,	FBR_C02_W,						
FBR_C03_E,	FBR_C04_W,						
FBR_C05_E							
ED006: Exchangeable Cations on Alkaline Soils							
Soil Glass Jar - Unpreserved							
FBR_L06_1.2,	FBR_C05_E	01-Nov-2021	22-Oct-2021	**10**	01-Nov-2021	22-Oct-2021	**10**
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved							
FBR_C01_E,	FBR_C02_W,	29-Oct-2021	22-Oct-2021	**7**	29-Oct-2021	22-Oct-2021	**7**
FBR_C03_E,	FBR_C04_W						
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved							
FBR_L07 2.5		01-Nov-2021	22-Oct-2021	**10**	01-Nov-2021	22-Oct-2021	**10**
EP004: Organic Matter							
Soil Glass Jar - Unpreserved							
FBR_L06_1.2,	FBR_L07 2.5,	01-Nov-2021	22-Oct-2021	**10**	01-Nov-2021	22-Oct-2021	**10**
FBR_C01_E,	FBR_C02_W,						
FBR_C03_E,	FBR_C04_W,						
FBR_C05_E							

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)								
Soil Glass Jar - Unpreserved (EA002)								
FBR_P01,	FBR_P02,	**20-Oct-2021**	**26-Oct-2021**	27-Oct-2021	✓	**27-Oct-2021**	26-Oct-2021	✗
FBR_p03,	FBR_P04,							
FBR_P06,	FBR_P07,							
FBR_P08,	FBR_P09,							
FBR_L01_1.2,	FBR_L02_2.5,							
FBR_L03_1.2,	FBR_L05_2.5							
Soil Glass Jar - Unpreserved (EA002)								
FBR_L06_1.2,	FBR_L07 2.5,	**24-Sep-2021**	**26-Oct-2021**	01-Oct-2021	✗	**27-Oct-2021**	26-Oct-2021	✗
FBR_C01_E,	FBR_C02_W,							
FBR_C03_E,	FBR_C04_W,							
FBR_C05_E								
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
FBR_P01,	FBR_P02,	**20-Oct-2021**	**----**	----	----	**26-Oct-2021**	03-Nov-2021	✓
FBR_p03,	FBR_P04,							
FBR_P06,	FBR_P07,							
FBR_P08,	FBR_P09,							
FBR_L01_1.2,	FBR_L02_2.5,							
FBR_L03_1.2,	FBR_L05_2.5							
Soil Glass Jar - Unpreserved (EA055)								
FBR_L06_1.2,	FBR_L07 2.5,	**24-Sep-2021**	**----**	----	----	**26-Oct-2021**	08-Oct-2021	✗
FBR_C01_E,	FBR_C02_W,							
FBR_C03_E,	FBR_C04_W,							
FBR_C05_E								
ED006: Exchangeable Cations on Alkaline Soils								
Soil Glass Jar - Unpreserved (ED006)								
FBR_P01,	FBR_P02,	**20-Oct-2021**	**01-Nov-2021**	17-Nov-2021	✓	**01-Nov-2021**	17-Nov-2021	✓
FBR_L01_1.2,	FBR_L03_1.2							
Soil Glass Jar - Unpreserved (ED006)								
FBR_L06_1.2,	FBR_C05_E	**24-Sep-2021**	**01-Nov-2021**	22-Oct-2021	✗	**01-Nov-2021**	22-Oct-2021	✗

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED007: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED007)							
FBR_p03, FBR_P04, FBR_P06, FBR_P07, FBR_P08, FBR_P09	**20-Oct-2021**	**29-Oct-2021**	17-Nov-2021	✓	**29-Oct-2021**	17-Nov-2021	✓
Soil Glass Jar - Unpreserved (ED007)							
FBR_C01_E, FBR_C02_W, FBR_C03_E, FBR_C04_W	**24-Sep-2021**	**29-Oct-2021**	22-Oct-2021	×	**29-Oct-2021**	22-Oct-2021	×
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
FBR_L02_2.5, FBR_L05_2.5	**20-Oct-2021**	**01-Nov-2021**	17-Nov-2021	✓	**01-Nov-2021**	17-Nov-2021	✓
Soil Glass Jar - Unpreserved (ED008)							
FBR_L07 2.5	**24-Sep-2021**	**01-Nov-2021**	22-Oct-2021	×	**01-Nov-2021**	22-Oct-2021	×
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
FBR_P01, FBR_P02, FBR_p03, FBR_P04, FBR_P06, FBR_P07, FBR_P08, FBR_P09, FBR_L01_1.2, FBR_L02_2.5, FBR_L03_1.2, FBR_L05_2.5	**20-Oct-2021**	**01-Nov-2021**	17-Nov-2021	✓	**01-Nov-2021**	17-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP004)							
FBR_L06_1.2, FBR_L07 2.5, FBR_C01_E, FBR_C02_W, FBR_C03_E, FBR_C04_W, FBR_C05_E	**24-Sep-2021**	**01-Nov-2021**	22-Oct-2021	×	**01-Nov-2021**	22-Oct-2021	×

