



Site Based Stormwater Management Plan

1 - 5 Railway St, Gulgong (Stage 1 - 4)

Prepared For
Mid-Western Regional Council

Project No.
TEL2021184

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Telford Consulting Pty Ltd
Sydney + Brisbane



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Disclaimer

The advice and information contained within this report relies on the quality of the records and other data provided by the Client and obtained from Council along with the time and budgetary constraints imposed.

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1 INTRODUCTION

Telford Consulting Pty Ltd have been commissioned to undertake a Site Based Stormwater Management Plan for the Proposed Subdivision at 1 - 5 Railway St, Gulgong (Stage 1-4).

The aim of this report is to:

1. Identify the proposed development details;
2. Describe the existing site topography and features;
3. Identify the lawful point of discharge;
4. Stormwater quantity management;
5. Stormwater quality management;
6. Assess erosion and sediment control;
7. Ensure the proposed development achieves the principle of "*no worsening*".

The limitations of this report are:

The concept plans provided are preliminary only and not for construction purpose.

2 STORMWATER QUANTITY MANAGEMENT PLAN

2.1 Site Details Summary

Table 2-1 provides a summary of development details for the subject site.

Table 2-1 – Site Details / Development Summary

Development Details	Comments
Applicant's Name	Mr Roy Amery
Street Address	1 - 5 Railway St
Suburb	Gulgong
State / Postcode	NSW / 2852
Local Authority	Mid-Western Regional Council
Zoning	R1 (General Residential)
Development Type	Subdivision
Number of Proposed Lots	41
Site Area	4.19ha (Stage 1 – 4 3.93ha)
Real Property Description	Lot 2 DP 613429
Stage	1-4

2.2 Location / Existing Development Details

The subject site is located at 1 - 5 Railway St, Gulgong and has a total site area of approximately 4.19 ha. Stages 1 – 4 site area is 3.93ha.

This site is bounded by residential areas to the west and south, Railway street to the north, and Homer Street to the east.

Refer to **Figure 2-1** below for a locality map of the site.



Figure 2-1 - Locality Map, Source: Google Map

2.3 Existing Topography and Drainage Patterns

The site falls from South to North with the lowest point occurring at the north eastern boundary of the site.

The lowest point is at RL 453.3m AHD while the highest point of the site is approximately at RL 460.5m at the most south western point.

The site falls towards the north at an average grade of approximately 3%.

2.4 External Catchment

Available Lidar data and specific site survey demonstrates that the site is affected by external runoff from the southern developments. These external flows will be captured by a 1.5 m wide swale along the southern side of the proposed lots (Stage 4) and directed towards the east via an outlet headwall.

Refer to **Appendix B** for Telford Civil Engineering plans for the external catchment and the proposed swale location.

2.5 Proposed Subdivision Plan

The proposal is a 41 lot subdivision.

Refer to **Figure 2-2** below for the proposed subdivision plan.

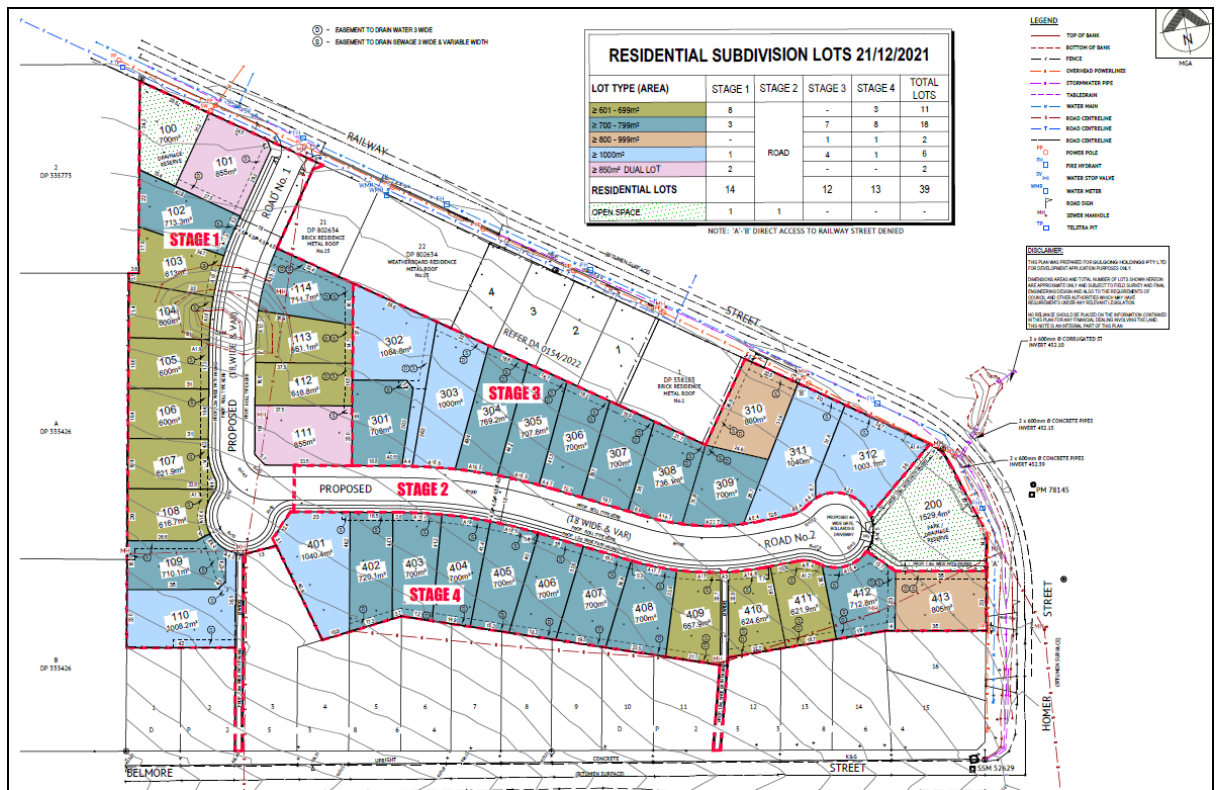


Figure 2-2 - Proposed Subdivision Plan

2.6 Lawful Point of Discharge

The lawful point of discharge for the site is proposed at two locations to the northeast and northwest corner of the site. These two locations were decided based on the site topography draining from south to north as well the proposed location of the bio-retention basins. Refer to **Appendix B** for Telford Civil engineering plans that demonstrate the locations of the lawful points of discharge.

2.7 Hydrological Model Establishment

DRAINS ILSAX model was used for all storm events to analyze and determine the pre-development and post development stormwater runoff from the subject site.

DRAINS is an integrated hydrological and hydraulic model. It is capable of modelling the hydrology through an ILSAX module including detention storages. Model parameters for sub catchment storages have been selected from recommended design values from the following data sources:

1. Time of Concentration – Time of Concentration has been calculated in accordance with QUDM.
2. Catchment roughness values – Based on aerial photography and previous experience with similar hydrologic assessment; and
3. Intensity-Frequency - Duration (IFD) values and rainfall temporal patterns were sourced from the Australian Government, Bureau of Meteorology website.

Pre-development Scenario

The following table details the pre-development runoff from the pre-development Catchments towards the lawful points of discharge calculated using ILSAX DRAINS model.

Table 2-2 - Hydrological Parameters - Pre Development East

Parameters	Value
Catchment No	Pre Dev East
Area (ha)	2.86
1 in 100 ARI Flow (m ³ /s)	0.999

Table 2-3 - Hydrological Parameters - Pre Development West

Parameters	Value
Catchment No	Pre Dev West
Area (ha)	1.02
1 in 100 ARI Flow (m ³ /s)	0.360

Post-development Scenario

The Post-development runoff has been calculated in DRAINS.

Table 2-4 - Hydrological Parameters - Post Development East

Parameters	Value
Catchment No	Post Dev East
Area (ha)	2.86
Q ₁₀₀ -ILSAX (m ³ /s)	1.249

Table 2-5 - Hydrological Parameters - Post Development West

Parameters	Value
Catchment No	Post Dev West
Area (ha)	1.02
Q ₁₀₀ -ILSAX (m ³ /s)	0.441

Refer to **Appendix C** for Drains Model data.

2.8 Hydraulic Analysis

Detention Requirements:

To mitigate the increased post-development runoff, it has been proposed to install two (2) above ground OSD basin to the northeast and northwest of the subject site. The proposed basins will cater in the proposed site flows and discharge it at the lawful points of discharge.

DRAINS ILSAX model was used to analyse the detention requirements for a range of storm events. The following table details the preliminary detention storage requirements for the proposed basin.

Table 2-6 - Detention Requirements

Name	Detention Volume required (m ³)	Source
Basin East	462.1	DRAINS ILSAX Model
Basin West	140.5	DRAINS ILSAX Model

A footprint has been estimated accordingly for the proposed basins.

Table below summarises the peak discharge from the site in the pre-development and post-development scenarios.

Table 2-7 - Summary of Peak Discharge

Outlet	Scenario	ARI Storm event (m ³ /s)				
		1 in 5	1 in 10	1 in 20	1 in 50	1 in 100
Lawful Point of discharge East	Pre-dev	0.377	0.490	0.663	0.865	0.999
	Post-dev	0.334	0.360	0.386	0.423	0.447
Lawful Point of discharge West	Pre-dev	0.137	0.179	0.241	0.312	0.360
	Post-dev	0.113	0.121	0.129	0.143	0.247

The table indicates that with the proposed detention basins, the development will successfully attenuate all post-development peak discharges from the proposed development, for all investigated return periods.

Refer to **Appendix B** for Telford Civil Engineering Plans.

Lots 310, 311, and 312 are sloping towards Railway street and due to sites topography, it will not be possible to drain them to the regional OSD/WSUD system to the east (Basin East). On this basis, it is recommended to design and install appropriate on-site detention systems as part of future DA/CDC.

On-Site Detention facilities can be designed in the form of an underground Masonry/PVC tank with an outlet pipe connecting to the proposed site's K&G.

DRAINS ILSAX model was used for all storm events to analyze and determine the pre-development and post development stormwater runoff from these lots and to analyse the detention requirements for a range of storm events.

In reference to a preliminary assessment of the OSD requirements and assuming 70% of the proposed sites will be impervious, footprints have been estimated for the detention tanks.

Table 2-8 - Detention Requirements

Name	Detention Volume required (m ³)	Source
Tank 310	13.8	DRAINS ILSAX Model
Tank 311	17.9	DRAINS ILSAX Model
Tank 312	12.7	DRAINS ILSAX Model

3 STORMWATER QUALITY MANAGEMENT

3.1 Stormwater Quality Management Objectives

The aim of this Stormwater Quality Management Plan is to minimize the generation and export of sediment and other pollutants resulting from the operational phase of the future development on site.

3.1.1 Construction Phase

During the construction phase of this development, the pollutants listed in the Table below have been identified as being typically generated for this type of development.

Table 3-1 – Construction Phase Pollutants

Pollutants	Source
Litter	Paper, construction packaging, food packaging, cement bags, off cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel an oil spill, leaks from construction equipment
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, washwater (eg from tile works)
pH Altering Substances	Acid sulfate soils, cement slurry and washwaters

Generally, the minimization of these pollutants is achieved by the project manager ensuring that the contractual lines of responsibility for all measures are clearly set out to Contractors and sub-Contractors from commencement of works until final stabilisation. Where there is a failure critical to environmental performance by a Contractor, the project manager should ensure there is a system in place to be discovered and promptly remediated.

This has been discussed in **Section 4** of this report.

3.1.2 Operational Phase

The key pollutants generated by developments of this kind during the operational phase (post construction) are tabulated below. Those presented in bold text are identified as the key pollutants to be targeted for treatment and have been selected with consideration of the proposed operational activities and processes to be undertaken on this site.

Table 3-2 – Operational Phase Pollutants

Type	Comment
Litter	Common
Sediment	Common
Nutrients (Nitrogen and phosphorus)	Common
Hydrocarbons	Common
Heavy metals	Associated with fine sediment
Surfactants	Common
Organochlorins and organophosphates	Unlikely to be present
Thermal pollution	Maybe present
pH altering substances	Maybe present
Oxygen demanding substances	Maybe present
Pathogens/Faecal coliforms	Maybe present

3.2 Stormwater Quality Management Measures

3.2.1 Modelling Guidelines

MUSIC Version 6.2 was used to assess pollutant generation and the performance of stormwater treatment measures for the proposed development.

3.2.2 Rainfall Data

Mid-western Regional Music Link has been used.

3.2.3 Music Model Layout

The layout of the site and the proposed drainage pattern were considered in the creation of the MUSIC model. The figures below present the layout of source, treatment and receiving nodes used in the modelling.

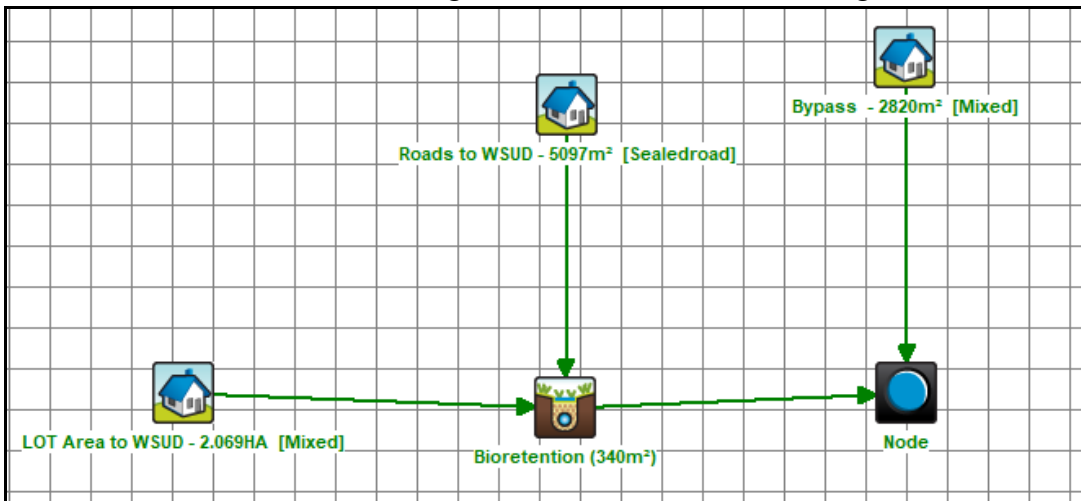


Figure 3-1 - Music Model Layout (East)

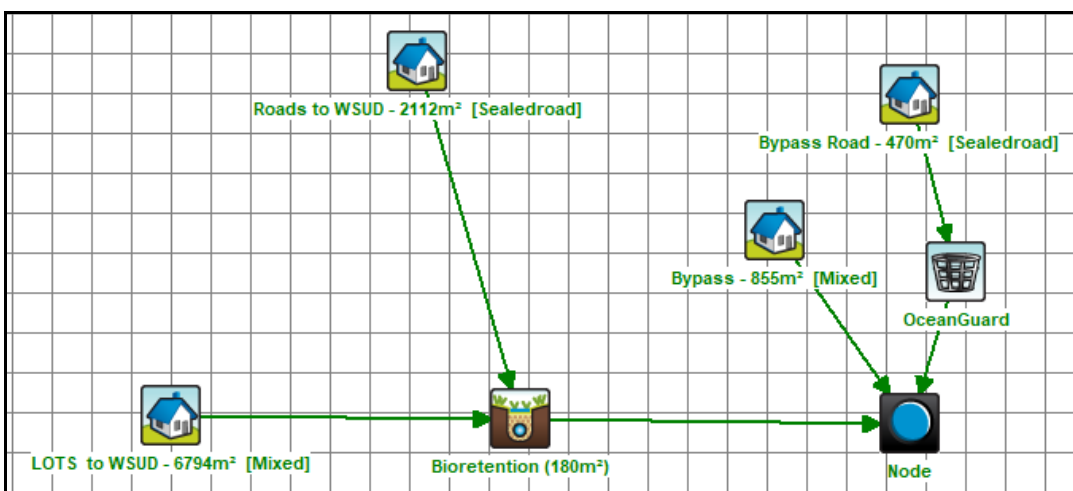


Figure 3-2 - Music Model Layout (West)

3.2.4 Bio-Retention

A bio-retention has been incorporated within the design of each basin to act as the stormwater treatment facility at the site. The bio-retention will be constructed as part of the proposed detention basins. Rainfall runoff generated within the site is to be collected via a drainage system and discharged into the proposed bio-retention basins for treatment.

Refer to **Appendix B** for the Civil Plans of the subject site that demonstrate the proposed locations of the bio-retentions.

The following parameters were adopted to the proposed Bio-Retentions.

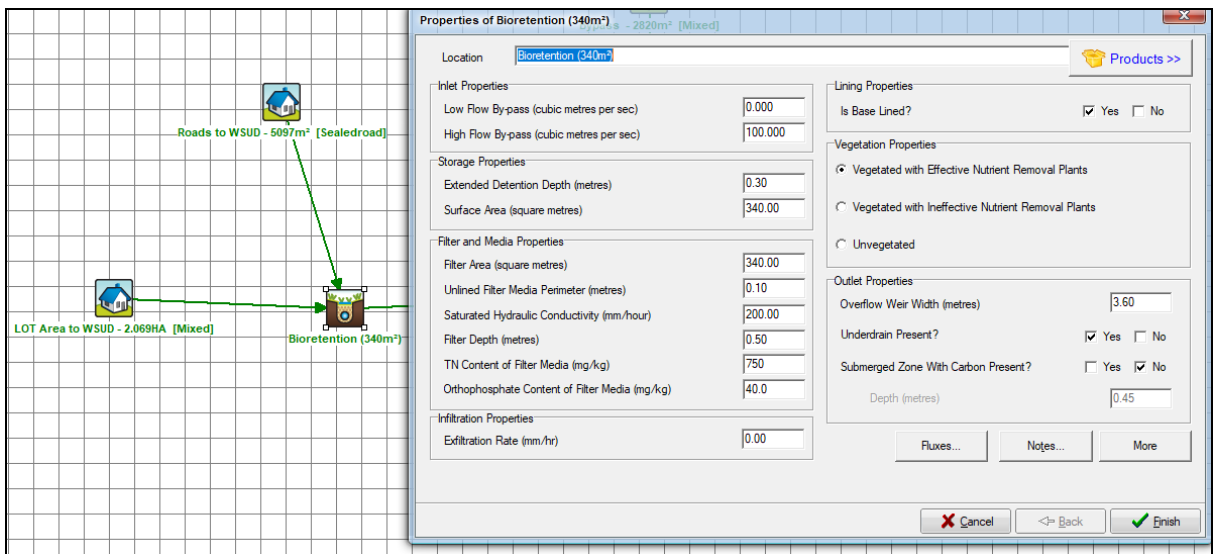


Figure 3-3 - Bio-Retention Parameters (East)

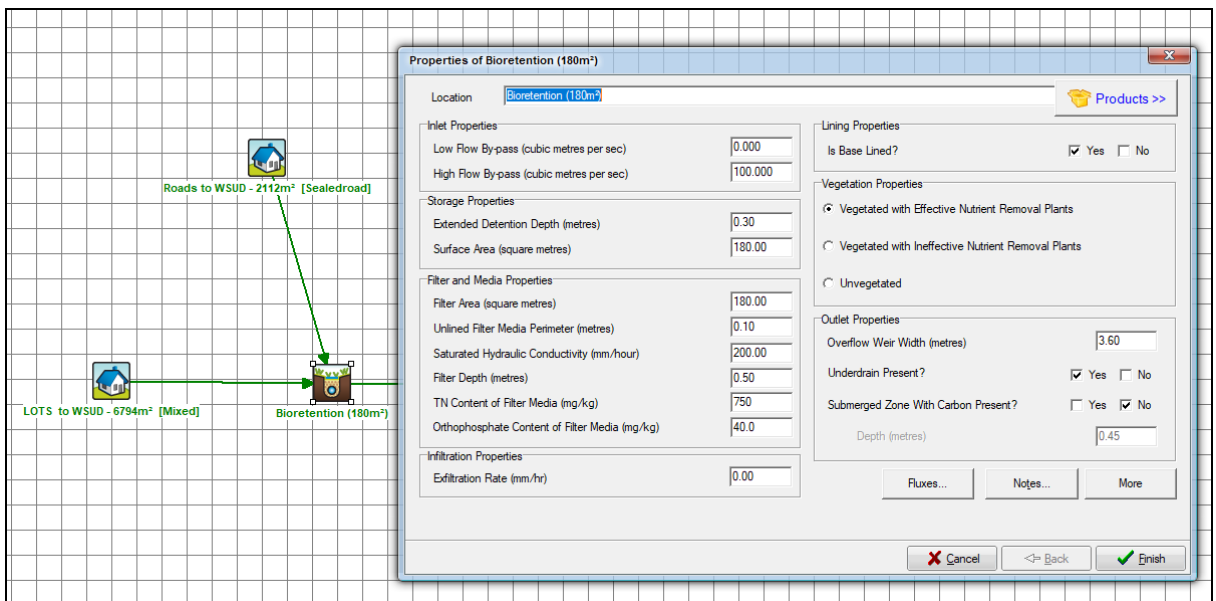


Figure 3-4 - Bio-Retention Parameters (West)

3.2.5 Modelling Results, Comparisons and Compliance

The MUSIC modelling results are shown on the figures below. They are in the form of percentage reduction achieved with the proposed stormwater quality treatment.

Table 3-3 - MUSIC Modelling Targets

Pollutant	Water Quality Objective
Total Suspended Sediment (TSS)	85%
Total Phosphorous (TP)	65%
Total Nitrogen (TN)	45%

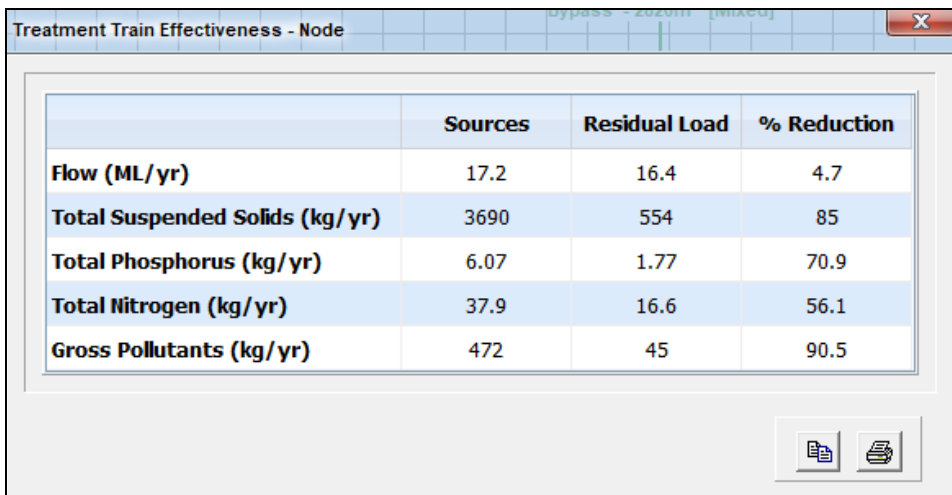


Figure 3-5 - MUSIC Modelling Results (East)

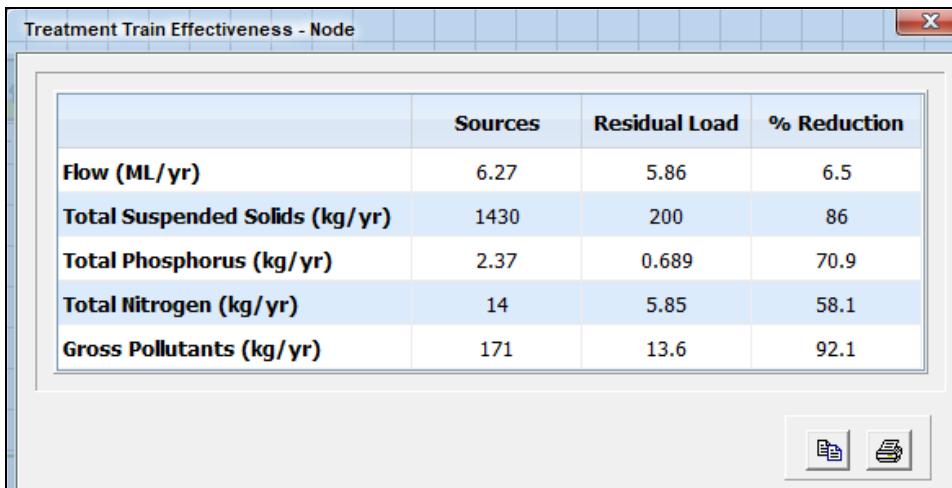


Figure 3-6 - MUSIC Modelling Results (West)

As seen above, it has been demonstrated that the proposed bio-retentions would be adequate to meet stormwater quality objectives in accordance with the current State Planning policy.

4 EROSION AND SEDIMENT

4.1 Site Establishment

Prior to any earthworks associated with site commencement, on site erosion and siltation control measures are to be put in place in accordance with Council's guidelines and best management practices for erosion and sediment control and as described herein. These measures include:

1. The installation of a perimeter fence covered with shade cloth or solid A class hoarding, to the perimeter of the work site area;
2. The construction of a silt fence on the low side of all site areas that are disturbed;
3. All water leaving each site will be processed through a sediment control basin, where applicable;
4. Swales and hay bales are to be used to assist with sediment control for overland flow paths leading into sedimentation control basins;
5. The erosion and sediment control measures will be inspected at least once a week or after rainfall events to check their integrity.

4.2 Construction Phase

The following information is provided to identify controls and procedures, and who is responsible for them, which will be incorporated into the Erosion and Sediment Control Program:

4.2.1 Pre-Construction

1. A single stabilised entry/exit point is to be established (vehicle shake down device) for each stage of construction. This point should also include a vehicle shakedown device to mitigate the transportation of dust and dirt;
2. Sediment fences are to be placed along the low side of the site to slow flows, reduce scour and capture some sediment runoff;
3. Sediment fences are to be constructed at the base of fill embankments;
4. Divert up-slope water around the work site and appropriately stabilise any drainage channels;
5. Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds;
6. Diversion banks are to be created at the upstream boundary of construction activities to ensure upstream runoff is diverted around any areas to be exposed. Catch drains are to be created at the downstream boundary of construction activities;
7. Construction of temporary sediment basins, where required;
8. Site personnel are to be educated in the sediment and erosion control measures to be implemented on site.