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Exchangeable Cations	ED007	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Exchangeable Cations	ED007	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Exchangeable Cations	ED007	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations on Alkaline Soils	ED006	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Organic Matter	EP004	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations on Alkaline Soils	ED006	SOIL	In house: Referenced to Soil Survey Test Method C5. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with alcoholic ammonium chloride at pH 8.5. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil.
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Lyons Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method (Alkaline Soils)	ED006PR	SOIL	In house: Referenced to Rayment and Lyons method 15C1.
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM Schedule B(3).

QUALITY CONTROL REPORT

Work Order	: **ES2135059**	Page	: 1 of 3
Client	: **PREMISE NSW Pty Ltd**	Laboratory	: Environmental Division Sydney
Contact	: BRENDAN STUART	Contact	: Customer Services ES
Address	: 154 Peisley St, Orange NSW 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: 0263935000	Telephone	: +61-2-8784 8555
Project	: 221306	Date Samples Received	: 29-Sep-2021
Order number	: ----	Date Analysis Commenced	: 01-Oct-2021
C-O-C number	: ----	Issue Date	: 13-Oct-2021
Sampler	: B STUART		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 20		
No. of samples analysed	: 14		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA002: pH 1:5 (Soils) (QC Lot: 3934894)									
ES2135059-010	FBS10_0.1	EA002: pH Value	----	0.1	pH Unit	6.2	6.4	3.2	0% - 20%
ES2134602-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	4.8	5.0	4.1	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3934896)									
ES2134602-003	Anonymous	EA055: Moisture Content	----	0.1	%	6.2	6.0	1.7	No Limit
ES2135059-014	FBS14_0.1	EA055: Moisture Content	----	0.1	%	10.9	11.0	0.0	0% - 20%
ED007: Exchangeable Cations (QC Lot: 3948091)									
ES2135059-002	FBS02_0.1	ED007: Exchangeable Sodium Percent	----	0.1	%	1.6	1.6	0.0	0% - 50%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	9.8	9.6	2.1	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	4.0	4.0	0.0	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	1.0	1.0	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	15.0	14.8	1.9	0% - 20%
ES2135059-014	FBS14_0.1	ED007: Exchangeable Sodium Percent	----	0.1	%	1.6	1.6	0.0	0% - 50%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	5.8	5.8	0.0	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	4.6	4.6	0.0	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	1.2	1.2	0.0	0% - 50%
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.2	0.2	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	11.9	11.9	0.0	0% - 20%
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 3947498)									
ES2134982-001	Anonymous	EP003: Total Organic Carbon	----	0.02	%	2.00	2.01	0.0	0% - 20%
EB2128225-001	Anonymous	EP003: Total Organic Carbon	----	0.02	%	0.16	0.15	0.0	No Limit
EP003: Total Organic Carbon (TOC) in Soil (QC Lot: 3947500)									
ES2135059-012	FBS12_0.1	EP003: Total Organic Carbon	----	0.02	%	1.32	1.32	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED007: Exchangeable Cations (QCLot: 3948091)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	96.0	75.8	120
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	95.8	74.9	115
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	104	80.0	120
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	94.2	80.0	120
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 3947498)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	4.16 %	100	70.0	130
				<0.02	0.48 %	118	70.0	130
EP003: Total Organic Carbon (TOC) in Soil (QCLot: 3947500)								
EP003: Total Organic Carbon	----	0.02	%	<0.02	1.03 %	102	70.0	130
				<0.02	0.48 %	110	70.0	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

Premise

M G O'KEEFE CONSTRUCTIONS

Environmental Management Plan

AREA IN PROXIMITY TO ANIMAL CARCASS BURIAL PIT, BOGAN GATE ROAD, FORBES NSW

Report No: P000462_EMP_001
Rev: 001B
31 October 2023

DOCUMENT AUTHORISATION			
Revision	**Revision Date**	**Report Details**	
A	13/09/23	Draft for client review	
B	31/10/23	Final	
Prepared By		**Reviewed By**	**Authorised By**
Brendan Stuart Senior Environmental Scientist		Peter Oste Senior Civil Engineer	Brendan Stuart Senior Environmental Scientist

CONTENTS

FIGURES

TABLES

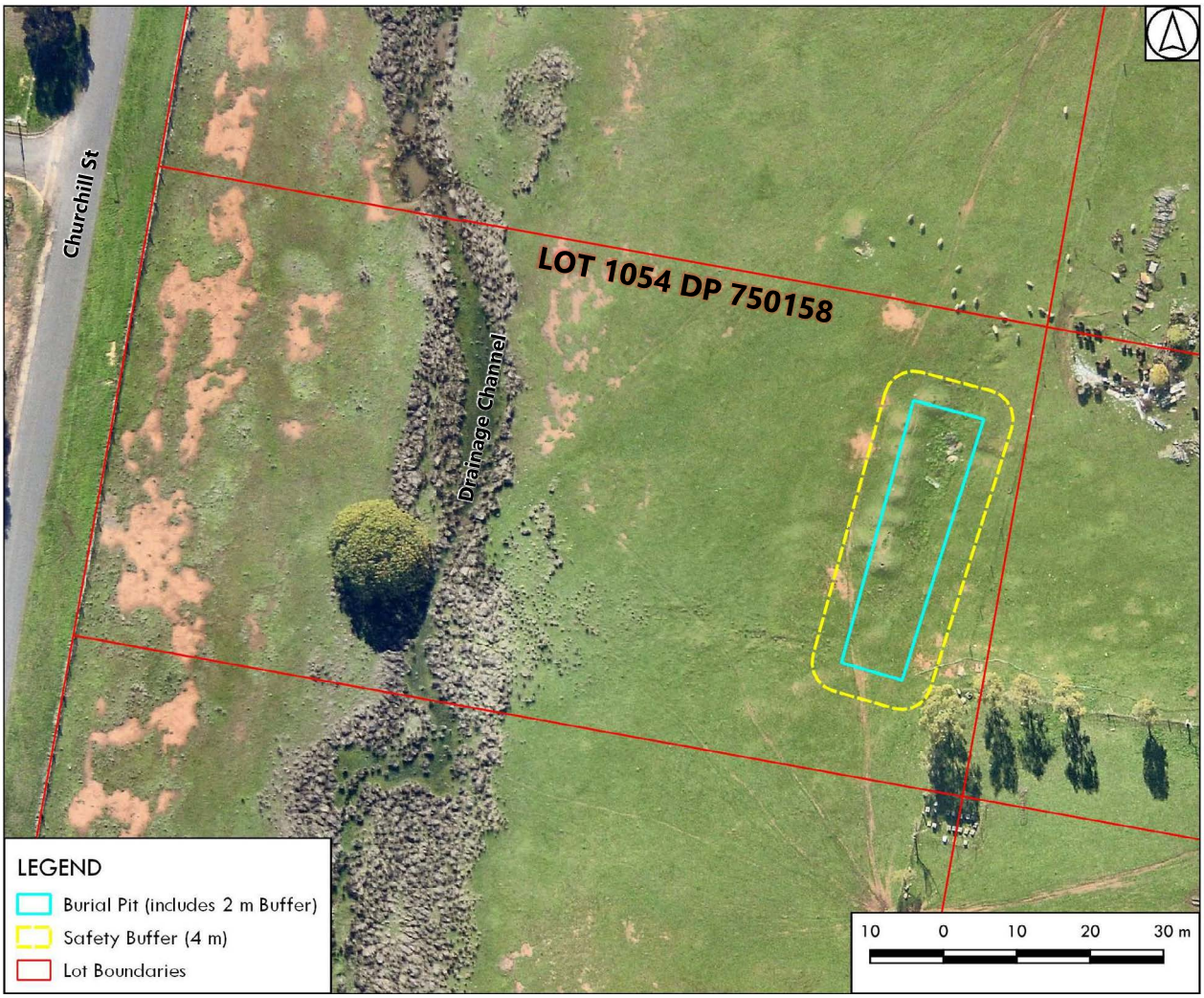
APPENDICES

1. INTRODUCTION

Premise Australia Pty Ltd (Premise) has been commissioned by M G O'Keefe Constructions, to prepare an Environmental Management Plan (EMP) for a portion of the site at Bogan Gate Road, Forbes NSW, within Lot 1054 of deposited plan (DP) 750158.

This EMP covers an approximate area of 830 m^2 and includes the inferred area of an historic animal burial pit and surrounding safety buffer area (the site). The boundaries of the site governed by this EMP are entirely encompassed within Lot 1054 as indicated in **Figure 1**.