4.2.2 During Construction

1. Progressive re-vegetation of filled areas and fill batters, if applicable;
2. Construction activities are to be confined to the necessary construction areas;
3. The provision of a construction exits to prevent the tracking of debris from tyres of vehicles onto public roads. Only one construction exit will be nominated to limit the movement of construction equipment;
4. The topsoil stockpile location will be nominated to coincide with areas previously disturbed. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile if required;
5. Roof downpipes should be installed as soon as practicable after the roof is laid;
6. Transport loads that are subject to loss through wind or spillage shall be covered or sealed to prevent entry of pollutants to the stormwater system;
7. Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures. Following rainfall events greater than 50mm, inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged equipment should be undertaken immediately;

4.2.3 Post Construction

1. The Contractor/Developer will be responsible for the maintenance of erosion and sediment control devices from the possession of the site until the site is accepted, or until stabilisation has occurred, to the satisfaction of the superintendent and developer;
2. Key stormwater quality improvement devices requiring maintenance during the operational phase of the project following construction are the bio-retention areas and the gross pollutant traps. Maintenance requirements for these devices consist of regular storm event inspection to ensure;
 - a. Sufficient vegetation within bio-retention areas; and
 - b. Ensuring no erosion has occurred
3. Regular mowing/harvesting to ensure vegetation is maintained at acceptable levels,
4. Removal of litter within verges, swales and bio-retention areas,
5. Regular trash removal,
6. The Sediment and Erosion Control Management Plans should be provided to all people involved with the site, including sub-contractors, private certifiers, home owners and regulators.

5 CONCLUSION

This proposed Site Based Stormwater Management Plan has been prepared for the Proposed Subdivision at 1 - 5 Railway St, Gulgong, to manage future site based stormwater quantity and quality requirements for the design storms up to and including the 1% AEP event.

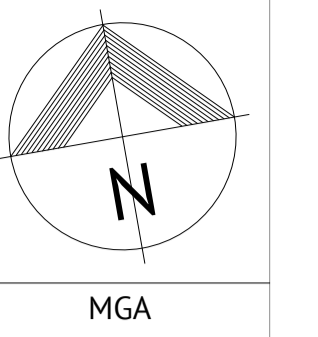
Two above ground Bio-Retention Basins are proposed at the subject site to ensure non-worsening of post-development discharge from the proposed development and to minimize the generation and export of pollutants within this lot.

Detention tank for any future DA/CDC is required at Lots 310, 311, and 312 to ensure non-worsening of post-development discharge from the proposed development.

The conclusion of this report is that the treatment outlined herein complies with the requirements of Council and conforms with best management recommendations and engineering practices.

APPENDICES

Appendix A SURVEY PLAN



MARK	MGA COORDINATES		RL
	EASTING	NORTHING	
PM 75042	739279.432	6417018.429	452.817
PM 6267	739155.311	6416697.248	463.897
PM 78145	739701.104	6416733.273	452.96
PM 6266	739128.303	6416528.726	481.096

PLAN IS ON MGA 2020 GROUND
ORIGIN IS PM 75042

- NOTES**
1. THESE PLANS ARE PREPARED FROM A FIELD SURVEY FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
 2. ALL UNDERGROUND SERVICES SHOWN ARE BASED ON A COMBINATION OF PREVIOUS RECORDS, VERBAL INSTRUCTIONS AND SURFACE INDICATORS LOCATED AT TIME OF SURVEY.
 3. CONTOUR INTERVAL OF 0.5m.
 4. THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN.

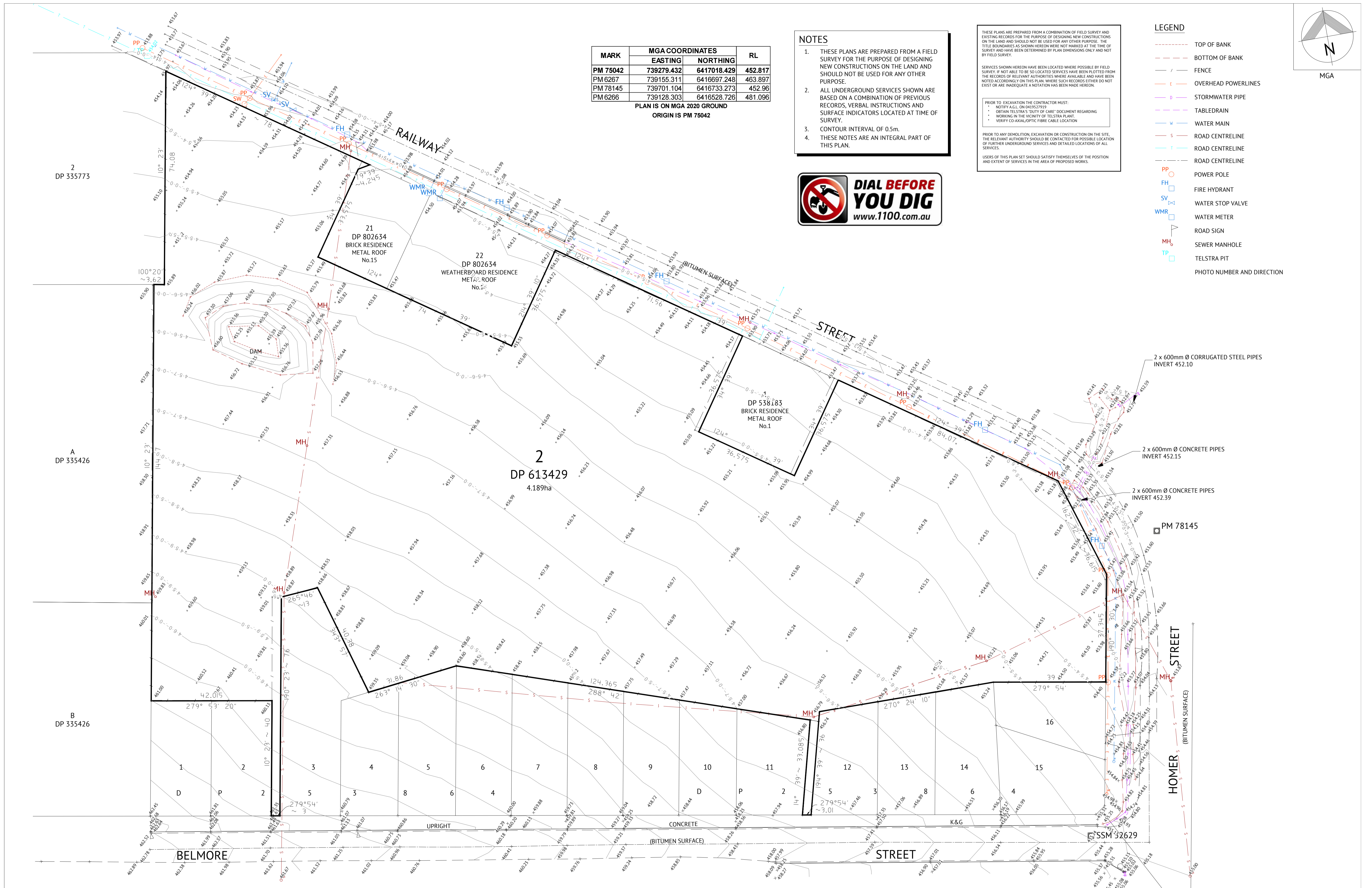
THESE PLANS ARE PREPARED FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE. THE TITLE BOUNDARIES AS SHOWN HEREON WERE NOT MARKED AT THE TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY AND NOT BY FIELD SURVEY.

SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE BY FIELD SURVEY. IF NOT ABLE TO BE SO LOCATED SERVICES HAVE BEEN PLOTTED FROM THE RECORDS OF RELEVANT AUTHORITIES WHERE AVAILABLE AND HAVE BEEN NOTED ACCORDINGLY ON THIS PLAN. WHERE SUCH RECORDS EITHER DO NOT EXIST OR ARE INADEQUATE A NOTATION HAS BEEN MADE HEREON.

PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

USERS OF THIS PLAN SET SHOULD SATISFY THEMSELVES OF THE POSITION AND EXTENT OF SERVICES IN THE AREA OF PROPOSED WORKS.

- LEGEND**
- TOP OF BANK
 - BOTTOM OF BANK
 - - - FENCE
 - - - OVERHEAD POWERLINES
 - STORMWATER PIPE
 - TABLEDRAIN
 - WATER MAIN
 - ROAD CENTRELINE
 - ROAD CENTRELINE
 - ROAD CENTRELINE
 - PP ○ POWER POLE
 - FH □ FIRE HYDRANT
 - SV □ WATER STOP VALVE
 - WMR □ WATER METER
 - ROAD SIGN
 - MH □ SEWER MANHOLE
 - TP □ TELSTRA PIT
 - PHOTO NUMBER AND DIRECTION



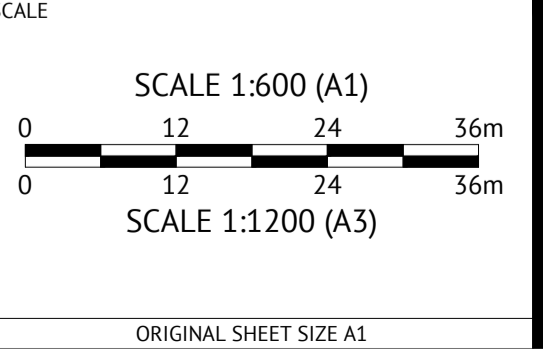
ISSUED FOR APPROVAL

DATE	REV	DESCRIPTION	REVISIONS
21/10/2021	B	DETAIL IN BELMORE ST - SEWER UPDATED	NZ WS
10/09/2021	A	ISSUED FOR APPROVAL	JE CH
			REC APP

Premise

DUBBO OFFICE
1ST FLOOR
62 WINGEWARRA STREET
DUBBO, NSW 2830
PH: (02) 6887 4500
WEB: www.premise.com.au

DESIGNED CH/NM
CHECKED WARREN SAUNDERS
PROJECT MANAGER WARREN SAUNDERS
REGISTERED SURVEYOR



CLIENT **GULGONG HOLDINGS PTY LTD**

PROJECT **CONTOUR AND FEATURE SURVEY**

LOCATION **1 RAILWAY STREET, GULGONG - LOT 2 IN DP 613429**

SHEET TITLE **EXISTING SITE PLAN**

JOB CODE **322037_01**

SHEET NUMBER	REV
DS01	B

Appendix B CIVIL ENGINEERING PLANS

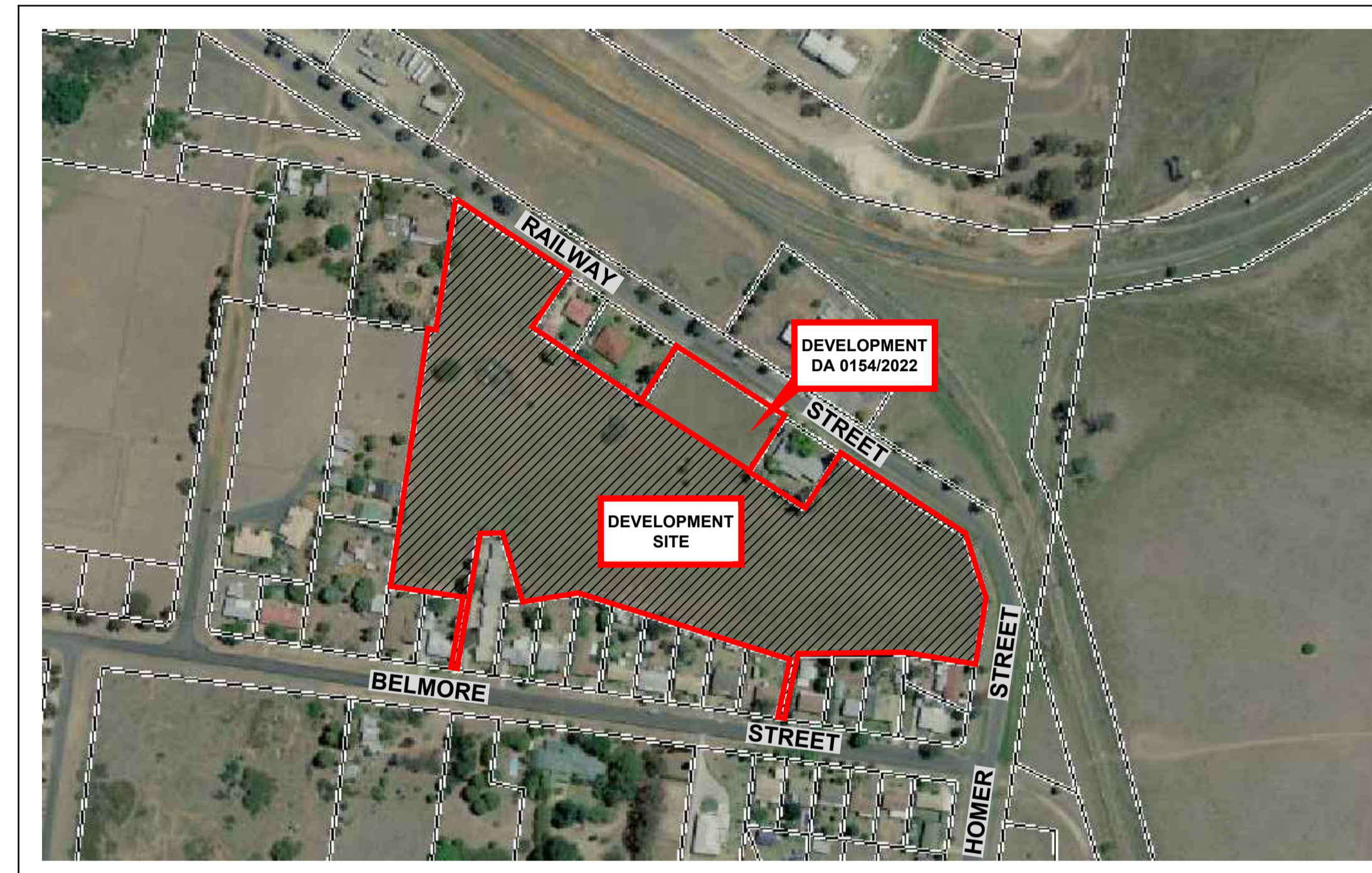
PROPOSED RESIDENTIAL SUBDIVISION

1 RAILWAY STREET, GULGONG

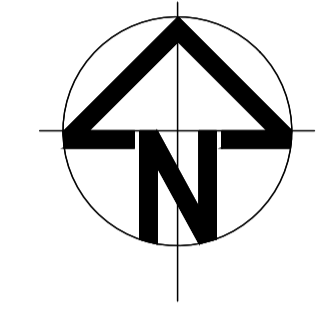
CIVIL ENGINEERING WORKS

FOR DEVELOPMENT APPLICATION

DRAWING SCHEDULE		
DRG No.	DESCRIPTION	REV.
GENERAL		
TEL2021184.CIV.DA.000	GENERAL NOTES, LOCALITY PLAN AND DRAWING SCHEDULE	B
TEL2021184.CIV.DA.001	EXISTING SERVICES AND DEMOLITION PLAN	A
EROSION AND SEDIMENT		
TEL2021184.CIV.DA.100	EROSION AND SEDIMENT CONTROL PLAN	B
TEL2021184.CIV.DA.101	EROSION AND SEDIMENT CONTROL DETAILS	A
EARTHWORKS		
TEL2021184.CIV.DA.200	BULK EARTHWORKS PLAN	A
TEL2021184.CIV.DA.201	EARTHWORKS TYPICAL CROSS SECTIONS SHEET 1 OF 2	A
TEL2021184.CIV.DA.202	EARTHWORKS TYPICAL CROSS SECTIONS SHEET 2 OF 4	A
TEL2021184.CIV.DA.203	EARTHWORKS TYPICAL CROSS SECTIONS SHEET 3 OF 4	A
TEL2021184.CIV.DA.204	EARTHWORKS TYPICAL CROSS SECTIONS SHEET 4 OF 4	A
ROADS		
TEL2021184.CIV.DA.300	STAGE LAYOUT PLAN	A
TEL2021184.CIV.DA.301	ROADWORKS AND DRAINAGE LAYOUT PLAN	B
TEL2021184.CIV.DA.302	ROAD 1 - LONGITUDINAL SECTIONS	A
TEL2021184.CIV.DA.303	ROAD 1 - CROSS SECTIONS SHEET 1 OF 3	A
TEL2021184.CIV.DA.304	ROAD 1 - CROSS SECTIONS SHEET 2 OF 3	A
TEL2021184.CIV.DA.305	ROAD 1 - CROSS SECTIONS SHEET 3 OF 3	A
STORMWATER		
TEL2021184.CIV.DA.400	STORMWATER CATCHMENT PLAN	B
BIO-RETENTION		
TEL2021184.CIV.DA.500	BIO-RETENTION BASIN 1 LAYOUT PLAN AND DETAILS SHEET 1 OF 2	A
TEL2021184.CIV.DA.501	BIO-RETENTION BASIN 1 LAYOUT PLAN AND DETAILS SHEET 2 OF 2	B



LOCALITY PLAN
N.T.S.



COORDINATION NOTES

- REFER ELECTRICAL CONSULTANTS DRAWINGS FOR ELECTRICAL RETICULATION SETOUT.
- REFER LANDSCAPE ARCHITECTS DRAWINGS FOR SOIL STABILATION AND PLANTING DETAILS.
- REFER SERVICE AUTHORITY FOR LOCATION AND CONSTRUCTION REQUIREMENTS APPLICABLE TO EXISTING SERVICES.

GENERAL NOTES

- ALL WORK IS TO CONFORM TO THE CURRENT COUNCIL STANDARDS, DRAWINGS AND SPECIFICATIONS U.N.O.
- WHERE CONNECTION IS TO BE MADE TO EXISTING CONSTRUCTION THE CONTRACTOR SHALL CONFIRM THE LOCATION AND LEVEL OF THIS CONSTRUCTION PRIOR TO COMMENCING WORK ON ANY CRITICAL SECTION. THE SUPERINTENDENT MAY VARY LEVELS AND GRADIENTS OF NEW WORKS TO ACHIEVE A SATISFACTORY CONNECTION.
- LEVEL DATUM IS AHD.
- ALL DIMENSIONS ARE IN METRES U.N.O.
- PRIOR TO CONSTRUCTION THE CONTRACTOR WILL SATISFY HIMSELF OF THE CORRECT LOCATIONS OF ALL EXISTING SERVICES WHETHER INDICATED OR NOT ON THE PLANS. ANY DAMAGE TO EXISTING SERVICES IS TO BE RECTIFIED AT THE CONTRACTORS EXPENSE.
- PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL VERIFY BENCH MARK LEVELS AND ADVISE THE SUPERINTENDENT OF ANY DISCREPANCIES.
- PRIOR TO CONSTRUCTION THE CONTRACTOR IS TO CONFIRM WITH THE SUPERINTENDENT THE FOLLOWING:
 - ALL INSPECTION HOLD POINTS, AND;
 - ALL COMPLIANCE TESTING REQUIREMENTS.
- ANY WORK ON EXISTING SERVICES THAT REQUIRE RELOCATION BY AUTHORITIES SHALL BE CARRIED OUT BY THE RELEVANT AUTHORITY, BUT WITHIN TERMS OF THE CONTRACT, AND SHALL BE CO-ORDINATED BY THE CONTRACTOR.
- AT COMPLETION OF CONSTRUCTION THE CONTRACTOR SHALL ARRANGE FOR AN INDEPENDENT LICENSED SURVEYOR TO CARRY OUT A "WORKS AS CONSTRUCTED" SURVEY IN ACCORDANCE WITH THE CURRENT COUNCIL STANDARDS AND SUBMIT THE DETAILS SHOWN ON A PLAN TO THE SUPERINTENDENT.
- ALL VERGES ARE TO BE FULLY TURFED WITH COUCH REFER TO LANDSCAPE ARCHITECTS PLANS FOR DETAILS.

EARTHWORKS NOTES

- EARTHWORKS NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL AND COORDINATION NOTES.
- EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH PROCEDURES SET DOWN IN AS3798 'GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS'.
- BULK EARTHWORKS INCLUDING CLEARING, FILLING AND TESTING, ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE CURRENT COUNCIL STANDARDS, DRAWINGS AND SPECIFICATIONS. COUNCIL STANDARDS SUPERSEDE ANY NOTES OR SPECIFICATIONS WRITTEN ON THE DESIGN DRAWINGS.
- BULK EARTHWORKS LEVELS SHALL BE DETERMINED RELATIVE TO THE FINISHED SURFACE LEVELS. REFER ARCHITECTURAL DRAWINGS FOR SLAB LEVELS, TO THE STRUCTURAL ENGINEERS DRAWINGS FOR BUILDING AND PATH SLAB THICKNESS AND TO THE CIVIL ENGINEERS DRAWINGS FOR EXTERNAL FINISHED SURFACE LEVELS AND EXTERNAL PAVEMENT THICKNESSES
- TOPSOIL SHALL BE STOCKPILED AS DIRECTED BY THE SUPERINTENDENT ON SITE.
- PRIOR TO PLACEMENT OF ANY FILLING ALL TOPSOIL AND ORGANIC MATERIAL IS TO BE REMOVED AND THE SUBGRADE SHALL BE UNIFORMLY COMPACTED TO THE MINIMUM DRY DENSITY RATIOS SHOWN IN NOTE 10. ANY SOFT SPOTS REVEALED BY COMPACTION SHALL BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND BACKFILLED WITH COMPACTED SELECT FILL.
- MOISTURE CONTENT OF COMPACTED FILL SHOULD BE MAINTAINED WITHIN 2% OF OPTIMUM MOISTURE CONTENT.
- FILL SHALL BE COMPACTED IN MAXIMUM 200mm THICK LAYERS (LOOSE THICKNESS) TO THE FOLLOWING MINIMUM DRY DENSITY RATIOS (STANDARD COMPACTION A.S.1289.5-1):
 - UPPER 0.3m OF PAVEMENT SUBGRADE = 100%;
 - UNDER BUILDINGS = 98%;
 - GENERAL FILL = 95%.
- ALL FILL MATERIAL PLACED ON THE SITE SHALL COMPRISE ONLY NATURAL EARTH AND ROCK, AND IS TO BE FREE OF CONTAMINANTS (AS DEFINED BY SECTION 11 OF THE ENVIRONMENTAL PROTECTION ACT 1994), NOXIOUS, HAZARDOUS, DELETERIOUS AND ORGANIC MATERIALS. NO DEMOLITION MATERIAL IS TO BE USED. SUITABLE FILL MATERIAL IS DEEMED TO COMPLY WITH THE REQUIREMENTS OF CLAUSE 4.3 OF AS3798, 'GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS'.
- IMPORTED FILL SHALL COMPLY WITH THE FOLLOWING:
 - SOAKED CBR = MINIMUM OF 15%;
 - LIQUID LIMIT = 30% MAX;
 - PLASTICITY INDEX = 15% MAX;
 - MAXIMUM AGGREGATE SIZE = 75mm;
 - PASSING 0.075mm SIEVE = 30% MAX;
 - SHRINK/SWELL INDEX = 1.0% MAX.
- THE CONTRACTOR IS TO ENGAGE, AT THEIR EXPENSE, AN APPROVED NATA REGISTERED LABORATORY TO CARRY OUT SITE CONTROL TO 'LEVEL 1' STANDARD AS SET OUT IN APPENDIX B OF AS3798-2007 'GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS' AND PROVIDE A 'LEVEL 1' REPORT ON COMPLETION OF EARTHWORKS.

DRAINAGE NOTES

- DRAINAGE NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL AND COORDINATION NOTES.
- CONTRACTOR IS TO CHECK THAT THE PROPOSED PIPE WORKS DO NOT CLASH WITH EXISTING SERVICES PRIOR TO ANY TRENCH EXCAVATION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CLASHES ARE FOUND FOR ADVICE ON ANY DESIGN REQUIREMENTS.
- STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR THE ASSESSMENT OF CONSTRUCTION LOADS AND PROVISION OF ANY TEMPORARY BRACING, PROPPING, ETC. REQUIRED DURING CONSTRUCTION. STRUCTURES SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED.
- ALL TRENCH EXCAVATIONS AND CONSTRUCTION IS TO BE IN ACCORDANCE WITH THE WORKPLACE HEALTH AND SAFETY 1989 AS AMENDED AND THE MINE REGULATIONS ACT.
- ALL TRENCHES IN TRAFFICABLE AND NON TRAFFICABLE ZONES SHALL BE BACKFILLED TO DENSITY RATIOS, FREQUENCIES AND LAYER INTERVALS IN ACCORDANCE WITH THE CURRENT COUNCIL STANDARDS. ALL TEST RESULTS SHALL FORWARDED TO THE SUPERINTENDENT AS THEY BECOME AVAILABLE.
- ALL PRECAST CONCRETE PIPES ARE TO BE MANUFACTURED IN ACCORDANCE WITH AS 4058. STORMWATER PIPES SHALL BE TO FOLLOWING CLASSES U.N.O.
 - REINFORCED CONCRETE PIPES (RCP) = CLASS 2;
 - FIBRE REINFORCED PIPES (FRC) = CLASS 2;
 - uPVC = CLASS 'SEH'.
- ALL RCP PIPES SHALL HAVE THE FOLLOWING JOINTS U.N.O.
 - RCP <=600 DIA = RUBBER RING JOINTED (RRJ);
 - RCP >600 DIA = FLUSH JOINTED (FJ);
- ROOFWATER PIPES SHALL BE uPVC PIPES CLASS 'SH' U.N.O.
- REFER TO STORMWATER LONGITUDINAL SECTIONS FOR ALL STRUCTURE TYPES, SIZES, LEVELS AND GRATE TYPES. GRATES SHALL BE TRAFFICABLE CLASS 'D' U.N.O.
- MANHOLE AND FIELD INLET ACCESS SHALL BE INSTALLED AS DESCRIBED BELOW IN ACCORDANCE WITH AS1657:
 - GULLY/FIELD INLETS >1.35m DEPTH: STEP IRONS;
 - MANHOLES 0.850m-3.0m DEPTH: STEP IRONS;
 - MANHOLES >3.0m DEPTH: FIXED ACCESS LADDER.
- TEST CERTIFICATES AND MATERIAL CERTIFICATION DOCUMENTATION IS REQUIRED FOR ALL PIPES, FITTINGS, BOX CULVERTS AND OTHER PRECAST CONCRETE PRODUCTS.
- ALL STORMWATER SETOUT IS TO CENTRE OF STRUCTURE U.N.O.