Figure 1 – Site Location Map



1.1 Background Information

Schedule 6 of the Forbes 1986 Local Environment Plan (LEP) identified "*Portions 1053 and 1054, Parish of Forbes, County of Ashburnham, Bogan Gate Road, Forbes*" as a "*disposal site for anthrax infected animals*". These portions correspond to Lots 1053 and 1054 of DP 750158.

In 2021, Premise established an investigation area to include the majority of the block bounded by Bogan Gate Road, Churchill Street, York Street and Atlee Street, with the portion of this area west of the drainage easement excluded from the investigation. The investigation area covered an area of approximately 5.3 hectares (ha) with approximate dimensions of 240 m to 340 m north-south and 190 m east west.

Within the investigation area, a single animal burial pit of approximate dimensions 34 m north-south and 6 m east-west has been identified on the site within land title Lot 1054 of DP 750158, as indicated on **Figure 1**. The depth of this burial pit was inferred to be approximately 3 m, based on historic site photography. A spatial survey of this area was completed and is attached in **Appendix A**.

Based on the findings of the 'Site Microbial Investigation, Anthrax – Bogan Gate Road, Forbes' (Premise, 2021), no significant routes of exposure by receptors (current or future) to anthrax impacts exist outside of a 2 m lateral buffer beyond the footprint of the burial pit. Similarly, no significant routes of exposure by receptors (current or future) to anthrax impacts exist in the burial pit capping material to a depth of 0.5 m.

1.2 Site Identification

The site location is shown on **Figure 1**, and site identification information is provided in **Table 1.1**.

Table 1.1 – Summary of Property Description Details

Feature	Details
Site Address[1]	1 Bogan Gate Rd, Forbes NSW (Portion)
Title Identification Details[1]	Lot 1054 in DP 750158 (Portion)
Current Ownership	M G O'Keefe Construction
Current Site Use and Zoning[2]	Land Use (Current): Rural (Grazing Pasture) Zoning: Environmental Management (E3)
Future Site Use	Open Space (passive use, including car parking)
Previous Environmental Reports	Premise, 2021: *Site Microbial Investigation, Anthrax – Bogan Gate Road, Forbes*
Site Area[1]	830 m^2 (approximately)
Sources: 1: Partial survey, partial compilation of deposited plans, partial SIX Maps Website developed by NSW Government, Land and Property Information. https://maps.six.nsw.gov.au/ (accessed September 2023). 2: Forbes Local Environmental Plan, 2013, under the Environmental Planning and Assessment Act 1979.	

1.3 Site Features

No structures are present on the site.

Uneven ground consistent with subsidence following settlement of a filled area is apparent at the burial pit area, Pooled water may be present, and small soil stockpiles, approximately 0.4 m in height, are located to the immediate west of this area.

The slope of the site is slight, to the south-west. No defined drainage pathways exist on the site, and overland surface flow not captured within the depression would be directed to the drainage channel approximately 50 m to the west of the site.

1.4 Legislative Requirements

This EMP has been prepared with the assumption that the future works on the site will be undertaken in accordance with relevant regulations and laws in NSW including, but not limited to;

- Work Health and Safety Act, 2011, (WHS Act, 2011);
- Work Health and Safety Regulation, 2011, (WHS Regulation, 2017);
- Contaminated Land Management Act, 1997, (CLM Act, 1997);
- Protection of the Environment Operations Act, 1997, (POEO Act, 1997);
- Protection of the Environment Operations (Waste) Regulation, 2014 (POEO Waste Regulation, 2014);
- National Environment Protection (Assessment of Site Contamination) Measure, 1999 (amended in 2013, (NEPM, 1999);
- Resilience and Hazards State Environmental Planning Policy (SEPP), 2021; (R&H SEPP, 2021)
- Waste Classification Guidelines, 2014, (NSW Environment Protection Authority, 2014);

1.5 Objectives

The objectives of this EMP are to:

- Define appropriate management and mitigation measures to be implemented to manage potential environmental and health and safety risks associated with residual subsurface soil where microbial impacts may be present;
- Ensure activities associated with any future site development and maintenance works are managed in a way that minimises the potential impact to the surrounding environment;
- Ensure all personnel working at the site, including future site occupants and contractors, are aware of environmental issues associated with residual soil contamination.

The objectives are to be achieved through the application of health and safety procedures as well as the application of controls during the maintenance of utilities, site planning / preparation works and potential future excavation works at the site.

All personnel working on the site are required to be inducted to this EMP, with induction details documented in **Appendix B**.

2. RESPONSIBILITIES

2.1 Implementation

Table 2.1 provides a summary of the responsibilities for the implementation and management of the EMP. The list of responsibilities does not replace any regulatory, planning or licensing responsibilities of the parties in undertaking works at the property. In any instance where an inconsistency arises between this EMP and environmental law, the environmental law will take precedence over the EMP.

Table 2.1 – EMP Responsibilities

Entity	Responsibilities
Property Owner	• Provide the EMP to the site occupant(s) and attach the EMP to all ground maintenance contracts commissioned for the site. • Attach a copy of the EMP to any lease or contract for sale of the site. • Incorporate the EMP into any other management plans implemented at the site. • Include the EMP on any Section 10.7 certificates (i.e. planning certificates) applicable to the site should the provision of a "disposal site for anthrax infected animals" in the 1986 LEP be repealed.
Site Occupants - Including lessee(s) and sub-lessee(s), as applicable	• Provide the EMP to any maintenance worker (who is engaged under the direction of the occupant); • Comply with the EMP during occupation of the property; and • Inform the property owner if disturbance of impacted soil may occur and/or if potential exposure to impacted soil is identified (e.g. existing capping layer or safety buffer area is compromised) or may result in the future.
Construction and Maintenance Workers	• Comply with the EMP, including relevant legislation and guidance (including the Work Health and Safety Act, 2011 and Work Health and Safety Regulation 2017 or relevant legislation current at the time of the works) when conducting works at the property; and • Inform the owner / occupant if disturbance of impacted soil may occur and/or if potential exposure to impacted soil is identified (e.g. existing capping layer or safety buffer area is compromised) or may result in the future.

This EMP is prepared with the assumption that any future works on the site shall be undertaken in accordance with relevant regulations, guidelines and laws current at the date works, in NSW including but not limited to those referred to in Section 1.2.

2.2 Environmental Awareness and Training

All site owners, occupants and maintenance workers should be made aware of this EMP and the requirements it contains. In particular, maintenance workers should complete the following:

- A site induction;
- Familiarisation with the requirements of the EMP; and
- Environmental emergency response training.

A record of completion of the EMP induction should be recorded in the log in **Appendix B**.

2.3 Non-Compliances and Review

Any non-compliance with this EMP should be recorded and communicated to the site owner. Review of this EMP by the site owner (and other parties where delegated by the site owner), should be conducted every 12 months, and would include but not be limited to the following aspects:

- Review non-compliances and corrective actions during the period;
- Ensure inspections of capped surfaces and safety buffer area have been undertaken;
- Ensure maintenance recommended (if any) during inspections and/or intrusive works has been completed; and
- Review whether proposed changes to land use may conflict with the EMP.

3. ENVIRONMENTAL MANAGEMENT

3.1 Intended Land Uses

On the basis of the capping material and safety buffer area of the animal burial pit being maintained and not disturbed, and no excavation to occur within the lateral extents of the animal burial pit and safety buffer area, Premise has considered the area of the site to be suitable for residential land uses.

Future land uses considered appropriate for the area governed by this EMP are limited to passive uses that do not breach the capped material or safety buffer area, and may include car parking.

3.2 Conceptual Site Model

A conceptual site model (CSM) for the site has been prepared to identify contamination sources and transport mechanisms, and exposure pathways to receptors. An 'incomplete' linkage between the source and the receptor (indicated by a '  ') indicates the risk to that receptor is considered to be negligible. Based on the previous investigation findings, potential linkages in the CSM between sources and receptors are illustrated below.

Figure 2 – Conceptual Site Model

CSM Aspect	Comments			
Primary Source	Infected Animal Burial Pit			
Potential Contaminant	Anthrax (spores or vegetative cells)			
Release Mechanism	Breach of Capping			
Media Impacted	Surface Soil		Surface Water	
Pathways to Receptors	Direct Exposure		Stormwater Flow	
Potential Receptors	Site Occupants	Construction Workers / Maintenance Workers	Recreational Users (Off-Site)	Ecology (Off-Site)
Exposure Route	Ingestion Inhalation (dust) Direct Contact		Ingestion Direct Contact	Fauna Uptake

Pathway Legend:
Complete | Potentially Complete | Incomplete

3.3 Characterisation of Residual Risks

Incomplete linkages in the above CSM are summarised below:

- 1 – Impacts within the animal burial pit are not identified to present a risk to receptors personnel due to the provisions of this EMP negating the risk of capping material being breached. The EMP includes the area of the burial pit, a surrounding 2 m investigation area and a further 4 m safety buffer area. Environmental management controls applicable to all site occupants and maintenance workers mitigate risks associated with ground disturbance activities at the site.

Premise has considered that residential receptors, construction workers and/or off-site ecology, may be at risk of anthrax exposure at the Bogan Gate Rd site if the capping material of the animal burial pit is disturbed or not maintained.