EROSION AND SEDIMENT CONTROL NOTES

- EROSION & SEDIMENT CONTROL (ESC) NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL AND COORDINATION NOTES.
- ALL ESC MEASURES SHALL BE IN ACCORDANCE CURRENT COUNCIL STANDARDS, DRAWINGS AND SPECIFICATIONS U.N.O.
- CONSTRUCTION OF ALL SEDIMENT CONTROL MANAGEMENT DEVICES SHALL BE TO THE SATISFACTION OF THE SUPERINTENDENT. THE CONTRACTOR IS TO FOLLOW THE CONSTRUCTION PHASE AS OUTLINED:
 - CONSTRUCTION OF EROSION AND SEDIMENT DEVICES;
 - STRIPPING TOPSOIL;
 - BULK EARTHWORKS;
 - SERVICES, BUILDING, PAVEMENT AND ROAD CONSTRUCTION;
 - LANDSCAPED AREAS TO BE TOPSOILED, TURFED, MULCHED OR PLANTED.
- THE CONTRACTOR IS TO PROVIDE A CONSTRUCTION TRAFFIC SHUTDOWN DEVICE AT ALL RELEVANT POINTS OF EXIT FROM THE SITE. THE CONTRACTOR SHALL CLEAN OUT AND MAINTAIN THE SHUTDOWN DEVICE REGULARLY TO ENSURE EFFICIENT OPERATION.
- THE CONTRACTOR SHALL PROVIDE SILT FENCES IMMEDIATELY DOWNSTREAM OF ANY SOIL STOCKPILES.
- BOTH TEMPORARY AND PERMANENT ESC MEASURES SHALL BE MAINTAINED AT A SUITABLE LEVEL/CONDITION THROUGHOUT CONSTRUCTION TO THE SATISFACTION OF THE SUPERINTENDENT.
- ALL TEMPORARY ESC MEASURES SHALL BE MAINTAINED AND FULLY OPERATIONAL DURING THE CONSTRUCTION AND MAINTENANCE PERIOD, AND ARE TO BE REMOVED AFTER THE SATISFACTORY COMPLETION OF AN 'OFF MAINTENANCE' INSPECTION BY THE SUPERINTENDENT.
- ALL ESC MEASURES ARE TO BE INSPECTED AT LEAST DAILY, PRIOR TO EXPECTED RAINFALL AND AFTER RAINFALL. ANY DAMAGE OR EXCESS EROSION/SEDIMENT IS TO BE REPAIRED/MANAGED AS REQUIRED TO MAINTAIN CONTROL DEVICES.
- ALL ESC MEASURES MUST SUIT THE PREVAILING CLIMATE/WEATHER CONDITIONS AT THE TIME OF CONSTRUCTION.
- THE CONTRACTOR IS TO ENSURE THE SUPPRESSION OF DUST AT ALL TIMES DURING THE CONSTRUCTION AND MAINTENANCE PERIOD OF THE DEVELOPMENT. ENVIRONMENTAL HARM AND NUISANCE FROM DUST IS TO BE PREVENTED. ACCEPTABLE METHODS INCLUDE:
 - WATERING;
 - PROMOTING VEGETATION IN WIND EROSION PRONE AREAS;
 - CONSTRUCTING WIND BREAKS;
 - MULCHING.
- THE CONTRACTORS VEHICLES & PLANT SHALL NOT OPERATE OUTSIDE THE LIMITS OF THE IMMEDIATE CONSTRUCTION AREA AND ARE RESTRICTED FROM CROSSING OR DISTURBING AREAS NOT SUBJECT TO CONSTRUCTION.
- ANY WATER TRAPPED WITHIN THE TEMPORARY SEDIMENT BASIN IS TO BE REGULARLY TESTED DURING THE COURSE OF CONSTRUCTION. REFER WATER QUALITY MONITORING TABLE FOR DETAILS.
- ALL DISTURBED GROUND IS TO BE GRASS SEED TO PREVENT EROSION IF THE DISTURBED GROUND IS TO BE LEFT "OPEN" FOR A PERIOD OF GREATER THEN ONE (1) MONTH.
- REFER DRAWING AS TEL2021184.CIV.DA - 100 TO 101 FOR EROSION AND SEDIMENT CONTROL DETAILS.

DISCLAIMER

ALL INFRASTRUCTURE INFORMATION (MAINS, SEWER, PIPES ETC.) IS DERIVED FROM DIAL BEFORE YOU DIG RECORDS. EVERY EFFORT WAS MADE TO ENSURE ACCURACY OF THESE RECORDS WHEN COMPILED. NO WARRANTY IS GIVEN TO CURRENCY OF DEPTHS AND LEVELS DUE TO THE POSSIBILITY OF SUBSEQUENT ALTERATION OF LEVELS THROUGH FILLING OR EXCAVATION. USERS OF THE INFORMATION IN THIS DRAWING/DESIGN SHOULD TAKE ALL REASONABLE STEPS TO VERIFY THE RELEVANT INFORMATION BEFORE COMMENCING EXCAVATING OR CONSTRUCTION WORK. TELFORD CIVIL DESIGN AND CONSTRUCTION EXCELLENCE TAKE NO RESPONSIBILITY FOR APPARENT ERRORS OR INACCURACIES IN THE INFORMATION PROVIDED.

IT IS THE CONTRACTOR RESPONSIBILITY TO CONTACT "DIAL BEFORE YOU DIG" FOR THE LOCATION OF EXISTING PUBLIC UTILITIES, PRIOR TO EXCAVATION.

DANGER :

LOCATION OF ALL EXISTING UNDERGROUND SERVICES SHOWN ARE APPROXIMATE AS TAKEN OFF DBYD INFO. EXTREME CAUTION TO BE EXERCISED WHEN WORKING IN THE VICINITY OF AND AROUND THESE SERVICES. PLEASE CALL THE RELEVANT AUTHORITIES TWO DAYS PRIOR TO CONSTRUCTION FOR A MORE EXACT LOCATION OF THE EXISTING SERVICES.



NOT FOR CONSTRUCTION

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B	ISSUE FOR DEVELOPMENT APPLICATION	28/02/2022	P.B.T.	J.A.B.
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

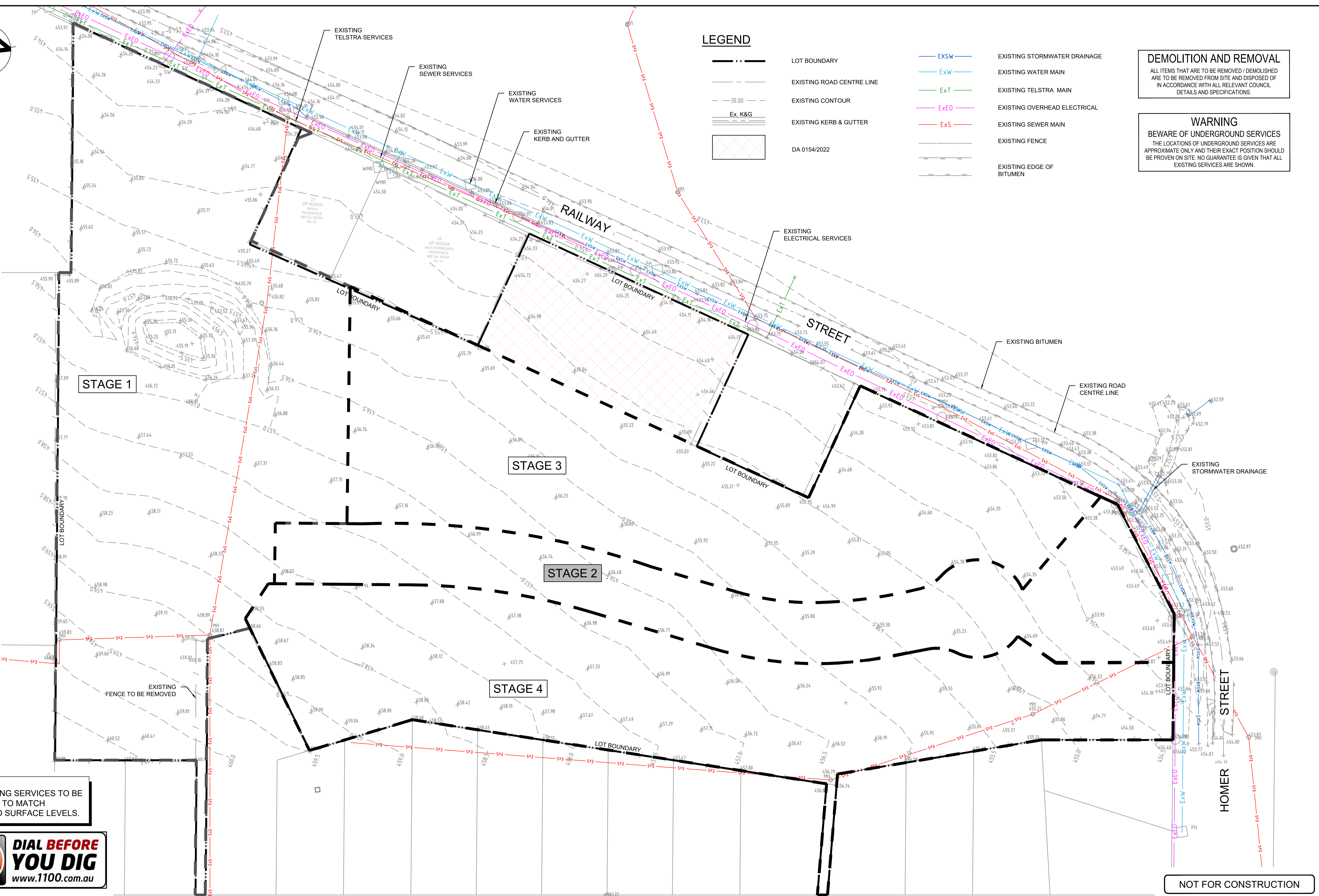
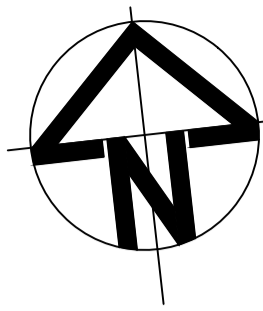
Certification By Dr. Michel Chaaya in affiliation with Joe Bacha (formerly Australian Consulting Engineers)

Client: MR. ROY AMERY
 Council: MID-WESTERN REGIONAL COUNCIL
 Surveyor: DUBBO OFFICE, 1ST FLOOR, 62 WINGEWARRA STREET, DUBBO, NSW 2830. Ph: (02) 6887 4500. WEB: www.premise.com.au
 Scale: 1:1000

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 Phone: 02 7809 4931
 PO BOX 3579 Parramatta 2124
 Company: Telford Consulting Pty Ltd

Project: 1 RAILWAY STREET, GULGONG
 PROPOSED RESIDENTIAL SUBDIVISION
 CIVIL ENGINEERING PLANS
 DEVELOPMENT APPLICATION

Drawing Title				
GENERAL NOTES, LOCALITY PLAN AND DRAWING SCHEDULE				
Scale	A1	Project No.	Dwg. No.	Issue
N.T.S.		2021184	000	B



LEGEND

- LOT BOUNDARY
- EXISTING ROAD CENTRE LINE
- EXISTING CONTOUR
- EXISTING KERB & GUTTER
- DA 0154/2022
- EXSW EXISTING STORMWATER DRAINAGE
- ExW EXISTING WATER MAIN
- ExT EXISTING TELSTRA MAIN
- ExEO EXISTING OVERHEAD ELECTRICAL
- ExS EXISTING SEWER MAIN
- EXISTING FENCE
- EXISTING EDGE OF BITUMEN

DEMOLITION AND REMOVAL
 ALL ITEMS THAT ARE TO BE REMOVED / DEMOLISHED ARE TO BE REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH ALL RELEVANT COUNCIL DETAILS AND SPECIFICATIONS.

WARNING
 BEWARE OF UNDERGROUND SERVICES
 THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

STAGE 1

STAGE 3

STAGE 2

STAGE 4

NOTE:
 ALL EXISTING SERVICES TO BE ADJUSTED TO MATCH PROPOSED SURFACE LEVELS.



NOT FOR CONSTRUCTION

A ISSUE FOR DEVELOPMENT APPLICATION		15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked

Certification by Dr. Michel Orsaya
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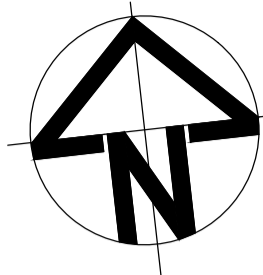
Scale

 SCALE 1:500 @ A1

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PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
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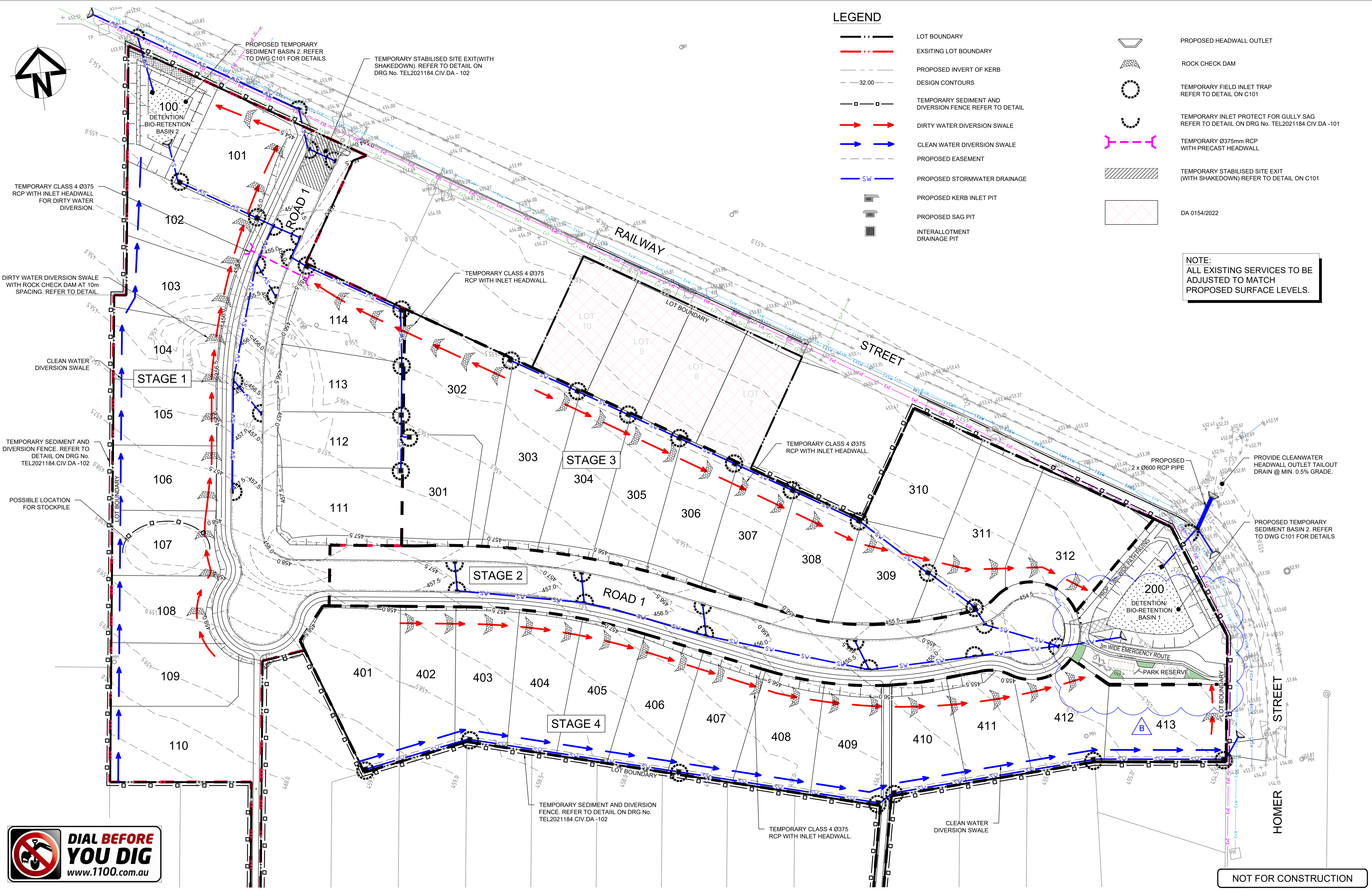
Drawing Title
EXISTING SERVICES & DEMOLITION PLAN
 Scale 1:500
 Project No. 2021184
 Dwg. No. 001
 Issue A



LEGEND

- LOT BOUNDARY
- EXISTING LOT BOUNDARY
- PROPOSED INVERT OF KERB
- DESIGN CONTOURS
- TEMPORARY SEDIMENT AND DIVERSION FENCE REFER TO DETAIL
- DIRTY WATER DIVERSION SWALE
- CLEAN WATER DIVERSION SWALE
- PROPOSED EASEMENT
- PROPOSED STORMWATER DRAINAGE
- PROPOSED KERB INLET PIT
- PROPOSED SAG PIT
- INTERALLOTMENT DRAINAGE PIT
- PROPOSED HEADWALL OUTLET
- ROCK CHECK DAM
- TEMPORARY FIELD INLET TRAP REFER TO DETAIL ON C101
- TEMPORARY INLET PROTECT FOR GULLY SAG REFER TO DETAIL ON DRG No. TEL2021184.CIV.DA -101
- TEMPORARY Ø375mm RCP WITH PRECAST HEADWALL
- TEMPORARY STABILISED SITE EXIT (WITH SHAKEDOWN) REFER TO DETAIL ON C101
- DA 0154/2022

NOTE:
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Scale
0 10 20 30 m
SCALE 1:500 @ A1

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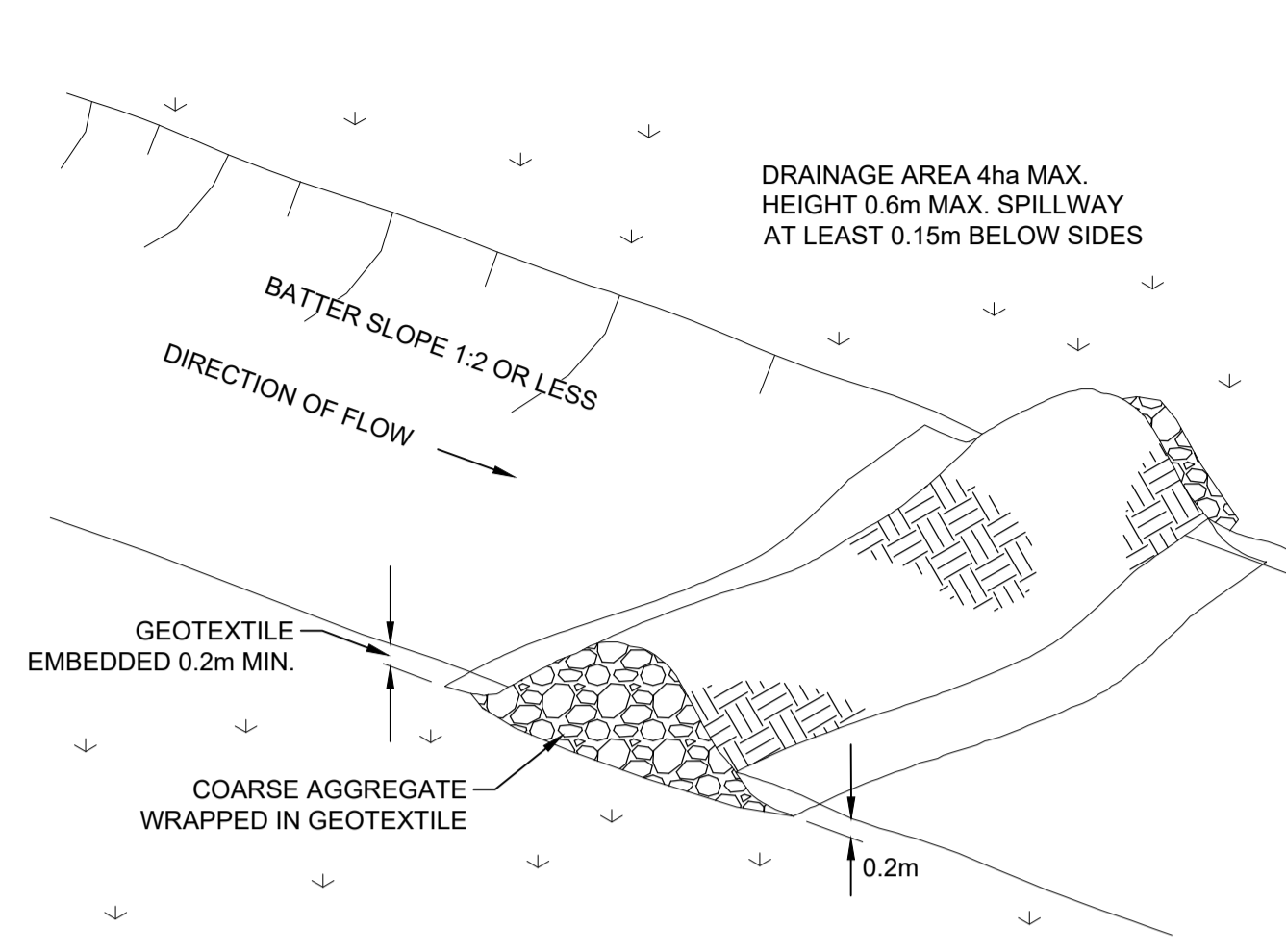
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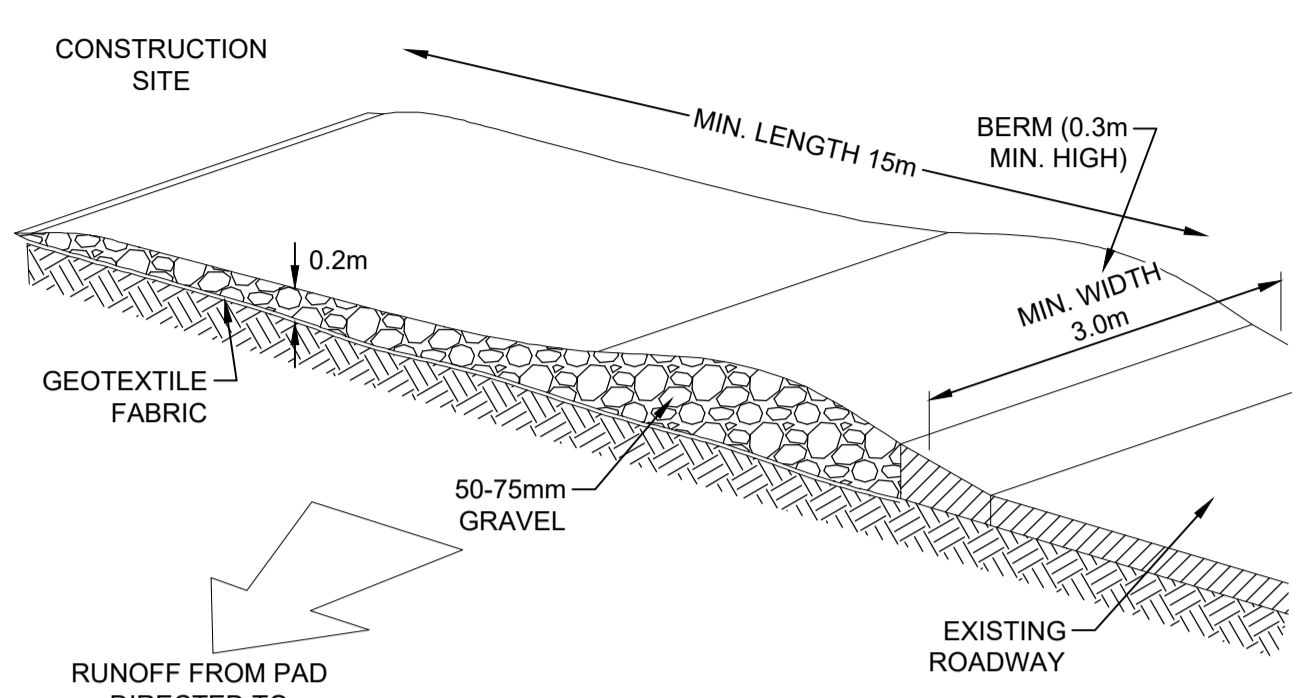
Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