4. RISK MANAGEMENT ACTIVITIES

4.1 Safety and Exposure Management

As reported in '*Site Microbial Investigation, Anthrax – Bogan Gate Road, Forbes*' (Premise, 2021), an animal burial pit has been capped by a layer of soil of approximate depth 0.5 m.

If landscaping is to be implemented at the site, it should generally comprise shallow-root varieties, with root systems not anticipated to exceed 0.5 m. No fruit, vegetables or edible produce are to be grown at the site. Implementation of notification and management controls described in **Table 4.1** will assist the mitigation of risks to larger tree species present at the site.

Drainage should be improved at the site to minimise the potential for infiltration and promote runoff. Works to achieve this may include raising the elevation (and increasing the cap thickness), and/or instating an impermeable surface (e.g. pavement). Erosion hazards are to be minimised.

The risks from residual impacts remaining in-situ will not present a risk to on-site occupiers and/or workers in capped areas as long as the capping material remains intact. A potential exposure pathway may exist in the event that the surface cover is broken to allow for excavation and/or intrusive works.

4.2 Environmental Controls

All activities / tasks that require the engagement of contractors should be undertaken in accordance with current regulatory requirements, in particular the Work Health & Safety Act 2011 and the Work Health & Safety Regulation 2017 (or relevant legislation current at the time of the proposed works). The legislation, planning instruments and guidelines that relate to the management of contaminated land in NSW at the time of preparation of the EMP is referred to in **Section 1.4**. This list should be reviewed for currency at the time of any proposed works. The advice of a suitably qualified environmental consultant and/or the NSW EPA should be sought where there is uncertainty as to the regulatory requirements.

Environmental management controls will be required to be implemented for any ground disturbance activities at the site. Ground disturbance activities should aim to avoid breaches of the capping material, however if this is unavoidable, an activity specific EMP is to be prepared by the relevant party to include, but not be limited to, the environmental controls for 'Excavation', outlined in **Table 4.1** below, as appropriate.

Table 4.1 – Environmental Controls

Environmental Management Control	Responsible Party
Maintenance of Capping • All capped areas where residual impact is present (as well as within the designated 4 m safety buffer) should be inspected every 12 months for breaches in containment. Where a breach is observed that may result in exposure to residual soil, reinstatement works are to be conducted. • All landscaped areas should be monitored for indications of vegetation which may potential penetrate to a depth of greater than 0.5 m. Any such observations are required to be reported to the site owner to implement manage controls, Management may include removal of vegetation.	Site Owner

Environmental Management Control	Responsible Party
• Where present, grass cover across the site should be maintained with scheduled watering. Watering should not result in generation of run-off or waterlogging of soil.	
Excavation, including repair of utility services and / or emergency maintenance works • Appropriate WHS measures should be developed and implemented to minimise risk of exposure to contamination. • Prepare Safe Work Method Statement (SWMS). The SWMS should include as a minimum the following contamination control measures: – Employ confined space entry procedures for excavations and utility pits prior to entry. – Workers wear appropriate PPE (e.g. wear gloves / eye and respiratory protection). Use of disposable overalls which should be disposed of appropriately at completion of each work shift. Use of boot wash. – Workers avoid creating dust (e.g. use of light water sprays, avoid working in hot and windy conditions). Where dust is unavoidable works are to cease. – Workers do not eat, drink or smoke during works. Workers wash hands and face immediately after works. – Brush / wash excavation tools at end of each work shift. Ensure surplus materials returned to stockpile areas and avoid spreading potentially contaminated materials across site. – Waste materials are managed so as not to generate dusts. – During excavation works (including stormwater system maintenance works) all soil/fill materials should be considered to be potentially impacted irrespective of visual observations. – All stockpiled soil/fill materials temporarily excavated within the capped area and safety buffer area should be bunded and sediment retention measures put in place immediately after the stockpile is formed. Stockpiles should be placed on sealed ground. – Where possible, stockpiled soil is to be reinstated into the source excavation, in a corresponding sequence to its exhumation. – Soil which cannot be reinstated is to be sampled and assessed and classified for disposal off-site at an appropriately licensed waste facility by an approved contractor in accordance with the requirements of NSW EPA Waste Guidelines (2014) and the POEO Waste Regulation (2014). – Make good any surface cover or capping removed during the works.	All site occupants, construction workers and maintenance workers

Environmental Management Control	Responsible Party
Development, including Erection of Structures (assumes Development Consent) • In the event that development is proposed at the site which may increase the risk of harm to health or the environment from contamination, provisions in accordance with the R&H SEPP (2021) are required to ensure the site is suitable for the proposed use(s). • As part of the Development Application process, provisions may include additional investigation and/or remediation of the impacted soils, and potentially consideration of groundwater impacts.	Site Owner

4.3 Ongoing Monitoring

No monitoring beyond annual inspection of the capped area (and 4 m safety buffer area) for indications of potential breach of the capping material. Such indications may include (but not be limited to) observations of subsidence, erosion or unauthorised works.

APPENDIX A

SPATIAL SURVEY – ANIMAL BURIAL PIT

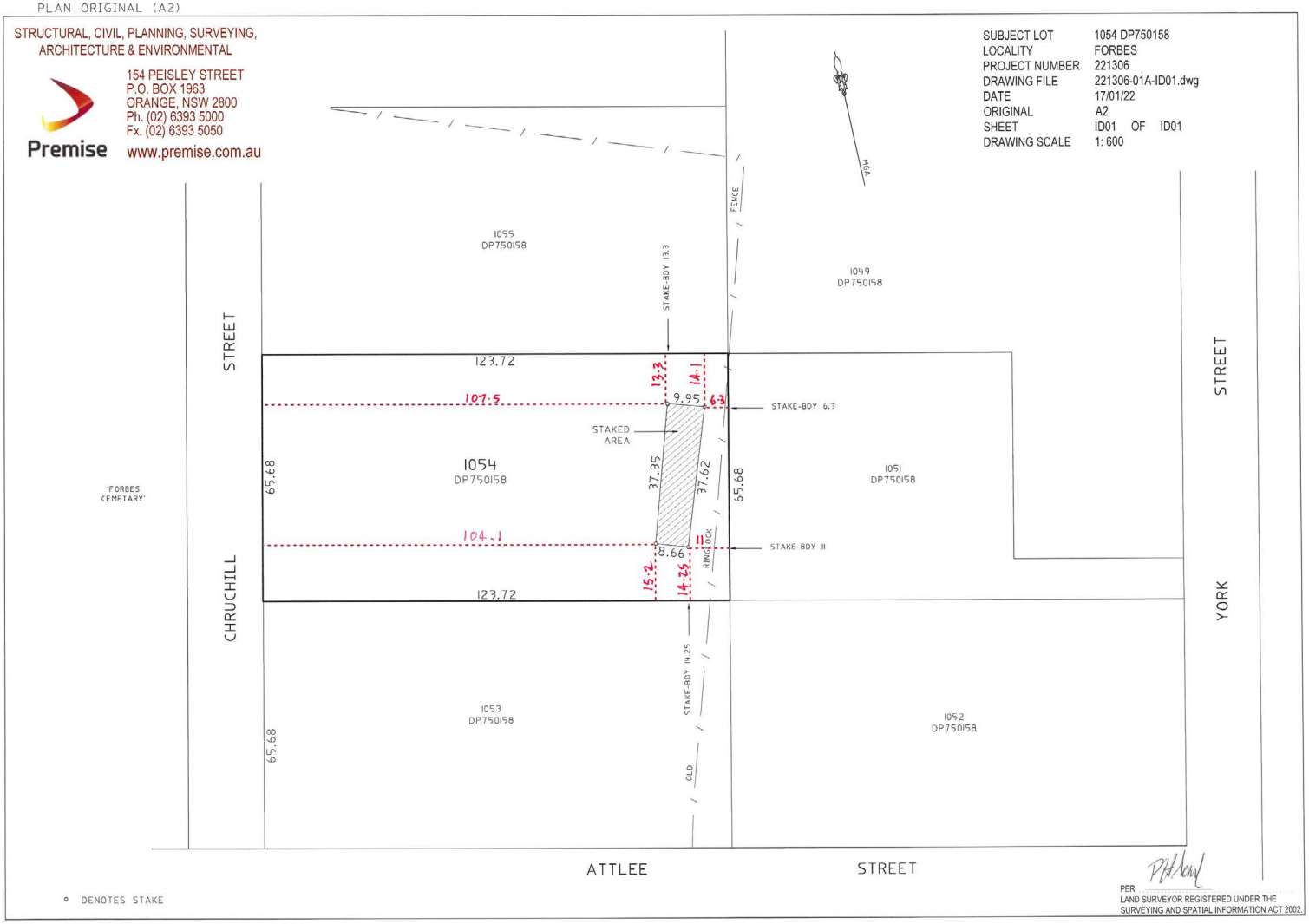
PLAN ORIGINAL (A2)

STRUCTURAL, CIVIL, PLANNING, SURVEYING,
ARCHITECTURE & ENVIRONMENTAL

Premise

154 PEISLEY STREET
P.O. BOX 1963
ORANGE, NSW 2800
Ph. (02) 6393 5000
Fx. (02) 6393 5050
www.premise.com.au

SUBJECT LOT	1054 DP750158
LOCALITY	FORBES
PROJECT NUMBER	221306
DRAWING FILE	221306-01A-ID01.dwg
DATE	17/01/22
ORIGINAL	A2
SHEET	ID01 OF ID01
DRAWING SCALE	1: 600



DENOTES STAKE

PER
LAND SURVEYOR REGISTERED UNDER THE
SURVEYING AND SPATIAL INFORMATION ACT 2002.