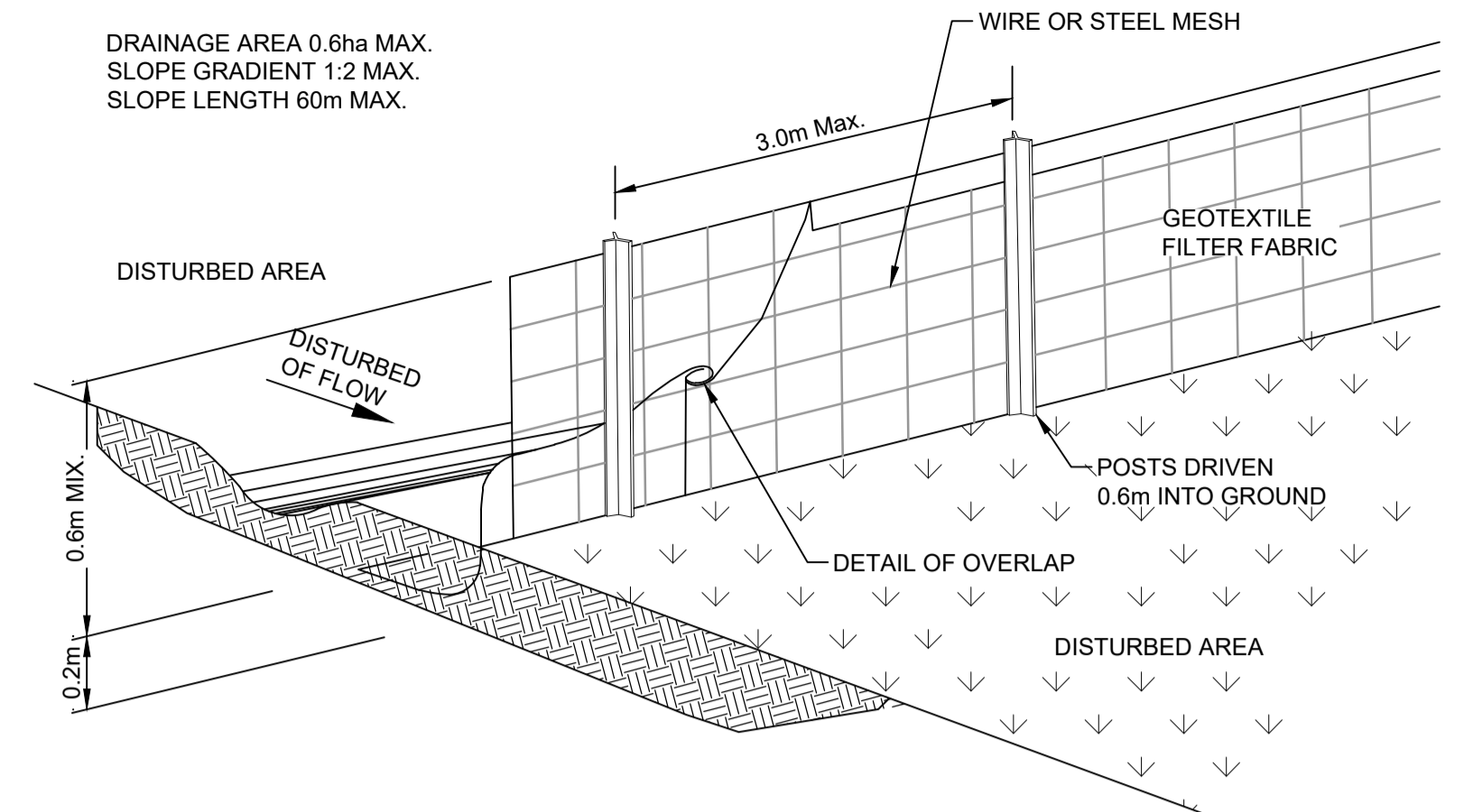
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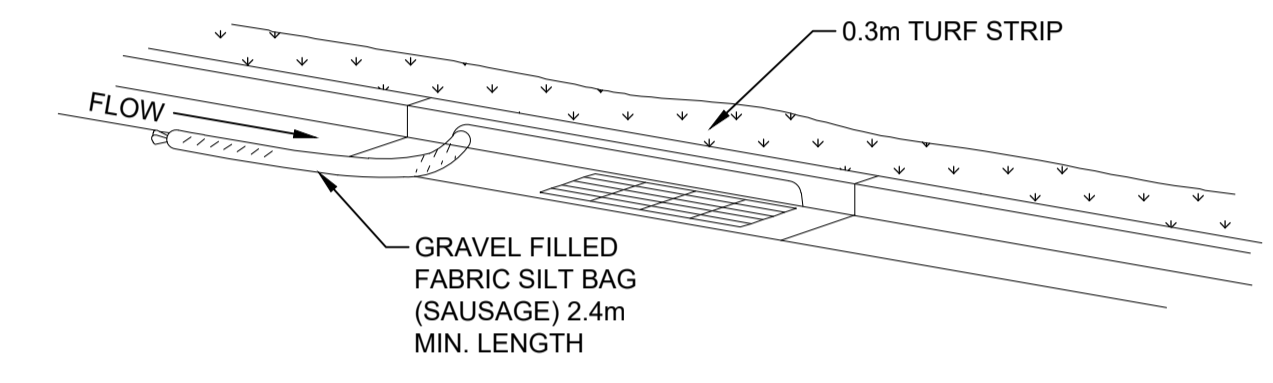
ROCK CHECK DAM
SCALE N.T.S



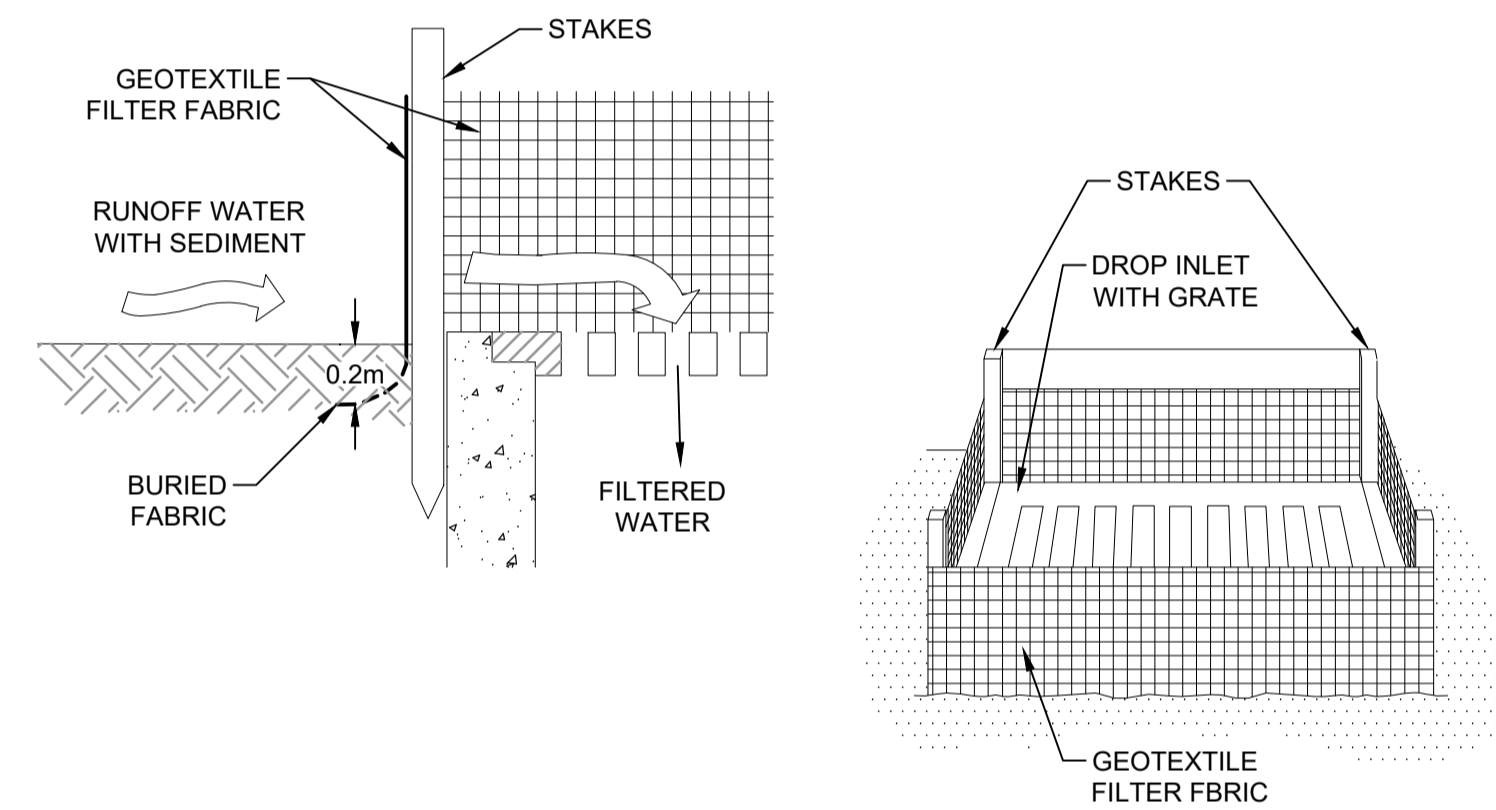
TEMPORARY CONSTRUCTION EXIT
SCALE N.T.S



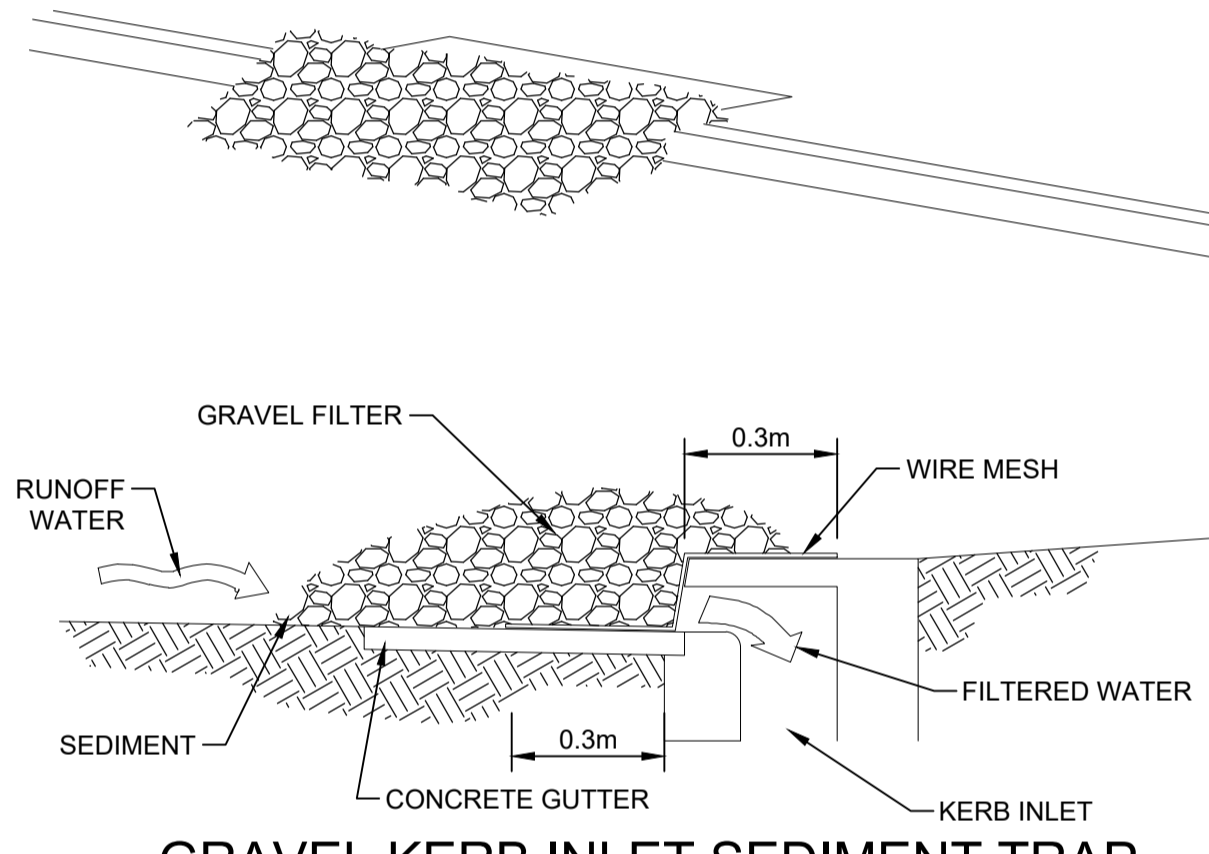
SEDIMENT FENCE
SCALE N.T.S



KERB INLET SEDIMENT TRAP
SCALE N.T.S



GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP
SCALE N.T.S



GRAVEL KERB INLET SEDIMENT TRAP
SCALE N.T.S

SEDIMENT BASIN SIZING CALCULATIONS - BASIN 1

$$V_s = 10 \cdot R_{(Y\%,5\text{-day})} \cdot C_v \cdot A$$

WHERE,

- V_s = VOLUME OF SETTLING ZONE (m³)
- $R_{(Y\%,5\text{-day})}$ = Y%, 5-DAY RAINFALL DEPTH (mm)
- C_v = VOLUMETRIC RUNOFF COEFFICIENT
- A = EFFECTIVE CATCHMENT SURFACE AREA CONNECTED TO THE BASIN (ha)

$R_{(Y\%,5\text{-day})} = 23.3$ mm
 $C_v = 0.5$
A = 2.0905 ha

SETTLING ZONE VOLUME = 243.543 m³

SEDIMENT STORAGE VOLUME = 50% SETTLING ZONE VOLUME = 121.771 m³

TOTAL SEDIMENT BASIN VOLUME = 365.314 m³

SEDIMENT BASIN SIZING CALCULATIONS - BASIN 2

$$V_s = 10 \cdot R_{(Y\%,5\text{-day})} \cdot C_v \cdot A$$

WHERE,

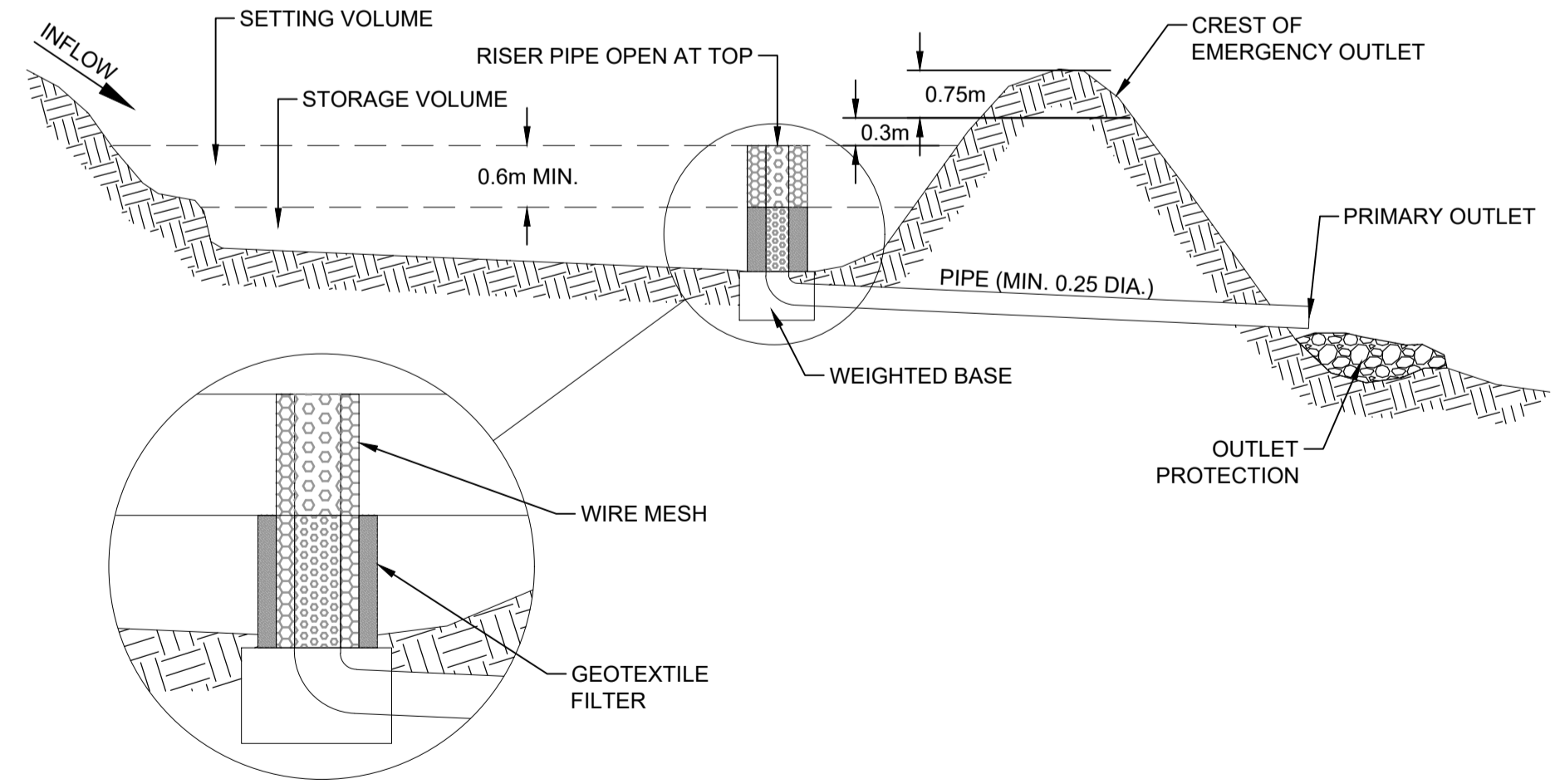
- V_s = VOLUME OF SETTLING ZONE (m³)
- $R_{(Y\%,5\text{-day})}$ = Y%, 5-DAY RAINFALL DEPTH (mm)
- C_v = VOLUMETRIC RUNOFF COEFFICIENT
- A = EFFECTIVE CATCHMENT SURFACE AREA CONNECTED TO THE BASIN (ha)

$R_{(Y\%,5\text{-day})} = 23.3$ mm
 $C_v = 0.5$
A = 1.246 ha

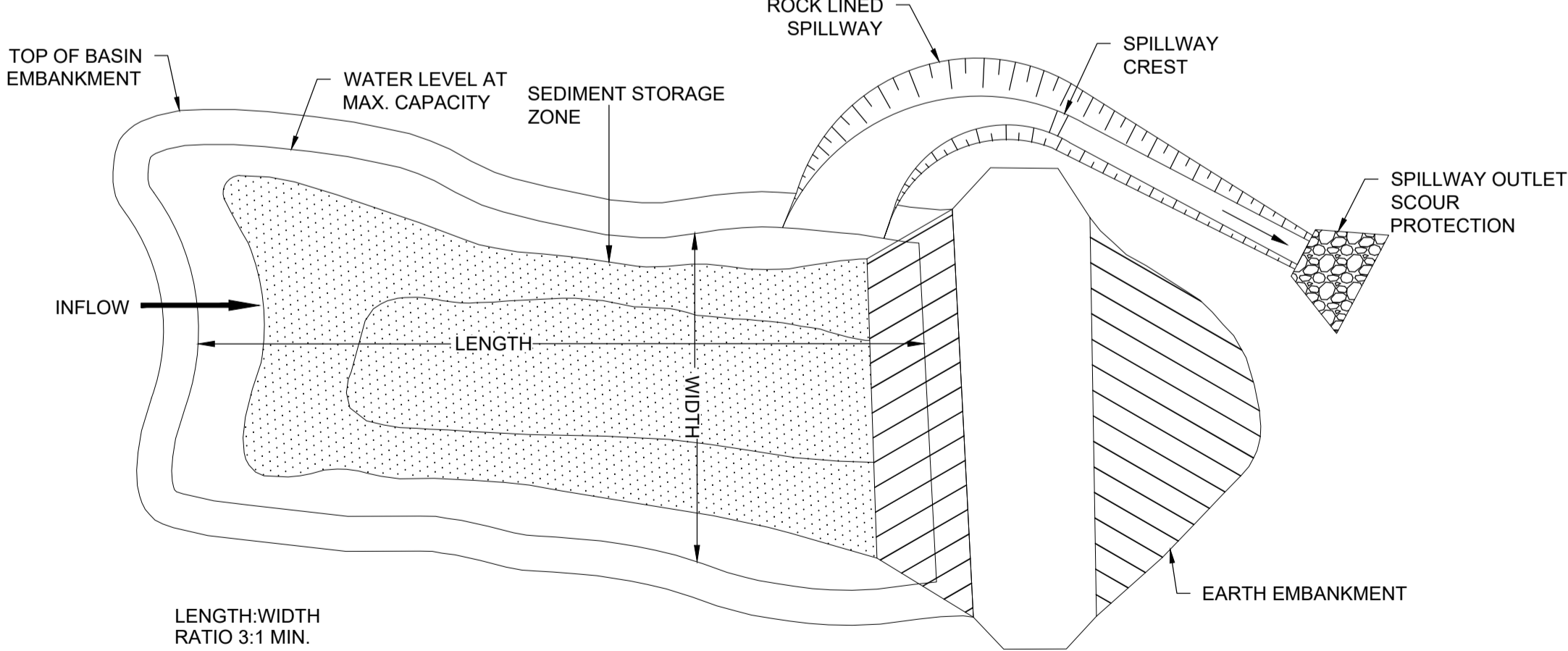
SETTLING ZONE VOLUME = 145.16 m³

SEDIMENT STORAGE VOLUME = 50% SETTLING ZONE VOLUME = 72.58 m³

TOTAL SEDIMENT BASIN VOLUME = 217.74 m³



CROSS SECTION OF TYPICAL SEDIMENT BASIN
SCALE N.T.S



PLAN VIEW OF TYPICAL SEDIMENT BASIN
SCALE N.T.S

NOT FOR CONSTRUCTION

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A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

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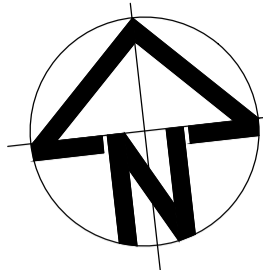
Drawing Title
EROSION AND SEDIMENT CONTROL DETAILS

Scale
N.T.S.

Project No.
2021184

Dwg. No.
101

Issue
A



LEGEND

	LOT BOUNDARY		DENOTE -4.50 ; -4 (CUT)		DENOTE 0.5 ; 1.0 (FILL)
	DESIGN CONTOURS		DENOTE -4 ; -3.50 (CUT)		DENOTE 0.5 ; 1.0 (FILL)
	EXISTING CONTOURS		DENOTE -3.50 ; -3.0 (CUT)		DENOTE 1.0 ; 1.5 (FILL)
	FLOW ARROWS		DENOTE -3.0 ; -2.50 (CUT)		DENOTE 1.5 ; 2.0 (FILL)
	DESIGN SURFACE LEVEL		DENOTE -2.50 ; -2.00 (CUT)		DENOTE 2.0 ; 2.5 (FILL)
	DA 0154/2022		DENOTE -2.00 ; -1.50 (CUT)		DENOTE 2.5 ; 3.0 (FILL)
			DENOTE -1.50 ; 1.00 (CUT)		DENOTE 3.0 ; 3.5 (FILL)
			DENOTE -1.00 ; 0.50 (CUT)		DENOTE 3.5 ; 4.0 (FILL)
			DENOTE -0.50 ; 0 (CUT)		DENOTE 4.0 ; 4.5 (FILL)

BULK EARTHWORKS VOLUMES
 EXCLUDING TRIMMING WORKS, BOXING,
 AND TRENCHES
 TOTAL CUT = -3029.366m³
 TOTAL FILL = 772.089m³
 BALANCE = -2257.277m³(EXCESS)



NOTE:
 ALL EXISTING SERVICES TO BE
 ADJUSTED TO MATCH
 PROPOSED SURFACE LEVELS.



NOT FOR CONSTRUCTION

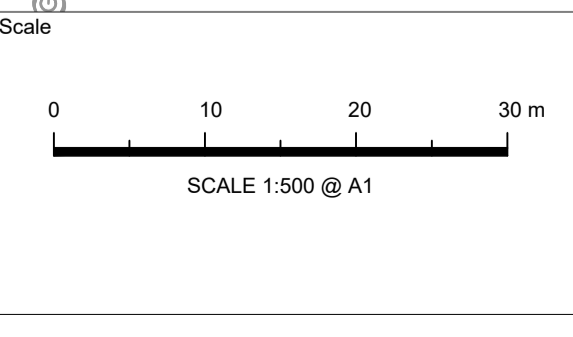
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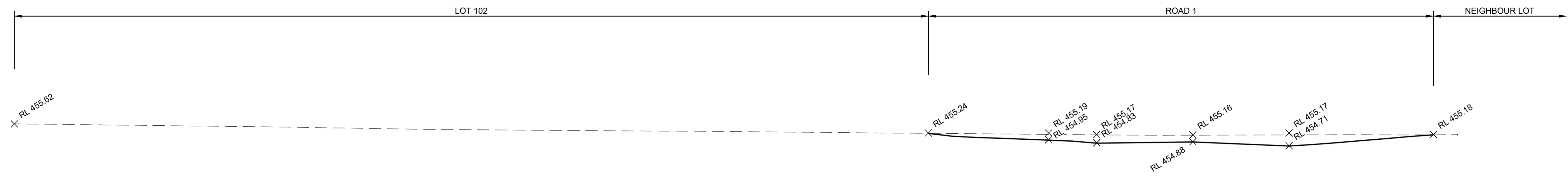


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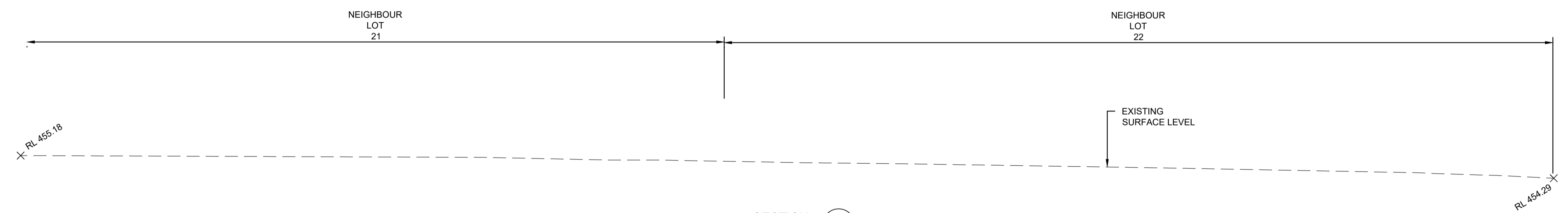
Project
**1 RAILWAY STREET, GULGONG
 PROPOSED RESIDENTIAL SUBDIVISION
 CIVIL ENGINEERING PLANS
 DEVELOPMENT APPLICATION**

Drawing Title
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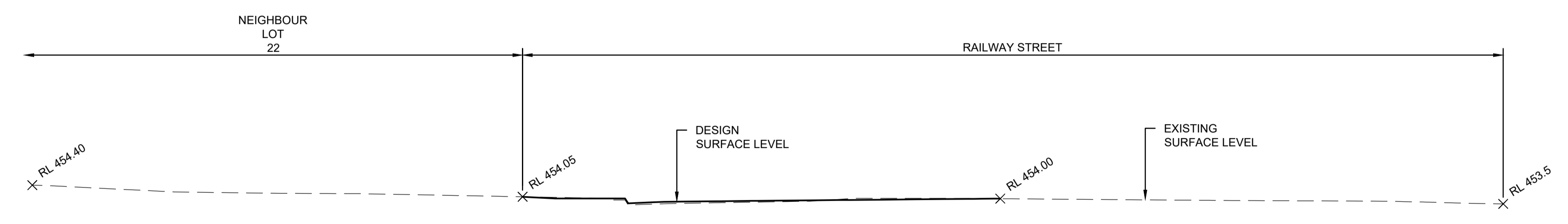
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1:500		2021184	200	A



SECTION A
SCALE 1:100 @ 200



SECTION A
SCALE 1:100 @ 200



SECTION A
SCALE 1:100 @ 200

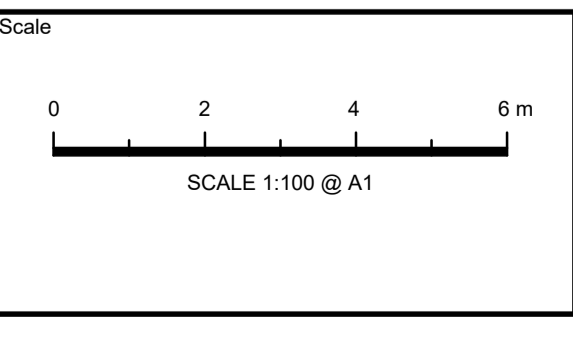
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Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification by Dr. Michel Ghasya in affiliation with Joe Bacha (formerly Australian Consulting Engineers)