APPENDIX B

EMP INDUCTION LOG

EMP Induction Log I have read and understand the contents of this Environmental Management Plan (EMP) and hereby agree to abide by its provisions.			
Name	**Company**	**Signature**	**Date**

Appendix D. Site Details and Contour Survey

PREPARED BY ARNDELL SURVEYING

PROJECT
Planning Proposal

SITE
Bogan Gate Road, Forbes NSW

LANDOWNER
M G O'Keeffe Constructions Pty Ltd

APPLICANT
Currajong Pty Ltd

CURRAJONG
PLANNING, PROPERTY + PROJECT MANAGEMENT

NOTES:

1. CONTOUR INTERVAL IS 0.2 METRES.
2. SERVICES SHOWN HAVE BEEN LOCATED WHERE POSSIBLE BY FIELD SURVEY. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES & DETAILED LOCATION OF ALL SERVICES.

KEY:

- GATE
- POWER POLE
- POWER POLE STAY
- SEWER MANHOLE
- TELSTRA PIT
- TELSTRA TWIN PIT
- FIRE HYDRANT
- STOP VALVE
- SIGN
- FENCE
- GAS LINE (INDICATIVE ONLY)
- POWERLINE
- SEWER LINE
- STORMWATER PIPE
- TELSTRA OR NBN LINE
- RETICULATED WATER LINE

N

M.G.A

900 X 300 RCBC
U/S INVERT 243.25
D/S INVERT 243.15

1200 X 600 RCBC X 6
U/S INVERT 243.25
D/S INVERT 243.15

BOGAN GATE

60.35 WIDE

ROAD

284.75

7026
DP1023238

STREET

DAM

900 X 300 RCBC
U/S INVERT 241.65
D/S INVERT 241.55

GRATED INLET PIT
GRATE 244.7
INVERT 243.65

900 X 300 RCBC
U/S INVERT 243.7
D/S INVERT 243.6

GRATED INLET PIT
GRATE 244.15
INVERT 243.5

600 X 300 RCBC
U/S INVERT 243.7
D/S INVERT 243.5

STREET

389.72

20.115 WIDE

7302
DP1144037

9.95

BIO-SAFETY AREA

37.35

37.62

8.67

243.30

20.115 WIDE

KERB INLET PIT
GRATE 243.35
INVERT 242.2

KERB INLET PIT
GRATE 243.1
INVERT 242.0

HURFORD
PLACE
18 WIDE

CHURCHILL

SMH
LID 239.6
INVERT 236.15

1800 X 600 RCBC X2
U/S INVERT 238.85
D/S INVERT 238.75

SMH
LID 240.95
INVERT 238.65

244.34

SMH
LID 243.3
INVERT 240.0

SMH
LID 242.3
INVERT 239.2

SMH
LID 243.1
INVERT 239.61

KERB INLET PIT
GRATE 243.0
INVERT 241.9

KERB INLET PIT
GRATE 243.25
INVERT 240.75

900 X 300 RCBC
U/S INVERT 239.35
D/S INVERT 239.25

ATTLEE

20.115 WIDE

STREET

YORK

KERB INLET PIT
GRATE 243.1

600 RCP X2
D/S INVERT 239.0

24 DP1044585

23
DP1044585

22
DP1008870

ROAD
20.115 WIDE

844
DP750158

0 50 100

SCALE 1:1000

ARNDELL SURVEYING

Registered Surveyors
48 Reid St. Parkes, NSW
Ph: (02) 6862 2208
Email: arndellsurvey@bigpond.com

Rev	Date	Description	Approved

REFERENCE: 11811	REDUCTION RATIO: 1:1000 @A2
DATE: 20/12/2022	HEIGHT DATUM: AHD
DRAWN BY: BI	DATUM SOURCE: GDA2020
CHECKED BY: AA	PROJECTION: MGA ZONE 55

PLAN SHOWING DETAIL AND LEVELS LOTS 1046 - 1055 & 796 DP750158

Bogan Gate Road, Forbes 2871