Client
MR. ROY AMERY
Council
MID-WESTERN REGIONAL COUNCIL

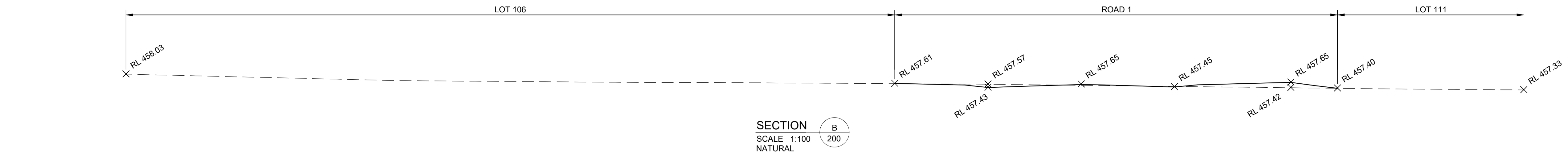
Surveyor
Premise
DUBBO OFFICE
1ST FLOOR
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DUBBO, NSW 2830
PH: (02) 6887 4500
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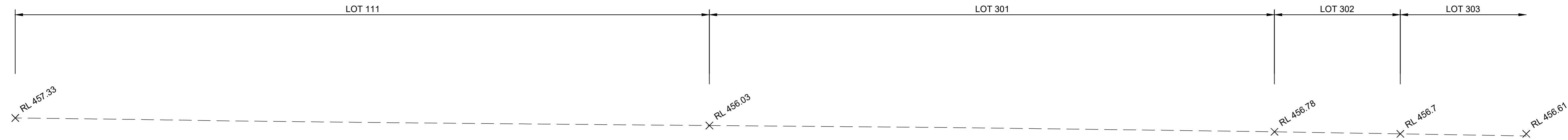
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

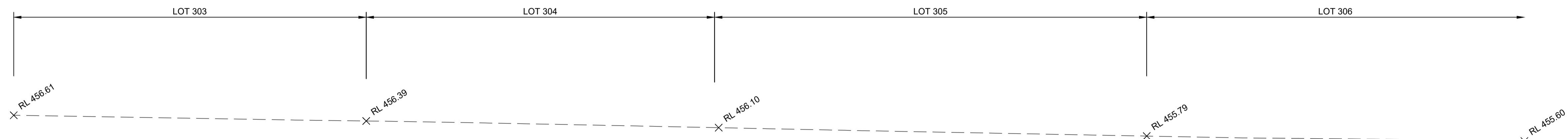
Drawing Title EARTHWORKS TYPICAL CROSS SECTIONS SHEET 1 OF 4	
Scale 1:100	Project No. 2021184
Dwg. No. 201	Issue A



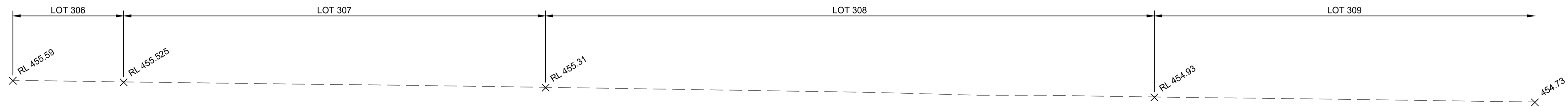
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SCALE 1:100
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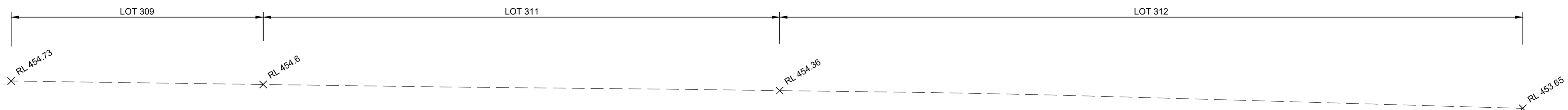
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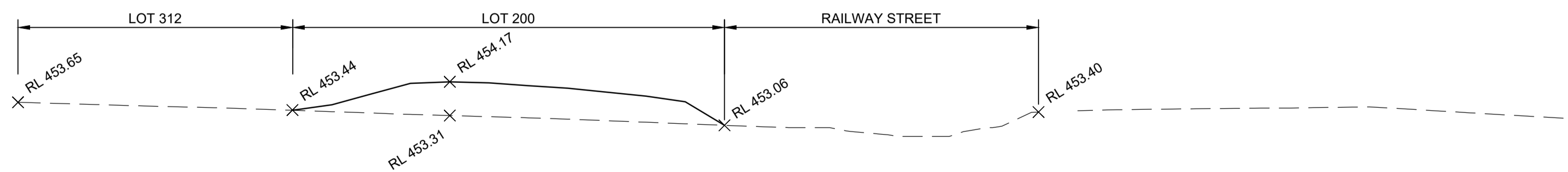
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SCALE 1:100
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SECTION B
SCALE 1:100
NATURAL



SECTION B
SCALE 1:100
NATURAL



SECTION B
SCALE 1:100
NATURAL

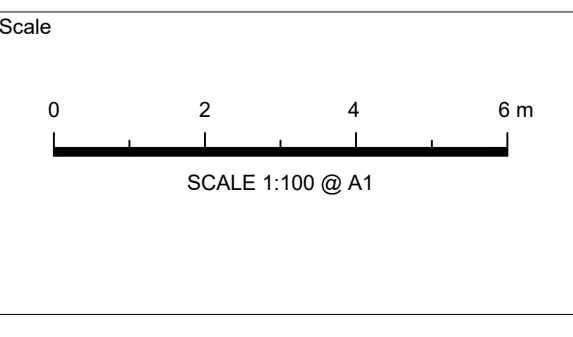
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Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya
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Client
MR. ROY AMERY
Council
MID-WESTERN REGIONAL COUNCIL

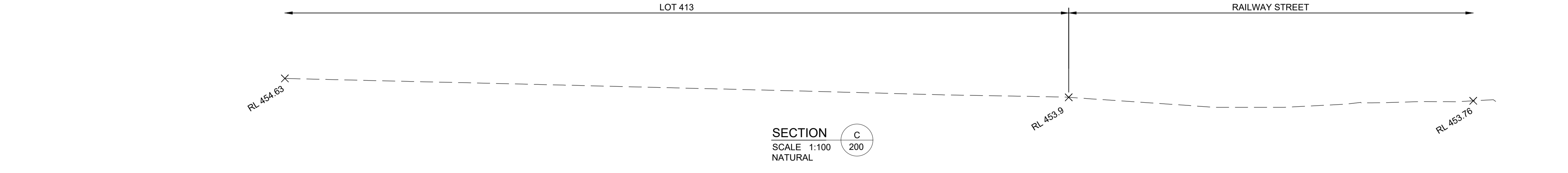
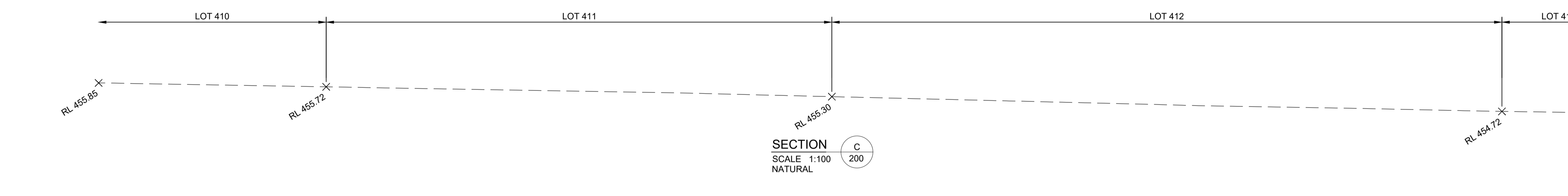
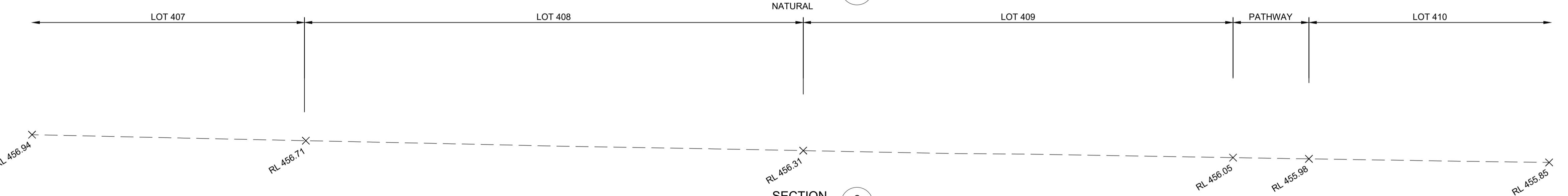
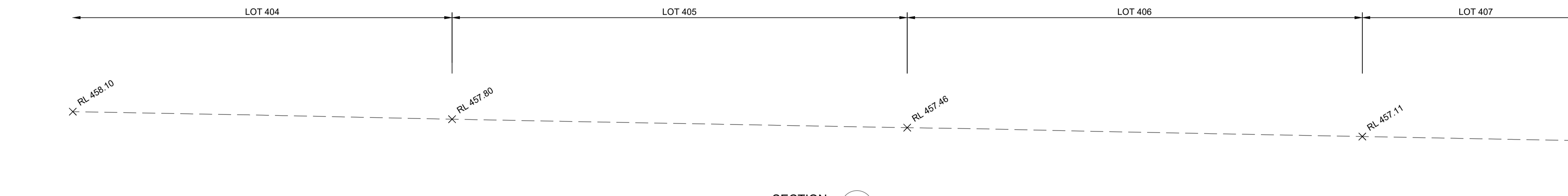
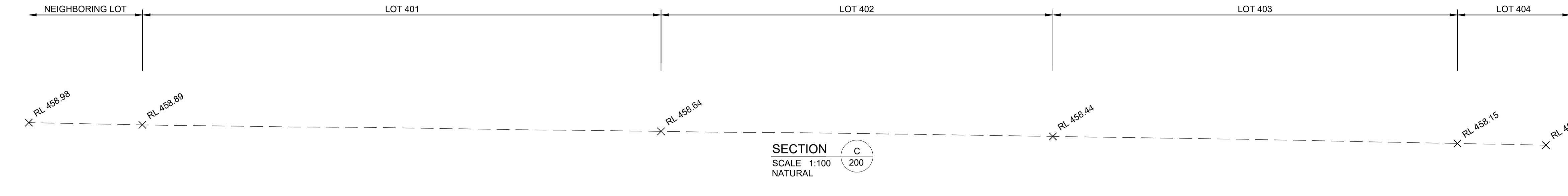
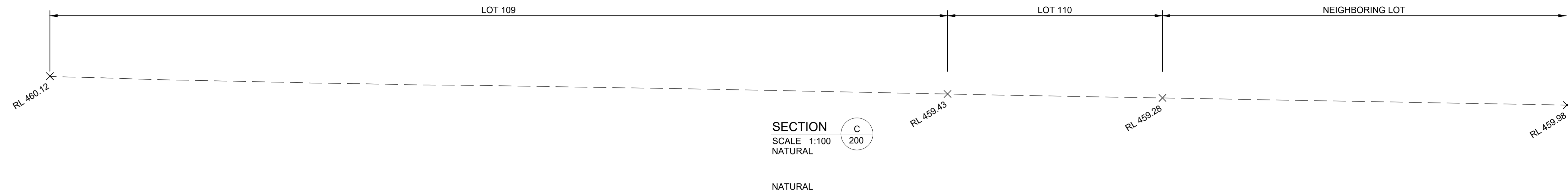
Surveyor
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

Drawing Title
**EARTHWORKS
TYPICAL CROSS SECTIONS
SHEET 2 OF 4**
Scale 1:100
Project No. 2021184
Dwg. No. 202
Issue A



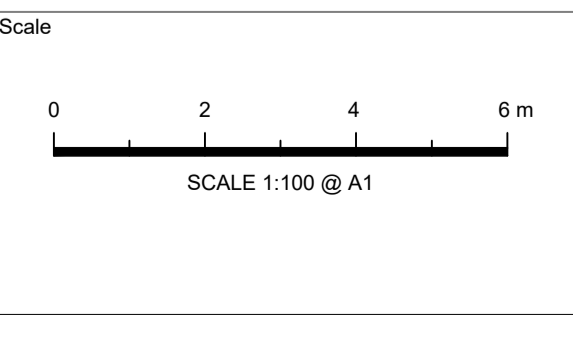
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A		ISSUE FOR DEVELOPMENT APPLICATION		15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked		
10m at full size		10cm		20cm		

Certification By Dr. Michel Chaaya in affiliation with Joe Bacha (formerly Australian Consulting Engineers):

Client
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Council
MID-WESTERN REGIONAL COUNCIL

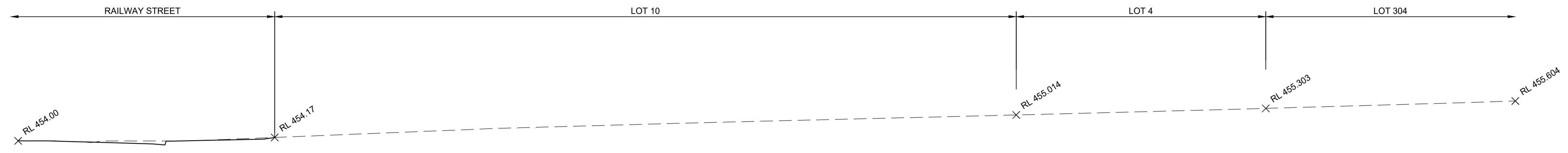
Surveyor
Premise
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1ST FLOOR
62 WINGEWARRA STREET
DUBBO, NSW 2830
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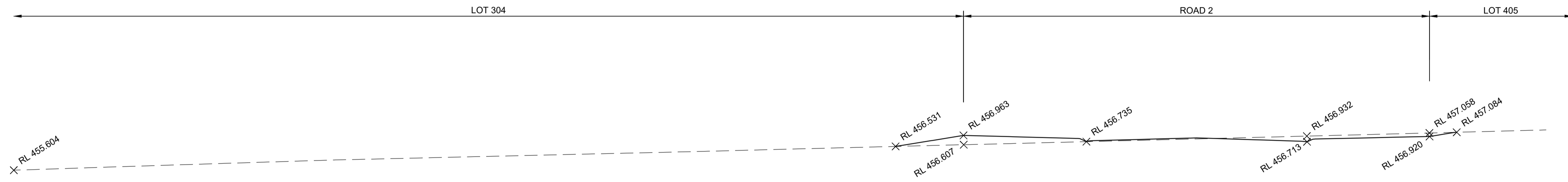
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

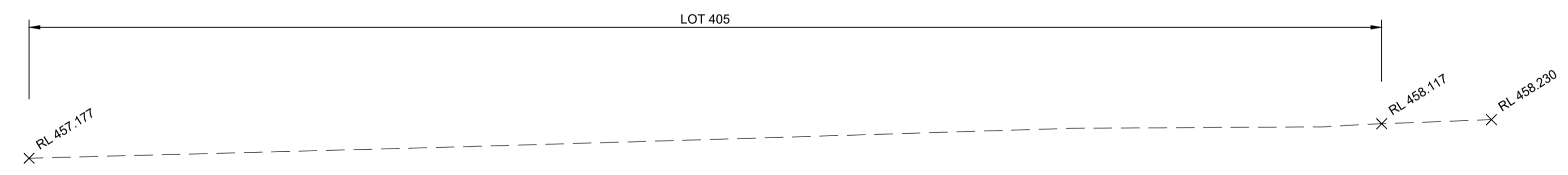
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**EARTHWORKS
TYPICAL CROSS SECTIONS
SHEET 3 OF 4**
Scale 1:100
Project No. 2021184
Dwg. No. 203
Issue A



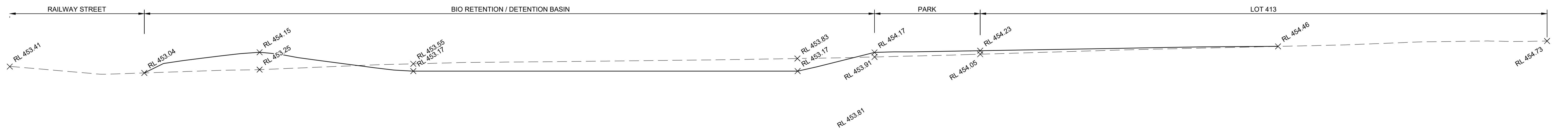
SECTION D
SCALE 1:100
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SECTION D
SCALE 1:100
NATURAL



SECTION D
SCALE 1:100
NATURAL



SECTION E
SCALE 1:500
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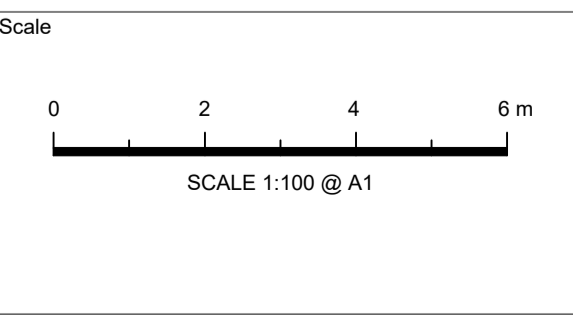
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Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya
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Client
MR. ROY AMERY
Council
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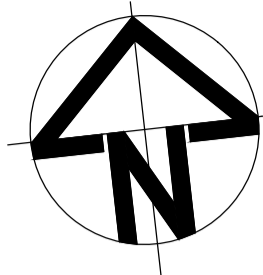
Surveyor
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

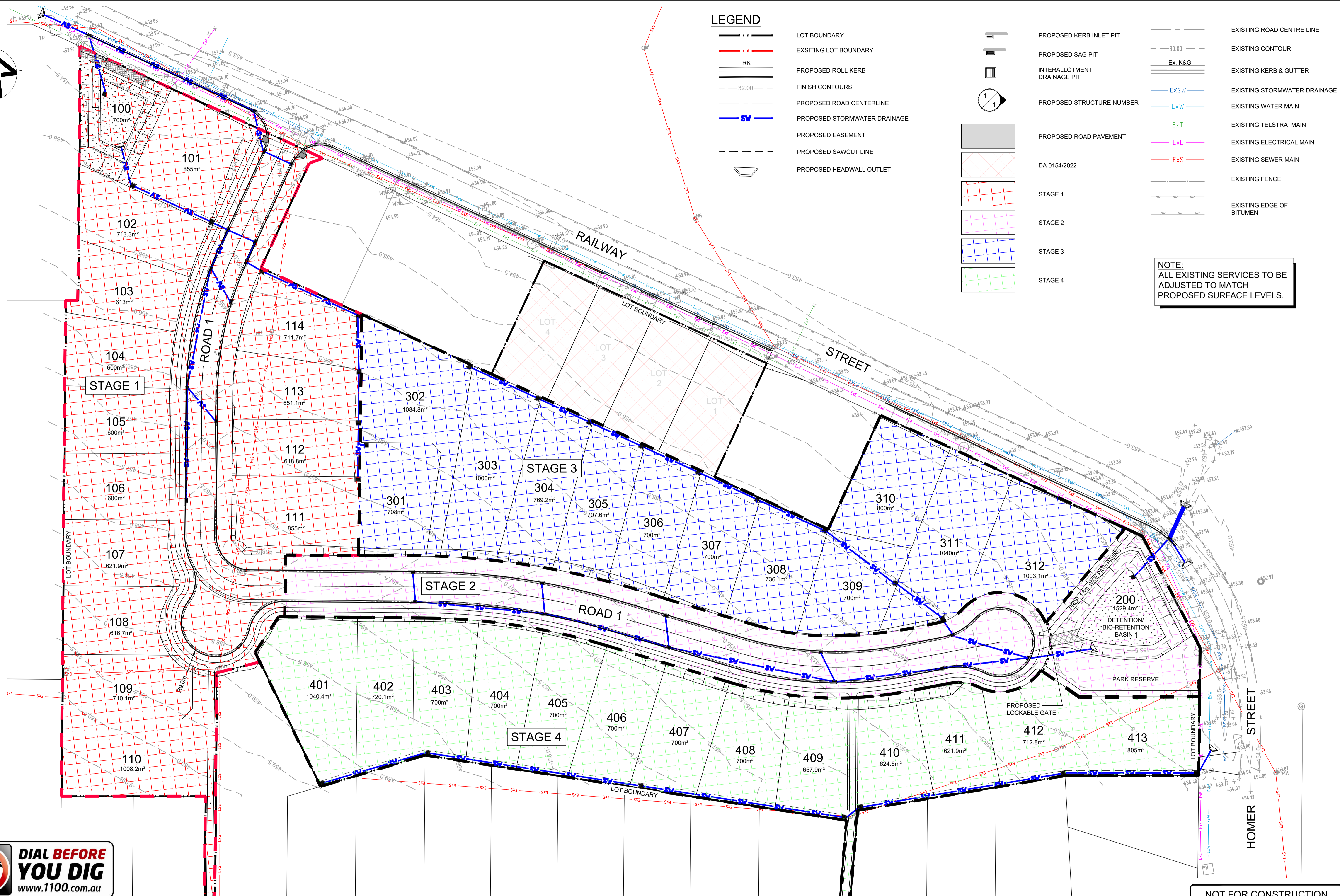
Drawing Title	EARTHWORKS TYPICAL CROSS SECTIONS SHEET 4 OF 4		
Scale	A1	Project No.	Dwg. No.
1:100		2021184	204
Issue	A		



LEGEND

- LOT BOUNDARY
- EXISTING LOT BOUNDARY
- RK
- PROPOSED ROLL KERB
- FINISH CONTOURS
- PROPOSED ROAD CENTERLINE
- PROPOSED STORMWATER DRAINAGE
- PROPOSED EASEMENT
- PROPOSED SAWCUT LINE
- PROPOSED HEADWALL OUTLET
- PROPOSED KERB INLET PIT
- PROPOSED SAG PIT
- INTERALLOTMENT DRAINAGE PIT
- PROPOSED STRUCTURE NUMBER
- PROPOSED ROAD PAVEMENT
- DA 0154/2022
- STAGE 1
- STAGE 2
- STAGE 3
- STAGE 4
- EXISTING ROAD CENTRE LINE
- EXISTING CONTOUR
- EX K&G
- EX SW
- EX W
- EX T
- EX E
- EX S
- EXISTING KERB & GUTTER
- EXISTING STORMWATER DRAINAGE
- EXISTING WATER MAIN
- EXISTING TELSTRA MAIN
- EXISTING ELECTRICAL MAIN
- EXISTING SEWER MAIN
- EXISTING FENCE
- EXISTING EDGE OF BITUMEN

NOTE:
ALL EXISTING SERVICES TO BE ADJUSTED TO MATCH PROPOSED SURFACE LEVELS.



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A		ISSUE FOR DEVELOPMENT APPLICATION		15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked		
1	10m at full size				10m	20m

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Scale

0 10 20 30 m

SCALE 1:500 @ A1

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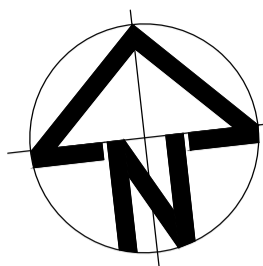
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Project

**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

Drawing Title
STAGE LAYOUT PLAN

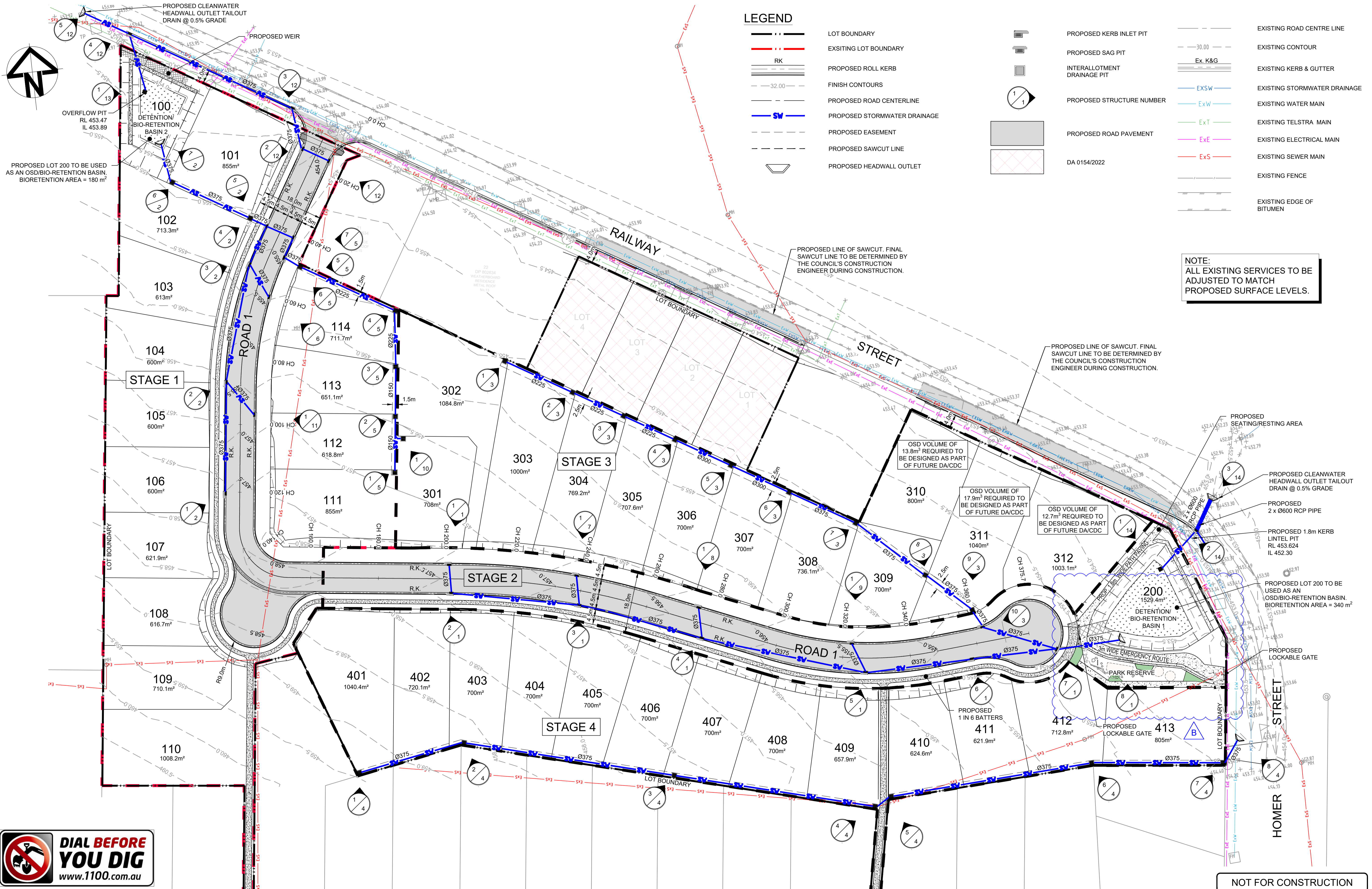
Scale 1:500 A1 Project No. 2021184 Dwg. No. 300 Issue A



LEGEND

- LOT BOUNDARY
- EXISTING LOT BOUNDARY
- RK
- PROPOSED ROLL KERB
- FINISH CONTOURS
- PROPOSED ROAD CENTERLINE
- PROPOSED STORMWATER DRAINAGE
- PROPOSED EASEMENT
- PROPOSED SAWCUT LINE
- PROPOSED HEADWALL OUTLET
- PROPOSED KERB INLET PIT
- PROPOSED SAG PIT
- INTERALLOTMENT DRAINAGE PIT
- PROPOSED STRUCTURE NUMBER
- PROPOSED ROAD PAVEMENT
- DA 0154/2022
- EXISTING ROAD CENTRE LINE
- EXISTING CONTOUR
- Ex. K&G
- EXISTING KERB & GUTTER
- EXSW
- EXW
- EX T
- EX E
- EX S
- EXISTING STORMWATER DRAINAGE
- EXISTING WATER MAIN
- EXISTING TELSTRA MAIN
- EXISTING ELECTRICAL MAIN
- EXISTING SEWER MAIN
- EXISTING FENCE
- EXISTING EDGE OF BITUMEN

NOTE:
ALL EXISTING SERVICES TO BE ADJUSTED TO MATCH PROPOSED SURFACE LEVELS.



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B	ISSUE FOR DEVELOPMENT APPLICATION	28/02/2022	P.B.T.	J.A.B.
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked

Certification By Dr. Michel Chaaya
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Client
MR. ROY AMERY

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Surveyor

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62 WINGEWARRA STREET
DUBBO, NSW 2830
Ph: (02) 6887 4500
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Scale

SCALE 1:500 @ A1

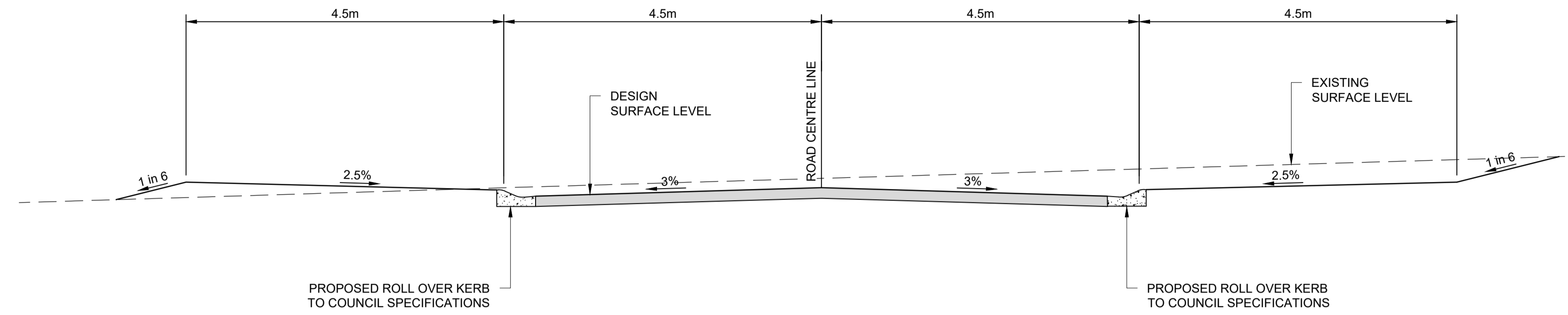
DESIGN & CONSTRUCTION EXCELLENCE

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Parramatta NSW 2150 Phone: 02 7809 4931
PO BOX 3579 Parramatta 2124 Company: Telford Consulting Pty Ltd

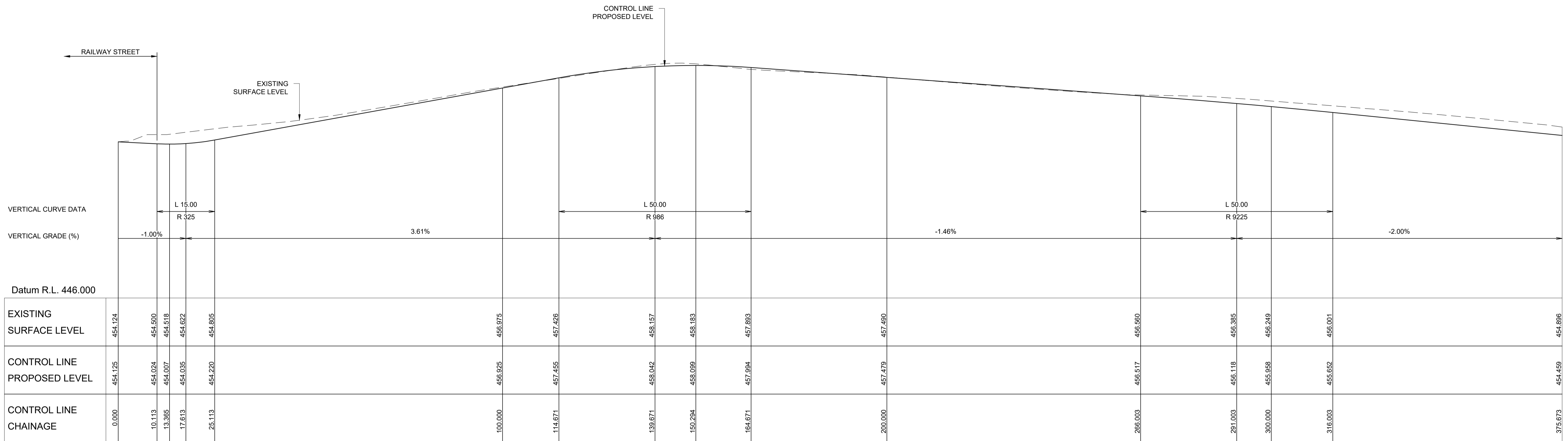
Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

Drawing Title
**ROADWORKS AND DRAINAGE
LAYOUT PLAN**

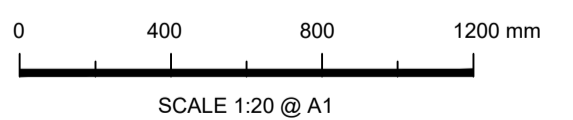
Scale	A1	Project No.	Dwg. No.	Issue
1:500		2021184	301	B



ROAD 1 - TYPICAL CROSS SECTIONS
SCALE 1:50



ROAD 1 - LONGITUDINAL SECTION
SCALE (H) 1:500
(V) 1:100



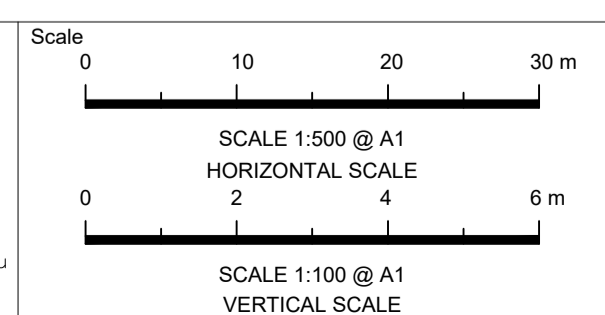
NOT FOR CONSTRUCTION

A		ISSUE FOR DEVELOPMENT APPLICATION		15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked		
From full size		10m		20m		

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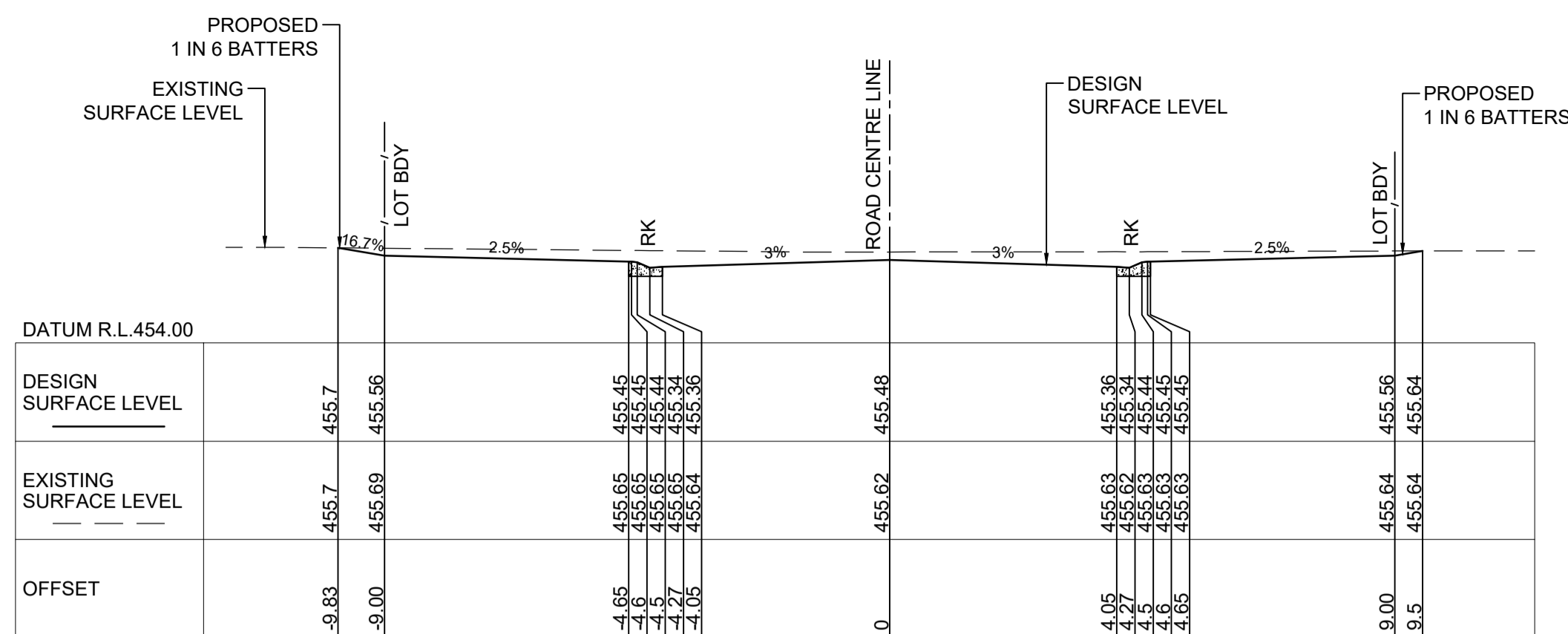
Surveyor
Premise
DUBBO OFFICE
1ST FLOOR
62 WINGWARRA STREET
DUBBO, NSW 2830
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WEB: www.premise.com.au



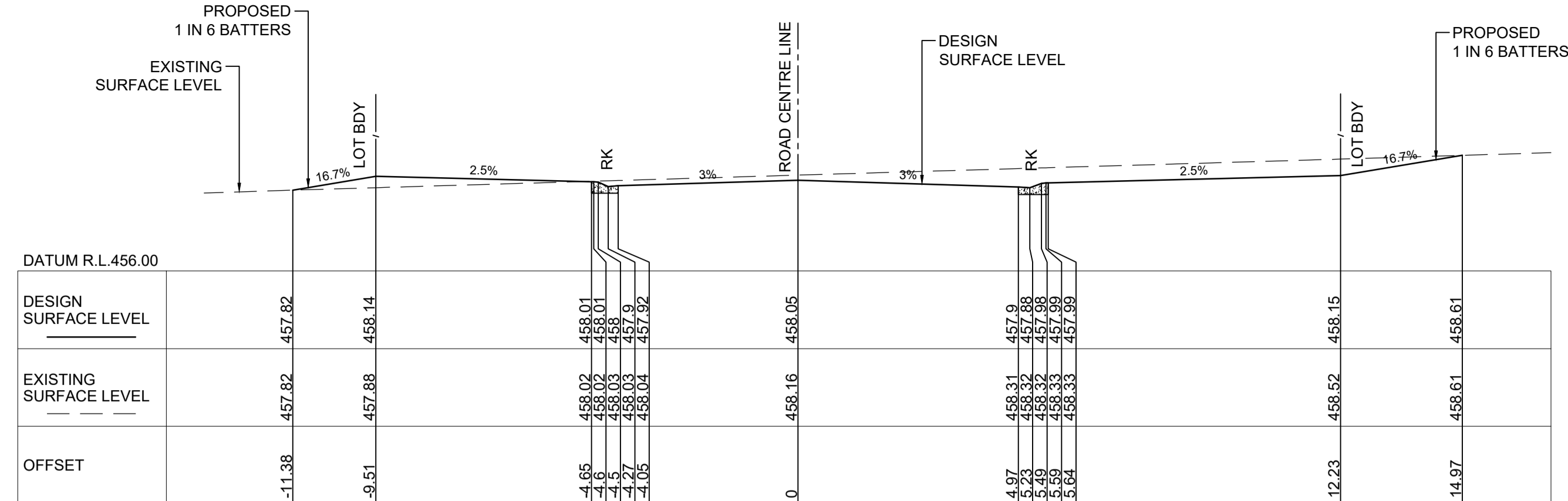
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

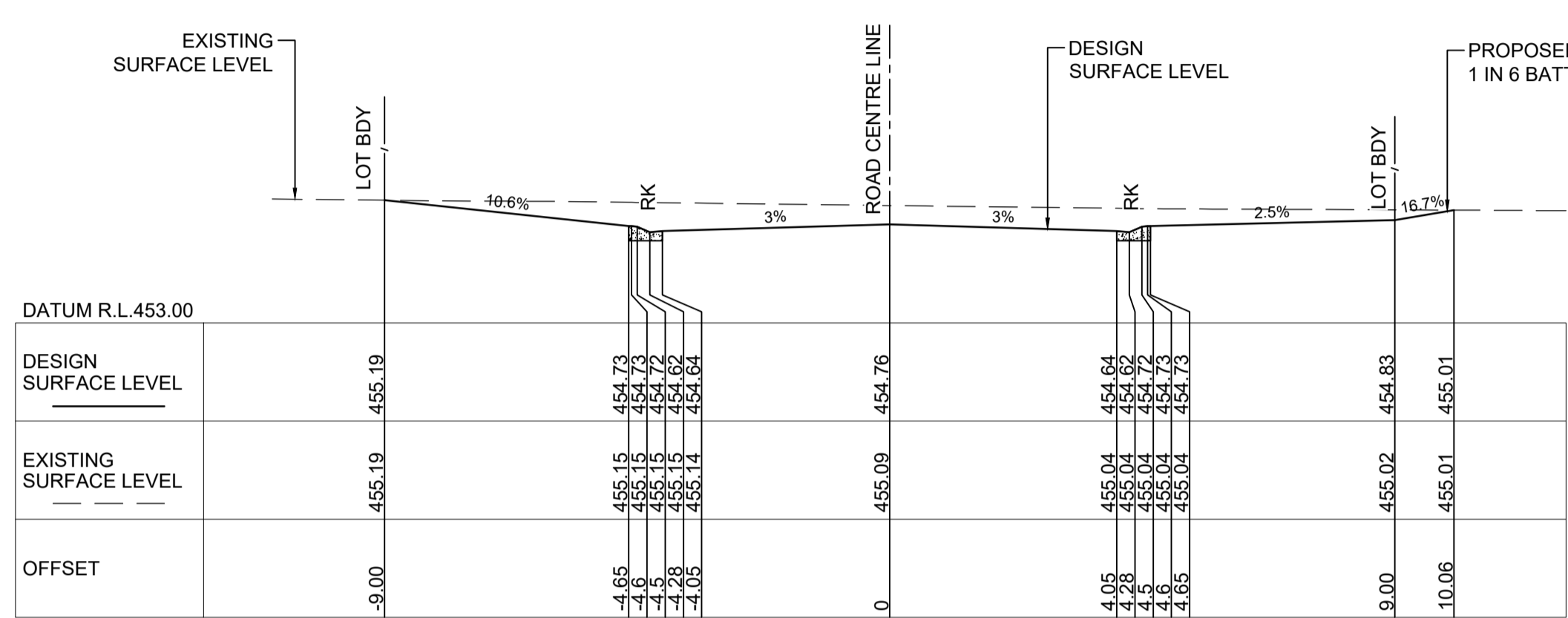
Drawing Title
**ROAD 1
LONGITUDINAL SECTION**
Scale A1 AS SHOWN Project No. 2021184 Dwg. No. 302 Issue A



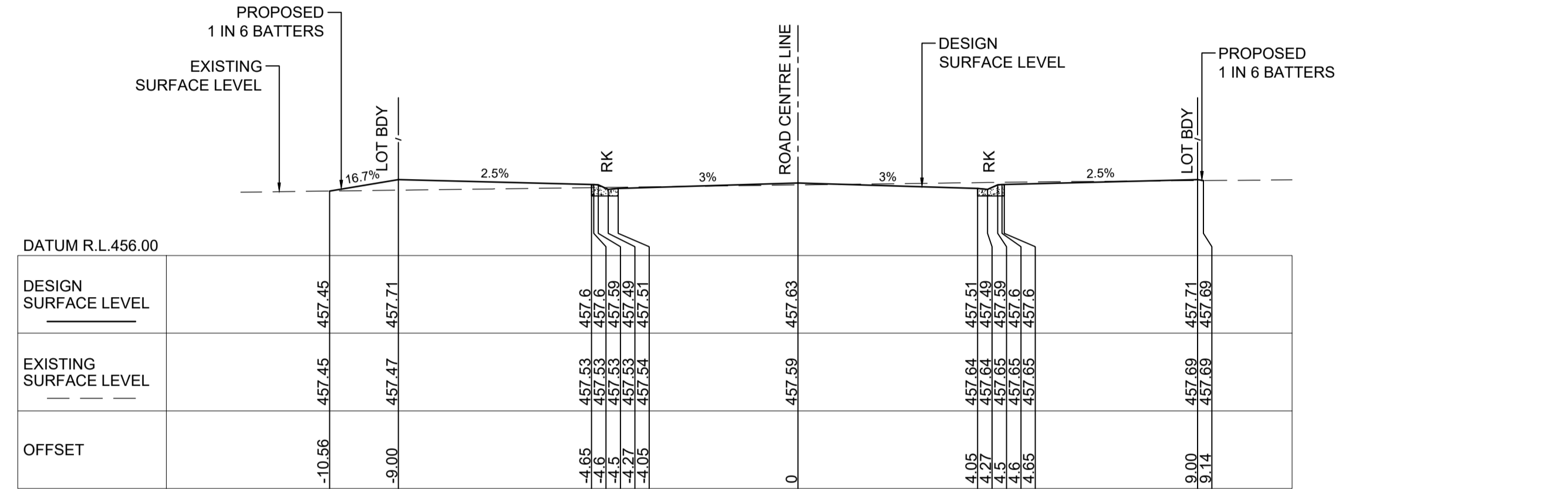
CH. 60



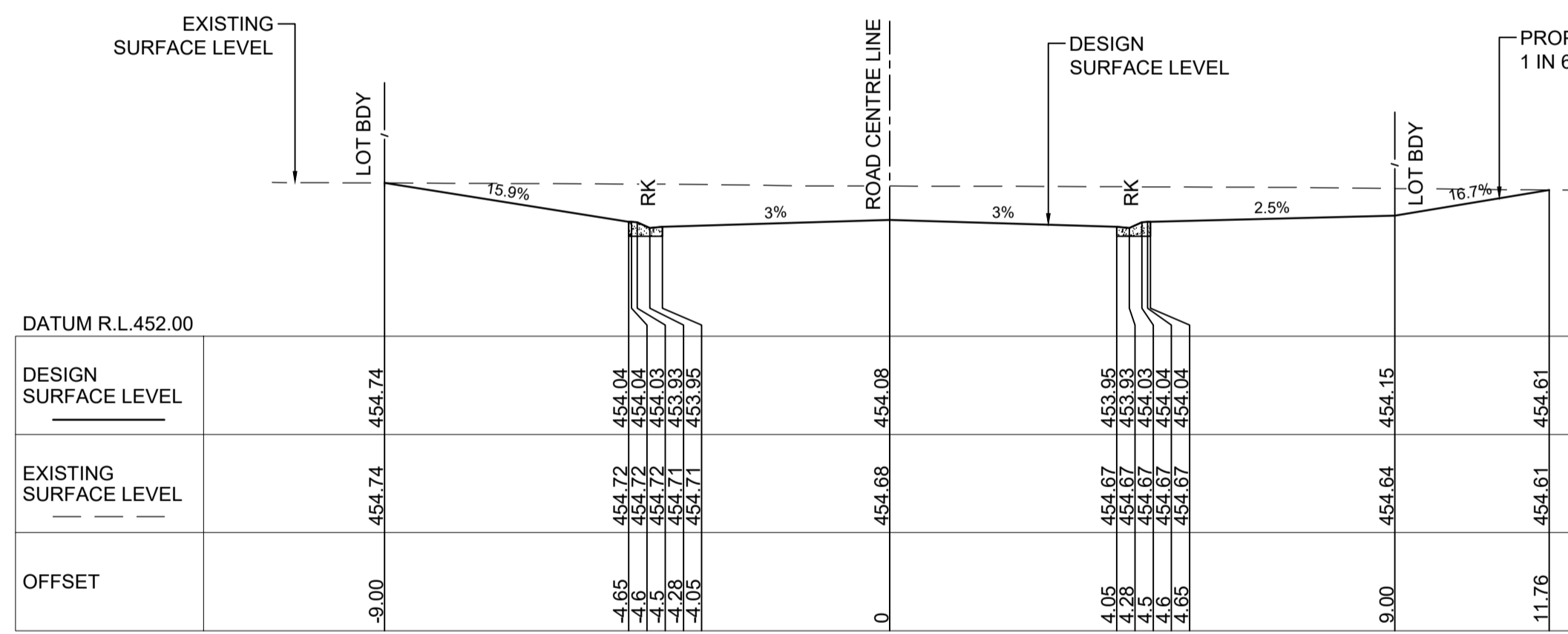
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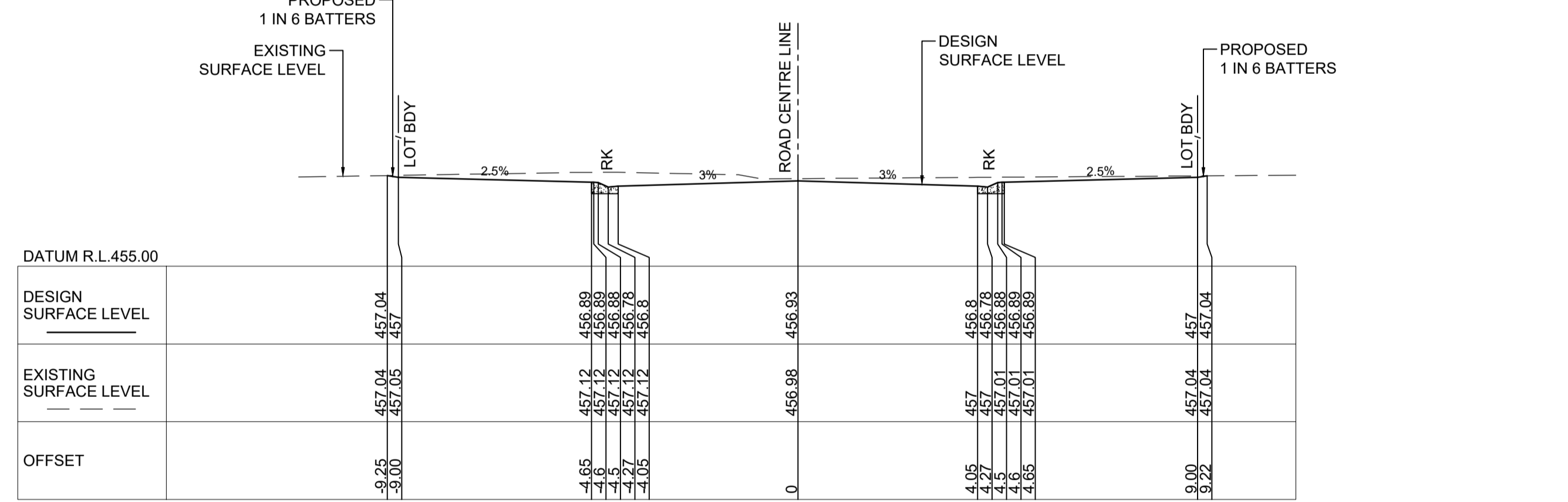
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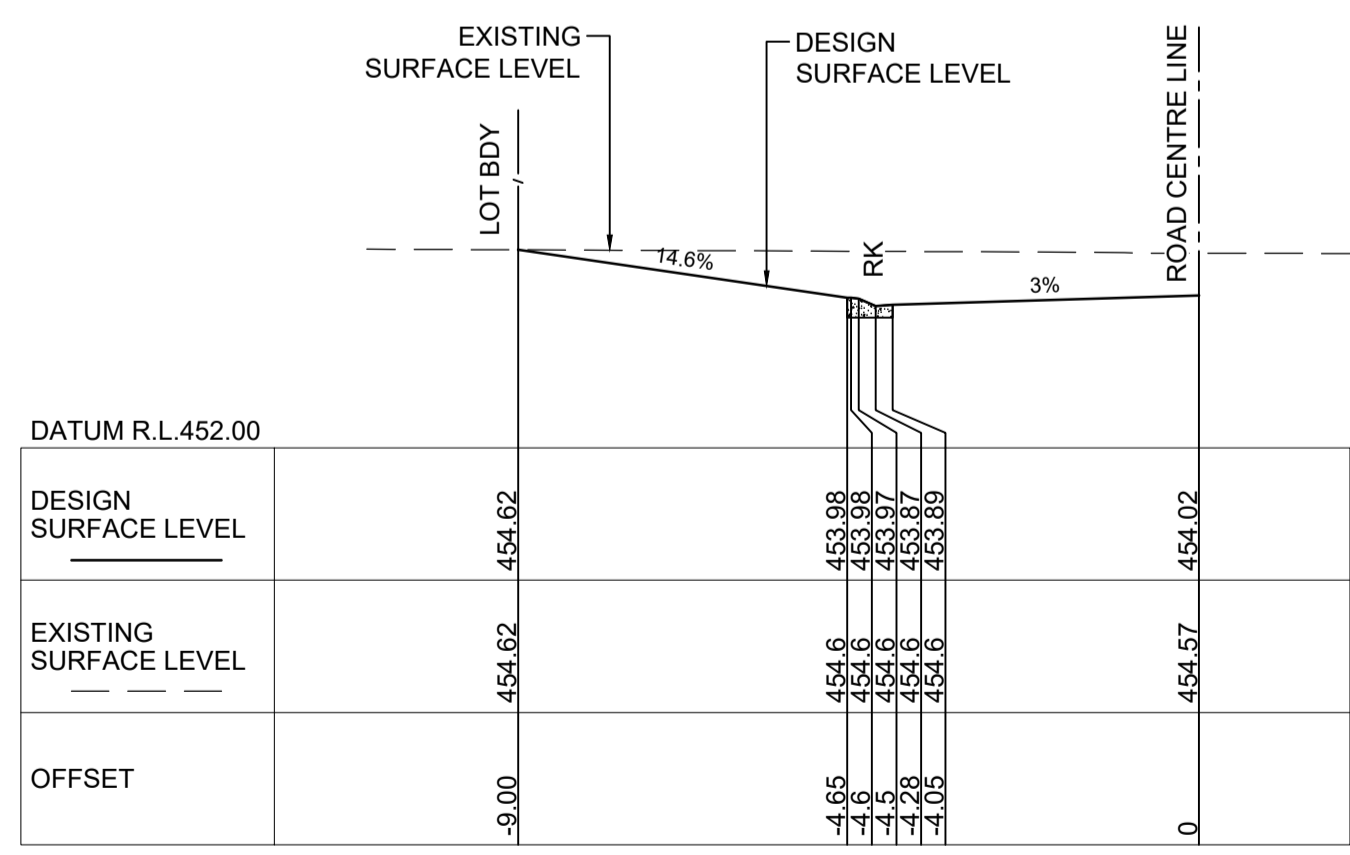
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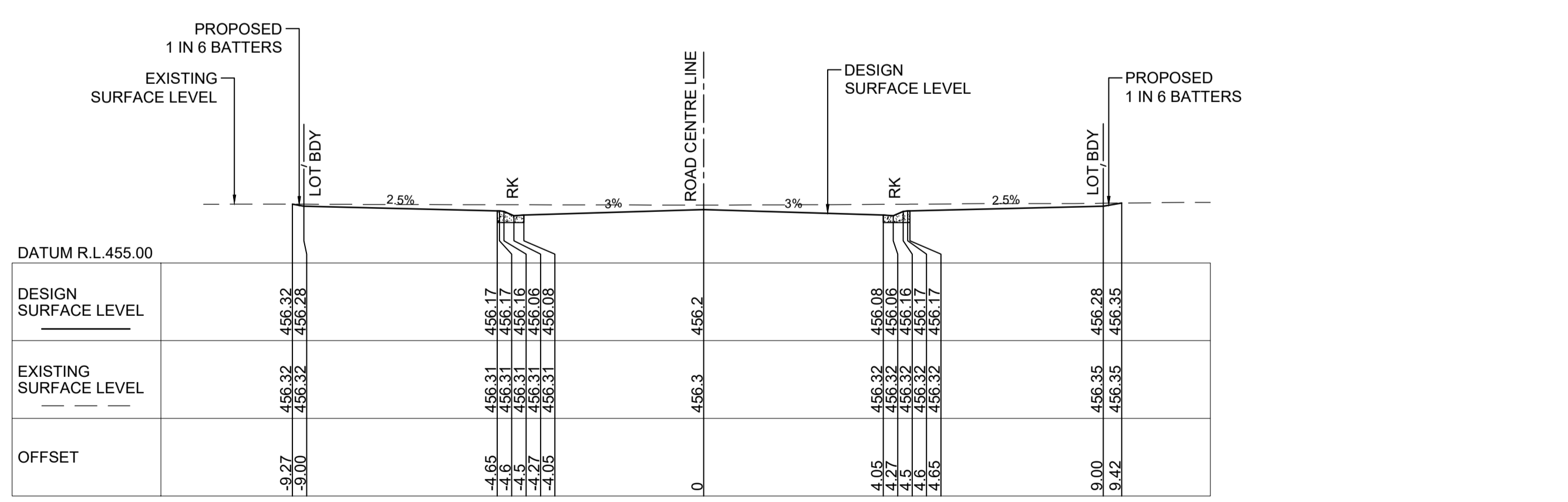
CH. 20



CH. 100



CH. 15.67



CH. 80

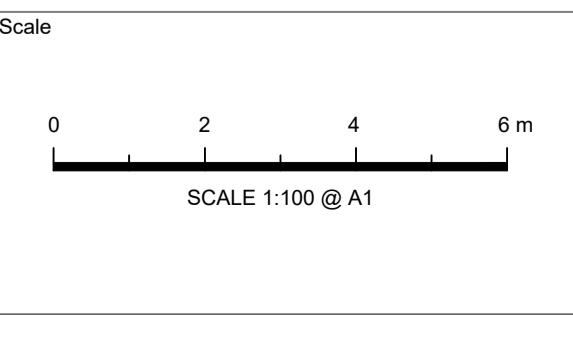
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Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya
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Client
MR. ROY AMERY
Council
MID-WESTERN REGIONAL COUNCIL

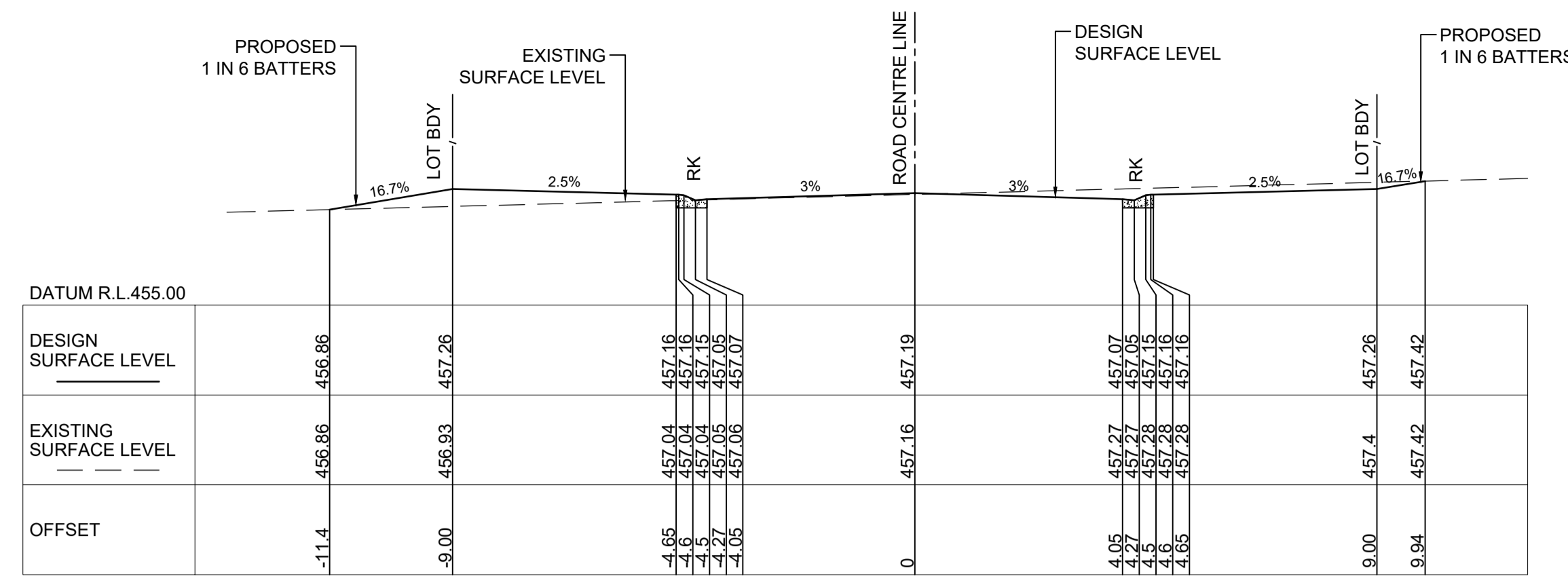
Surveyor
Premise
DUBBO OFFICE
1ST FLOOR
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DUBBO, NSW 2830
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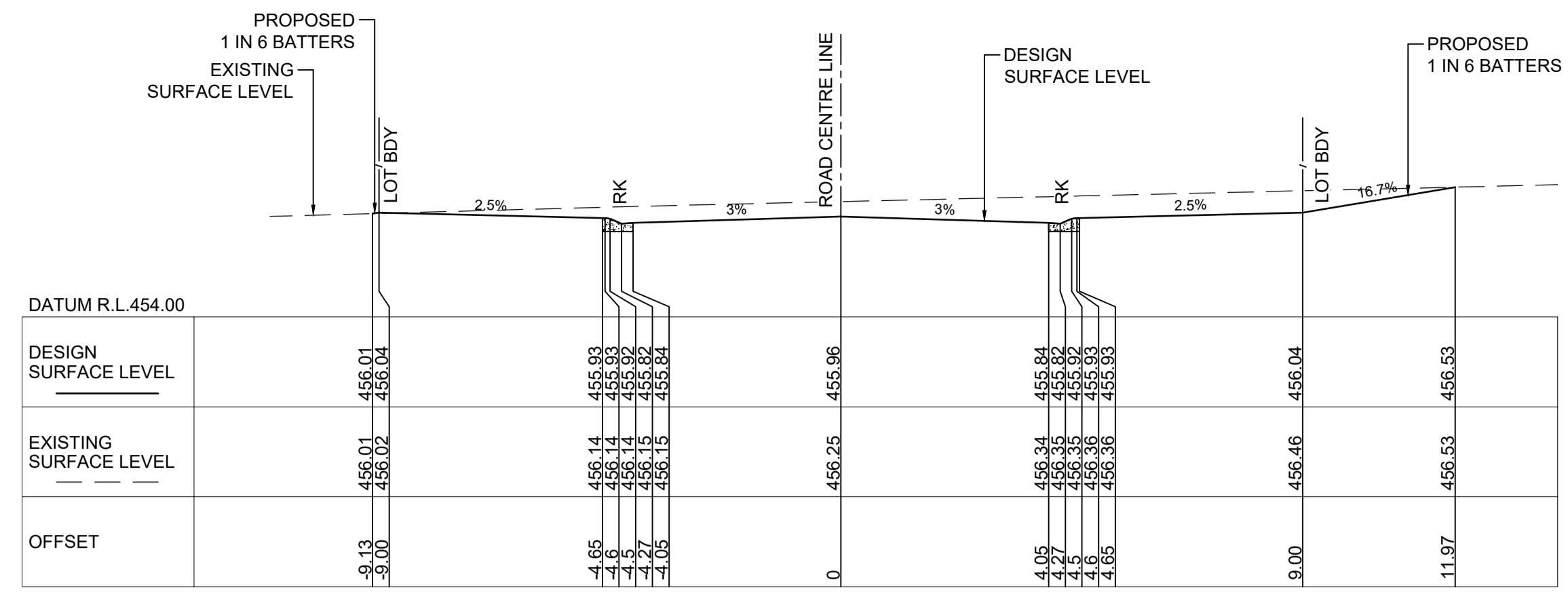
TELFORD CIVIL
DESIGN & CONSTRUCTION EXCELLENCE
Level 4, 470 Church Street, Email: info@telfordcivil.com.au
Parramatta NSW 2150 Phone: 02 7809 4931
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Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

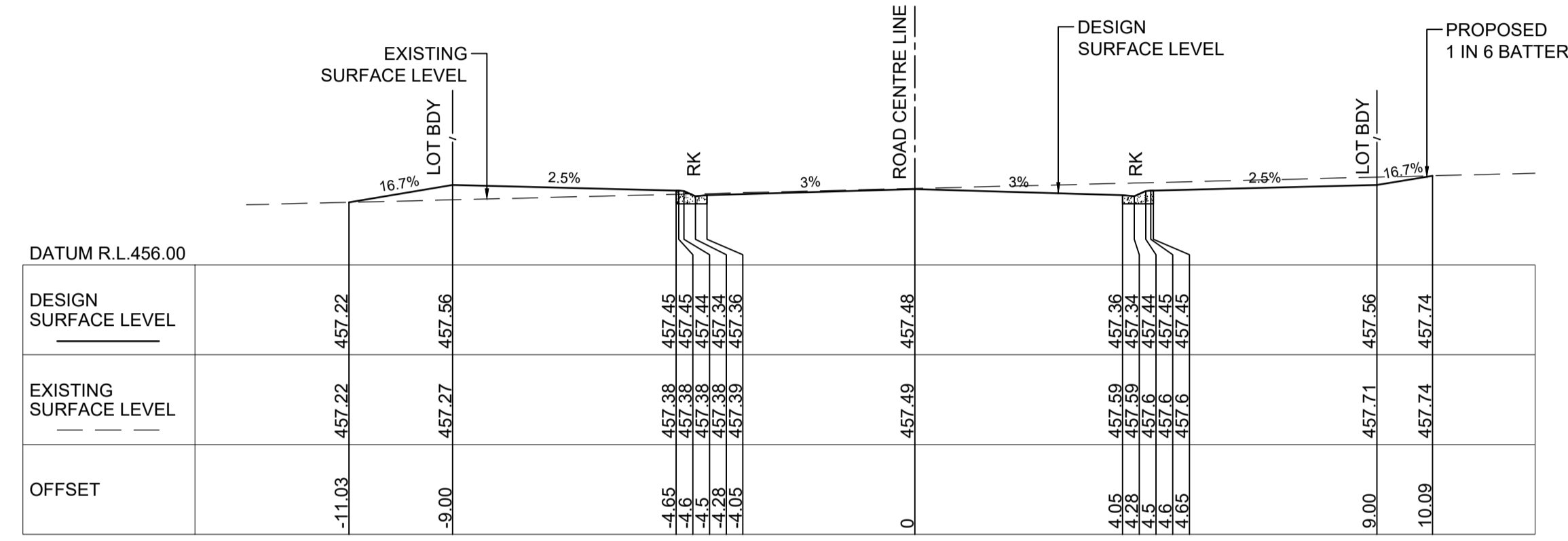
Drawing Title
**ROAD 1
CROSS SECTIONS
SHEET 1 OF 3**
Scale A1 Project No. 2021184 Dwg. No. 303 Issue A



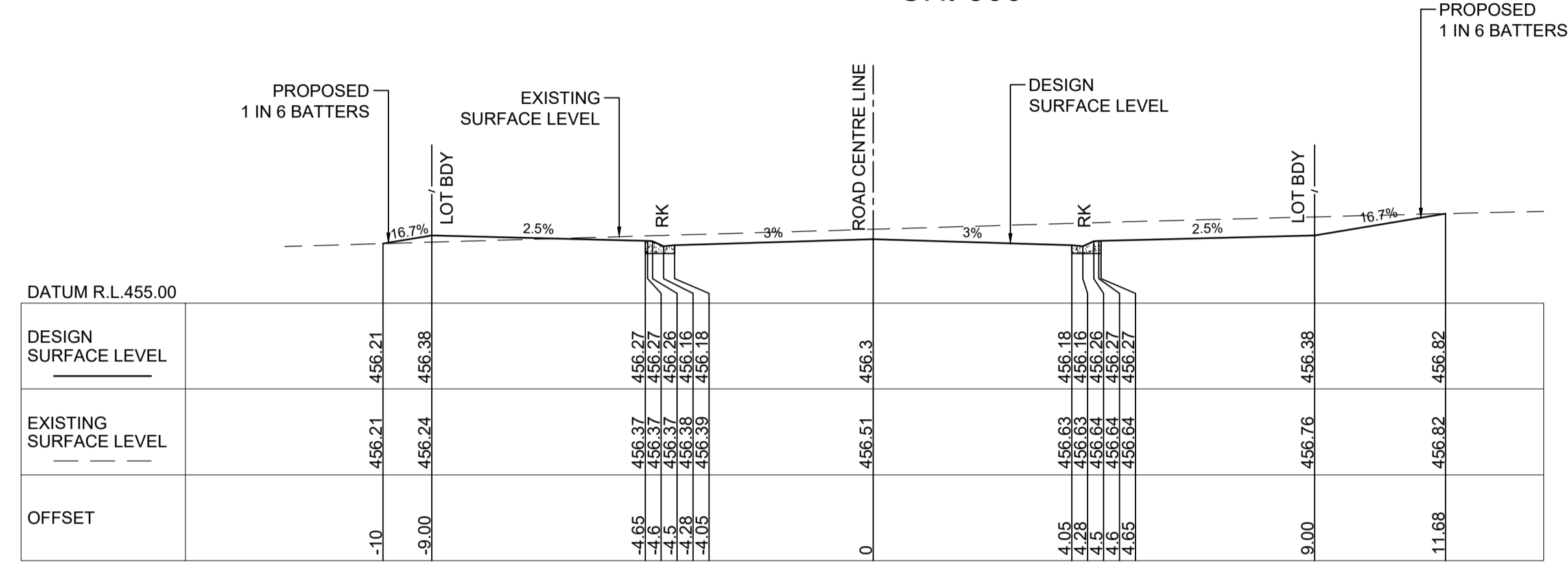
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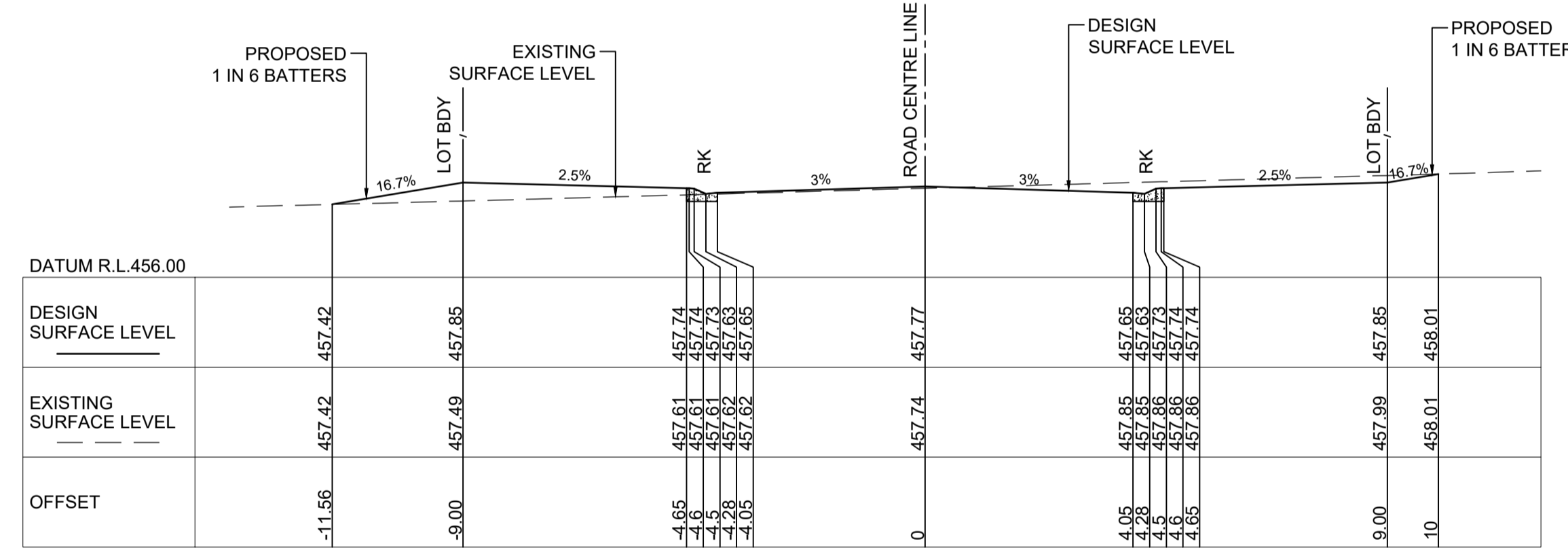
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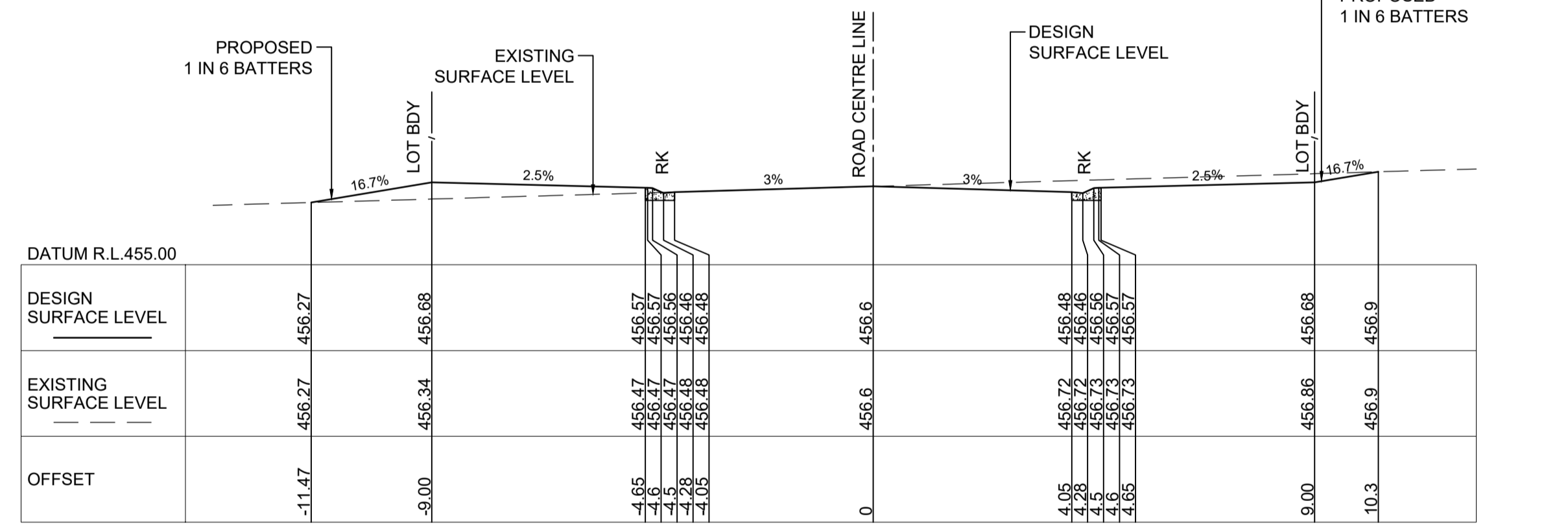
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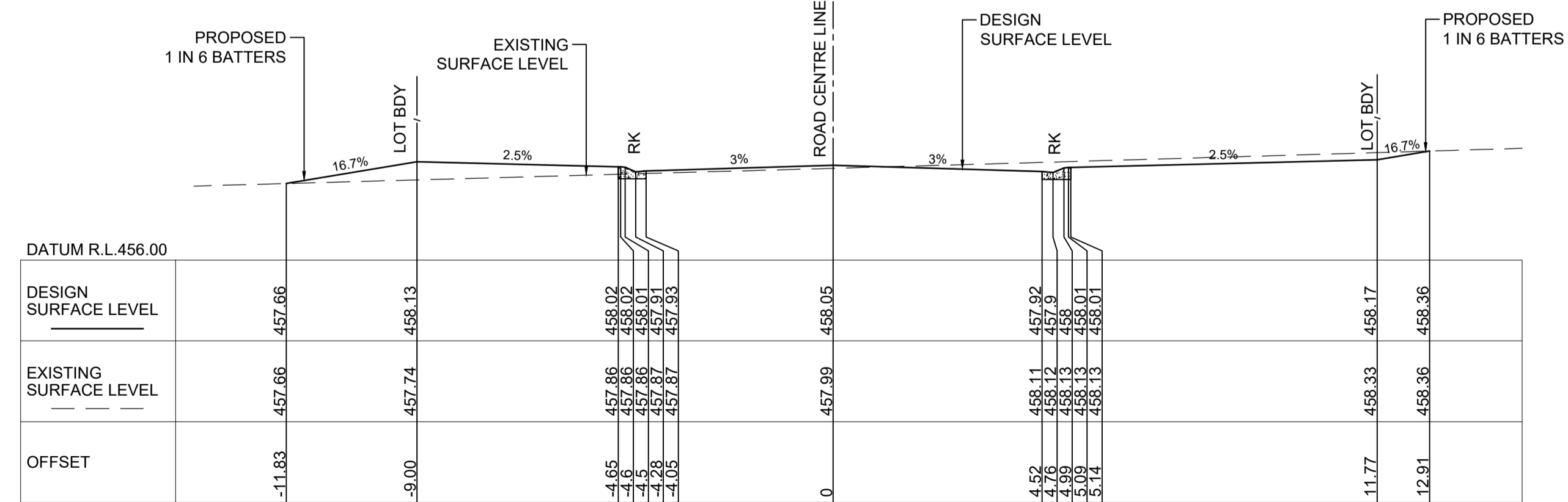
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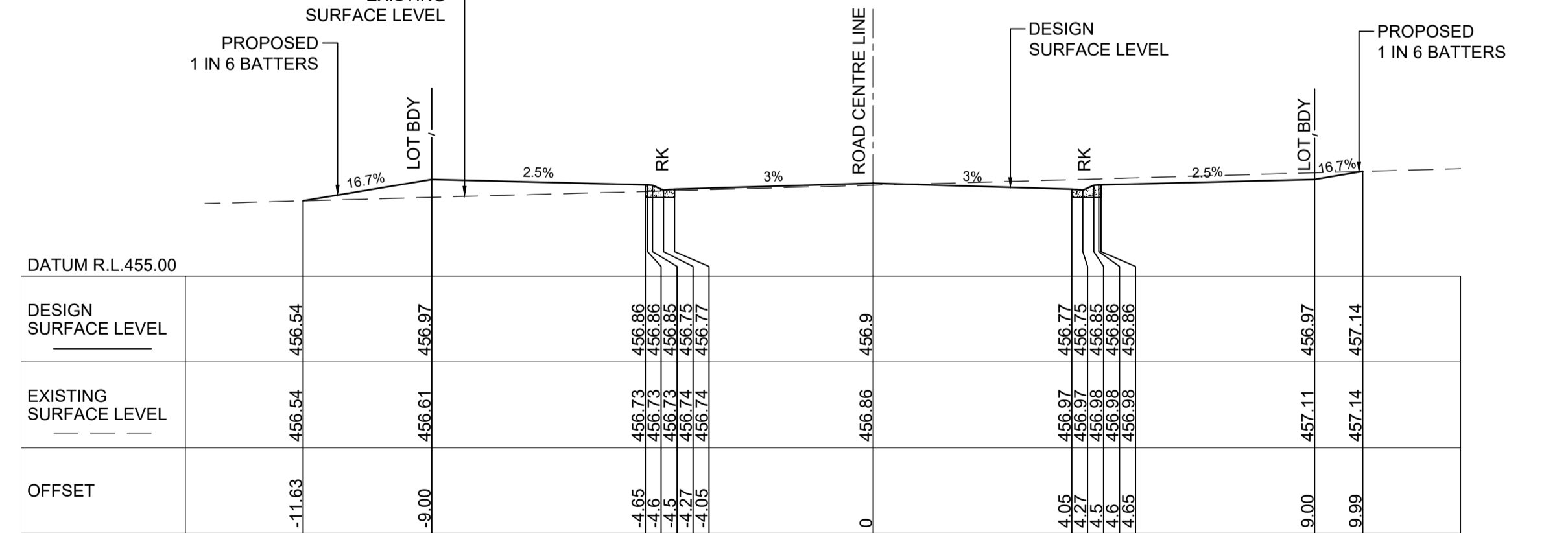
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CH. 260



CH. 160



CH. 240

NOT FOR CONSTRUCTION

A ISSUE FOR DEVELOPMENT APPLICATION		15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked
1	From full size	15/02/2022		

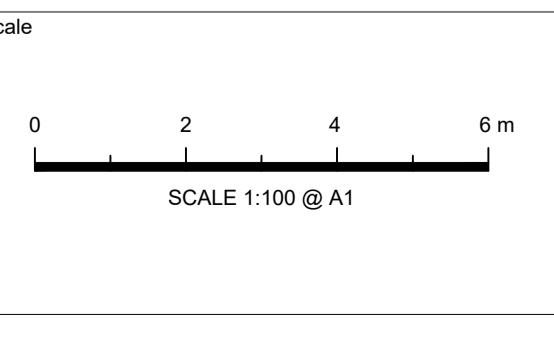
Certification By Dr. Michel Chaaya
in affiliation with Joe Bacha (formerly
Australian Consulting Engineers)

Client
MR. ROY AMERY

Council
MID-WESTERN REGIONAL COUNCIL

Surveyor
Premise

DUBBO OFFICE
1ST FLOOR
62 WINGWARRA STREET
DUBBO, NSW 2830
PH: (02) 6887 4500
WEB: www.premise.com.au



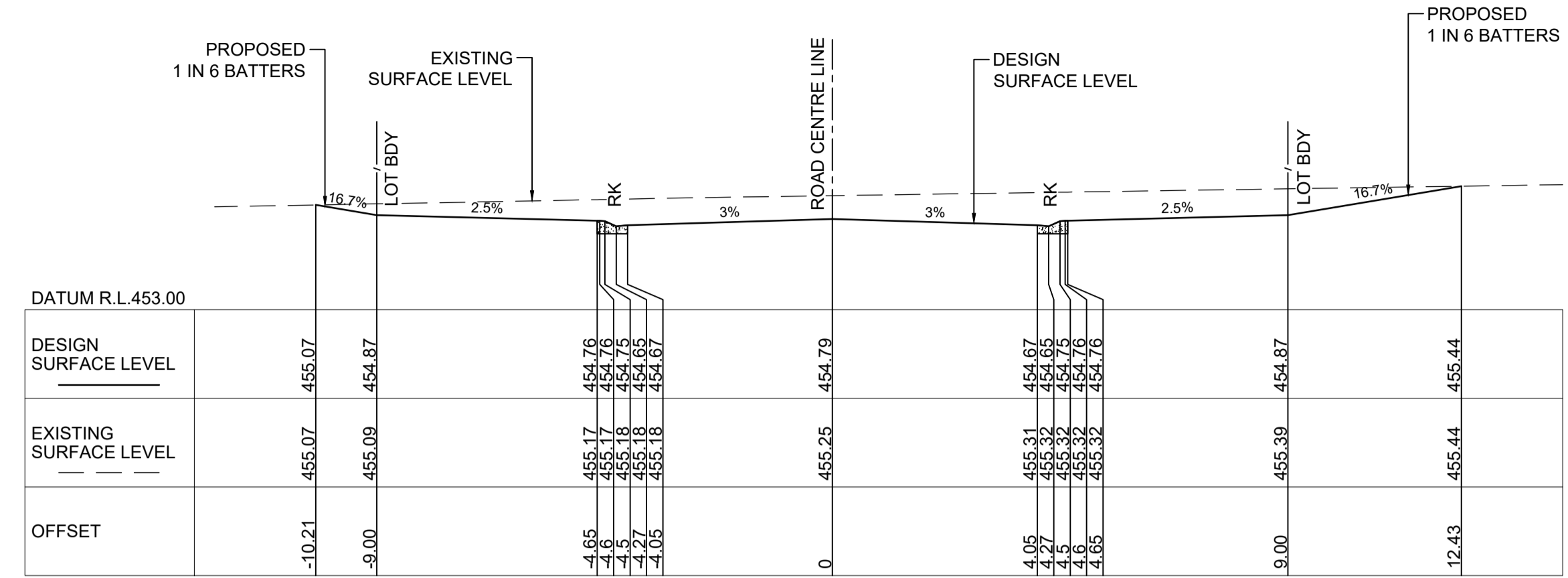
TELFORD CIVIL
DESIGN & CONSTRUCTION EXCELLENCE

Level 4, 470 Church Street, Parramatta NSW 2150
PO BOX 3579 Parramatta 2124

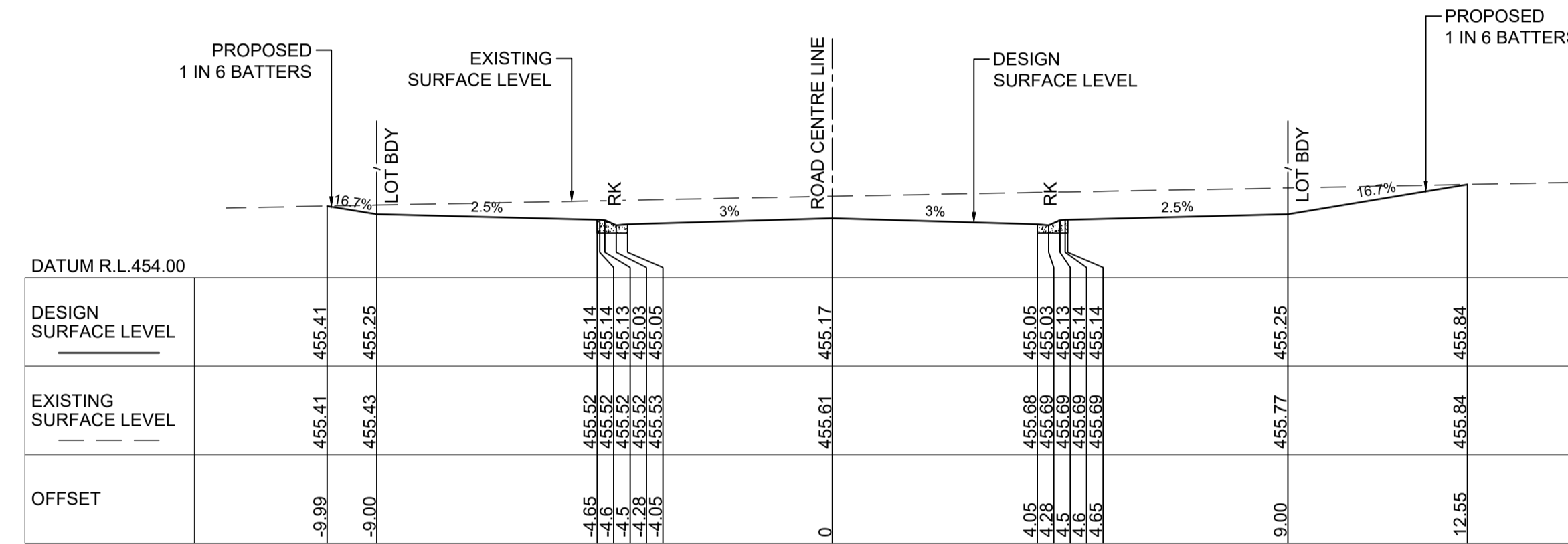
Email : info@telfordcivil.com.au
Phone : 02 7809 4931
Company : Telford Consulting Pty Ltd

Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

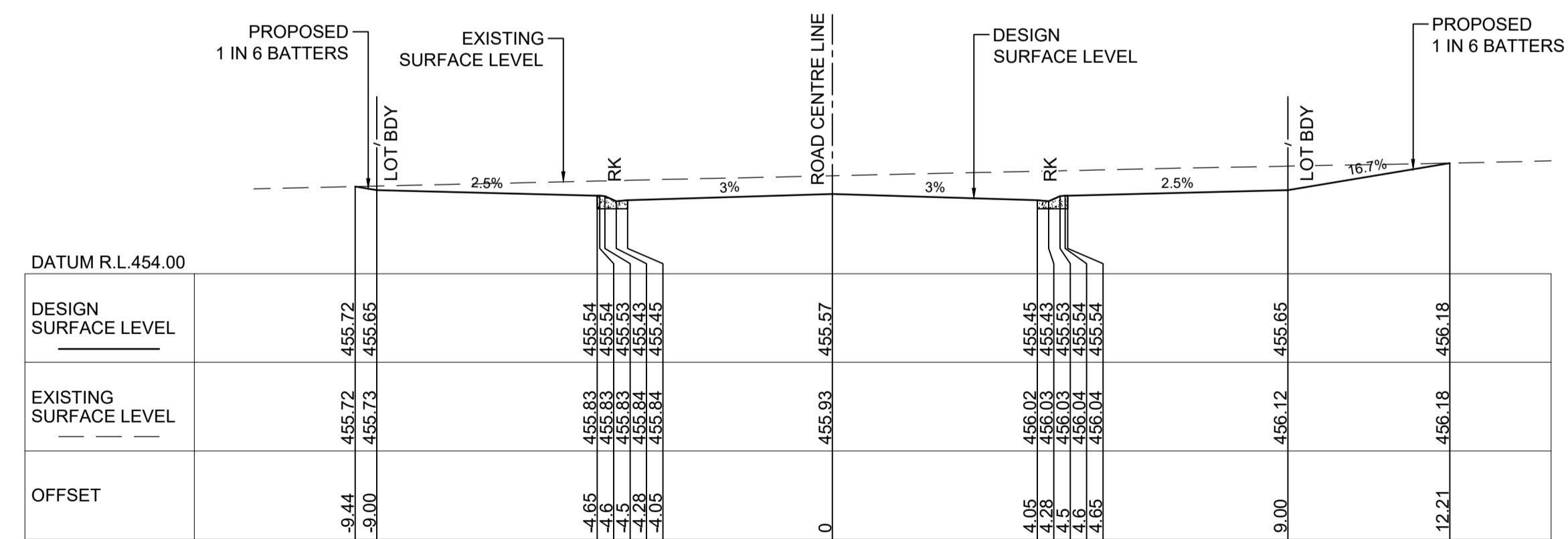
Drawing Title ROAD 1 CROSS SECTIONS SHEET 2 OF 3	Scale 1:100	A1	Project No. 2021184	Dwg. No. 304	Issue A
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CH. 359.16



CH. 340



CH. 320

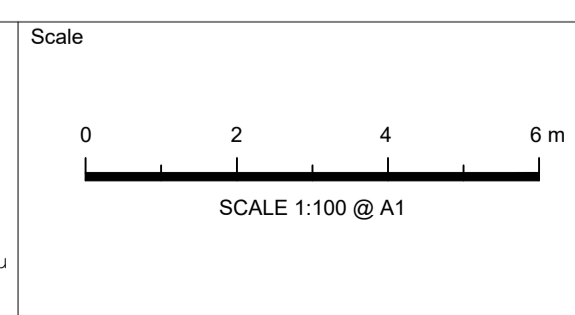
NOT FOR CONSTRUCTION

Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya
in affiliation with Joe Bacha (formerly
Australian Consulting Engineers)

Client
MR. ROY AMERY
Council
MID-WESTERN REGIONAL COUNCIL

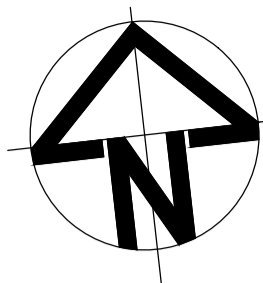
Surveyor
Premise
DUBBO OFFICE
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62 WINGEWARRA STREET
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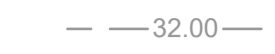


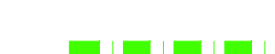
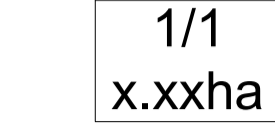




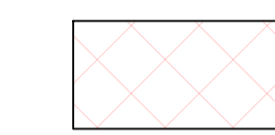
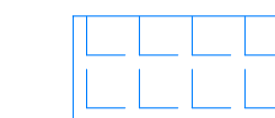
TELFORD CIVIL
DESIGN & CONSTRUCTION EXCELLENCE
Level 4, 470 Church Street,
Parramatta NSW 2150
PO BOX 3579 Parramatta 2124
Email : info@telfordcivil.com.au
Phone : 02 7809 4931
Company : Telford Consulting Pty Ltd

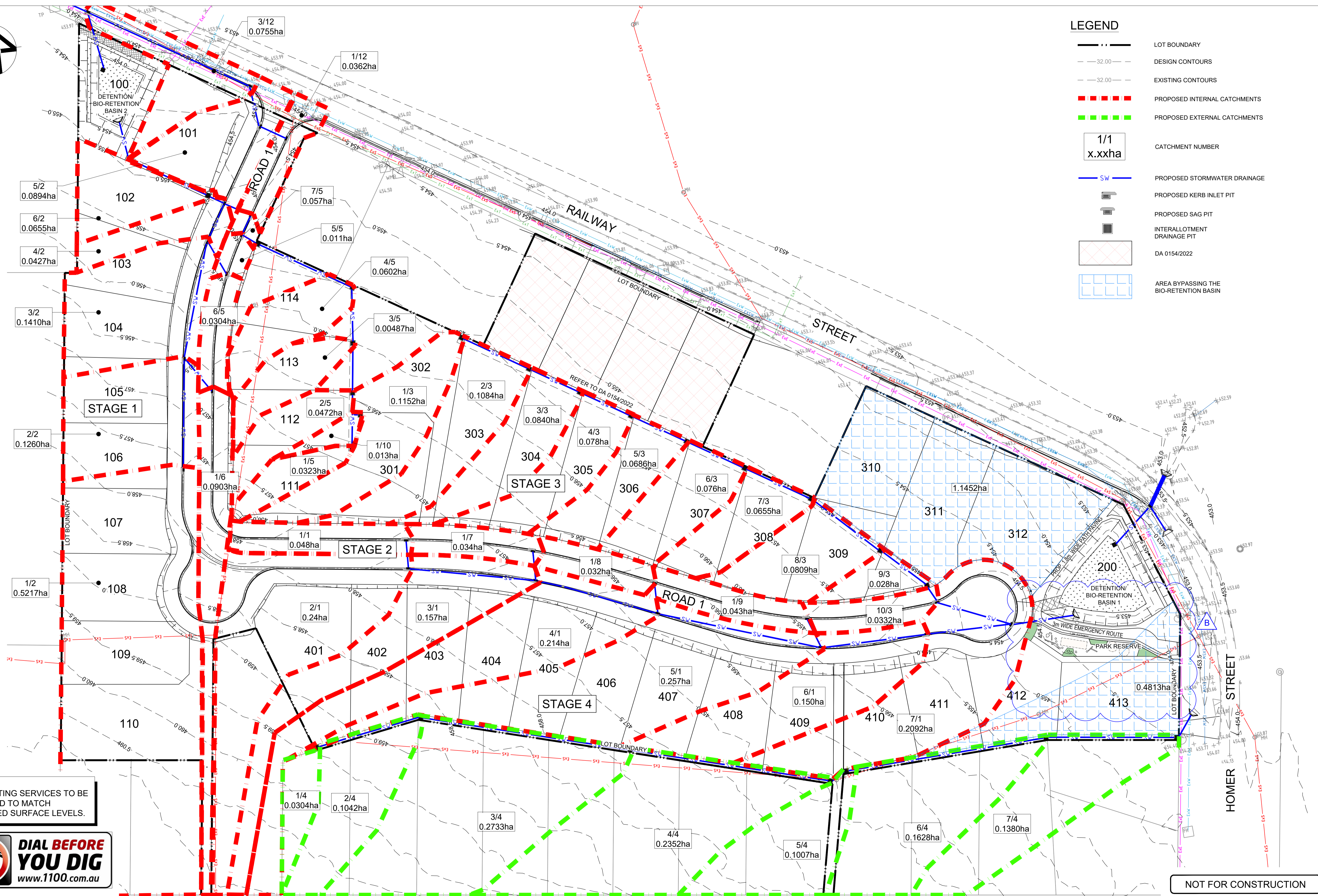
Project
**1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION**

Drawing Title
**ROAD 1
CROSS SECTIONS
SHEET 3 OF 3**
Scale A1
1:100
Project No.
2021184
Dwg. No.
305
Issue
A



LEGEND

-  LOT BOUNDARY
-  DESIGN CONTOURS
-  EXISTING CONTOURS
-  PROPOSED INTERNAL CATCHMENTS
-  PROPOSED EXTERNAL CATCHMENTS
-  CATCHMENT NUMBER
-  PROPOSED STORMWATER DRAINAGE
-  PROPOSED KERB INLET PIT
-  PROPOSED SAG PIT
-  INTERALLOTMENT DRAINAGE PIT
-  DA 0154/2022
-  AREA BYPASSING THE BIO-RETENTION BASIN



NOTE:
ALL EXISTING SERVICES TO BE ADJUSTED TO MATCH PROPOSED SURFACE LEVELS.




NOT FOR CONSTRUCTION

B	ISSUE FOR DEVELOPMENT APPLICATION	28/02/2022	P.B.T.	J.A.B.
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.
Issue	Description	Date	Design	Checked

Certification By: Dr. Michel Chayya
in affiliation with Joe Bacha (formerly Australian Consulting Engineers)

Client: MR. ROY AMERY
Council: MID-WESTERN REGIONAL COUNCIL

Surveyor:  **Premise**
DUBBO OFFICE
1ST FLOOR
62 WINGWARRA STREET
DUBBO, NSW 2830
PH: (02) 6887 4500
WEB: www.premise.com.au

Scale: 0 20 40 60 80 m
SCALE 1:1500 @ A1

TELFORD CIVIL
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PO BOX 3579 Parramatta 2124
Email: info@telfordcivil.com.au
Phone: 02 7809 4931
Company: Telford Consulting Pty Ltd

Project: 1 RAILWAY STREET, GULGONG
PROPOSED RESIDENTIAL SUBDIVISION
CIVIL ENGINEERING PLANS
DEVELOPMENT APPLICATION

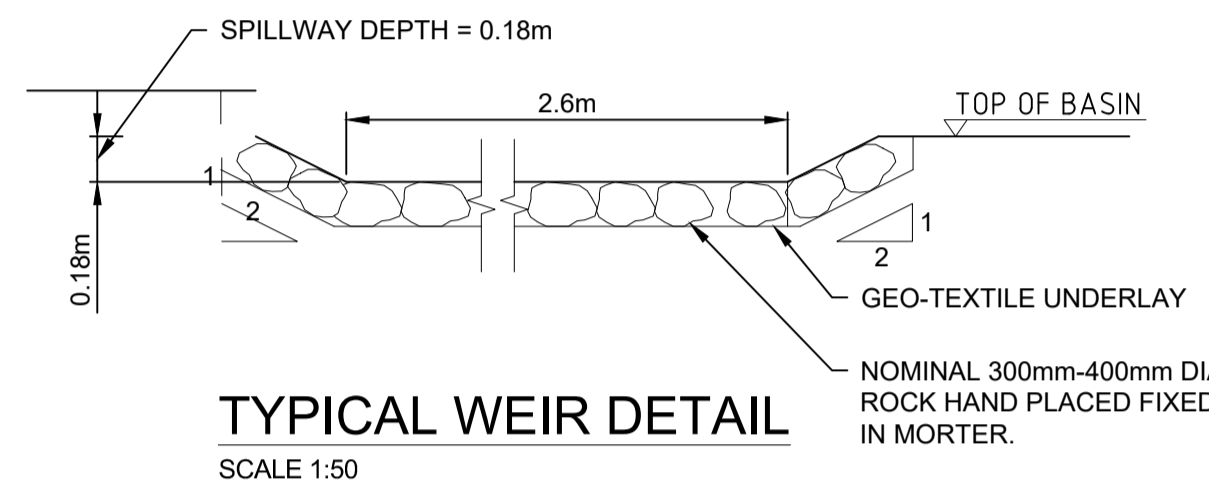
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Scale: 1:500
Project No: 2021184
Dwg. No: 400
Issue: B

BIO-RETENTION BASIN NOTES:

- AN IMPERMEABLE LINER SHALL BE INSTALLED TO FULLY CONTAIN INFILTRATED WATER AND PREVENT INFILTRATION TO GROUNDWATER. LINER SUBGRADE SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY AND TO FORM CONTINUOUS BED FREE OF VOIDS AND FREE OF SHARP OBJECTS TO PREVENT TEARING. SUBGRADE SHALL BE GRADED AS SHOWN ON THE DRAWINGS TO FORM ROUNDED BASE. LINER TO HAVE ALL WELDED JOINTS SEALED IN ACCORDANCE WITH THE PRODUCTS SPECIFICATIONS TO ENSURE THE SYSTEM IS WATER TIGHT. LINER NEEDS TO BE APPROPRIATELY KEED INTO THE BATTERS AND EMBANKMENTS AND WRAPPED UP AGAINST DRAINAGE PITS TO TOP OF SOIL LAYER WITH CONSIDERATION TO PROTRUSIONS THROUGH THE LINERS SUCH AS OUTLET PIPES..
- UNDERDRAINS SHALL BE LAID IN A MINIMUM OF 200MM DRAINAGE LAYER COMPRISED OF FINE GRAVEL (2-5MM, WITH <2% FINES AND HYDRAULIC CONDUCTIVITY OF 400MM/HR. THE DRAINAGE LAYER DEPTH MUST ENSURE AT LEAST 50MM COVER OVER THE UNDERDRAIN. BRIDGING CRITERIA SHALL BE APPLIED TO AVOID MIGRATION OF THE ON-TOP LAYER INTO THE DRAINAGE LAYER. D15 (DRAINAGE LAYER) Ø5xD85 (ON-TOP LAYER).
- WHERE INDICATED ON THE DESIGN DRAWINGS A TRANSITION LAYER SHALL BE INCLUDED. THE TRANSITION LAYER MATERIAL SHALL BE CLEAN, WELL GRADED SAND MATERIAL (TYPICALLY 1MM) CONTAINING <2% FINES. THE PARTICLE SIZE DISTRIBUTION OF THE SAND SHALL BE ASSESSED TO MEET BRIDGING CRITERIA THAT THE SMALLEST 15% OF THE SAND PARTICLES BRIDGE WITH THE LARGEST 15% OF THE FILTER MEDIA. D15 (TRANSITION LAYER) Ø5xD85 (FILTER MEDIA).
- BIO-RETENTION FILTER MEDIA SHALL COMPLY WITH THE FOLLOWING:
 - HAVE A MINIMUM HYDRAULIC CONDUCTIVITY OF 200MM/HR. THIS SHOULD BE MEASURED ACCORDING TO ASTM F1815-06 STANDARD TEST METHODS FOR SATURATED HYDRAULIC CONDUCTIVITY, WATER RETENTION, POROSITY, AND BULK DENSITY OF PUTTING GREEN AND SPORTS TURF ROOT ZONES METHOD.
 - HAVE TOTAL CLAY AND SILT MIX LESS THAN 3% (W/W) TO REDUCE THE LIKELIHOOD OF STRUCTURAL COLLAPSE OF SUCH SOILS.
 - THE FILTER MEDIA SHALL BE GRADED LOAMY SAND WITHOUT GAP IN THE PARTICLE SIZE GRADING AND THE COMPOSITION SHALL NOT BE DOMINATED BY A SMALL PARTICLE SIZE RANGE. THE FOLLOWING IS A GUIDE FOR THE FILTER MEDIA PARTICLE SIZE DISTRIBUTION:
 - CLAY AND SILT <3% (0.05MM)
 - VERY FINE SAND 5-30% (0.05-0.15MM)
 - FINE SAND 10-30% (0.25-1.0MM)
 - MEDIUM TO COARSE SAND 40-60% (0.25-1.0MM)
 - COARSE SAND 7-10% (1.0-2.0MM)
 - FINE GRAVEL <3% (2.0-3.4MM)
 - FILTER MEDIA SHALL BE TESTED (ACCORDING TO AS4419-2003) TO COMPLY WITH THE FOLLOWING:
 - TOTAL NITROGEN (TN) CONTENT < 80MG/KG
 - ORTHOPHOSPHATE (PO4) CONTENT < 40MG/KG
 - ORGANIC MATTER AT LEAST 3% (W/W)
 - PH 5.5-7.5 (PH 1:5 IN WATER)
 - ELECTRICAL CONDUCTIVITY (EC) < 1.2DS/M
 - DISPERSIBILITY
- AN ALTERNATIVE OPTION FOR BIORETENTION FILTER MEDIA IS AN ENGINEERED FILTER MEDIA. THIS IS A WASHED, WELL GRADED SAND WITH APPROPRIATE HYDRAULIC CONDUCTIVITY (SUCH AS MATERIALS USED FOR CONSTRUCTION OF GOLF GREENS). THE TOP 100MM OF THE FILTER MEDIA SHALL THAN BE AMELIORATED WITH APPROPRIATE ORGANIC MATTER, FERTILISER AND TRACE ELEMENTS AS SHOWN BELOW:

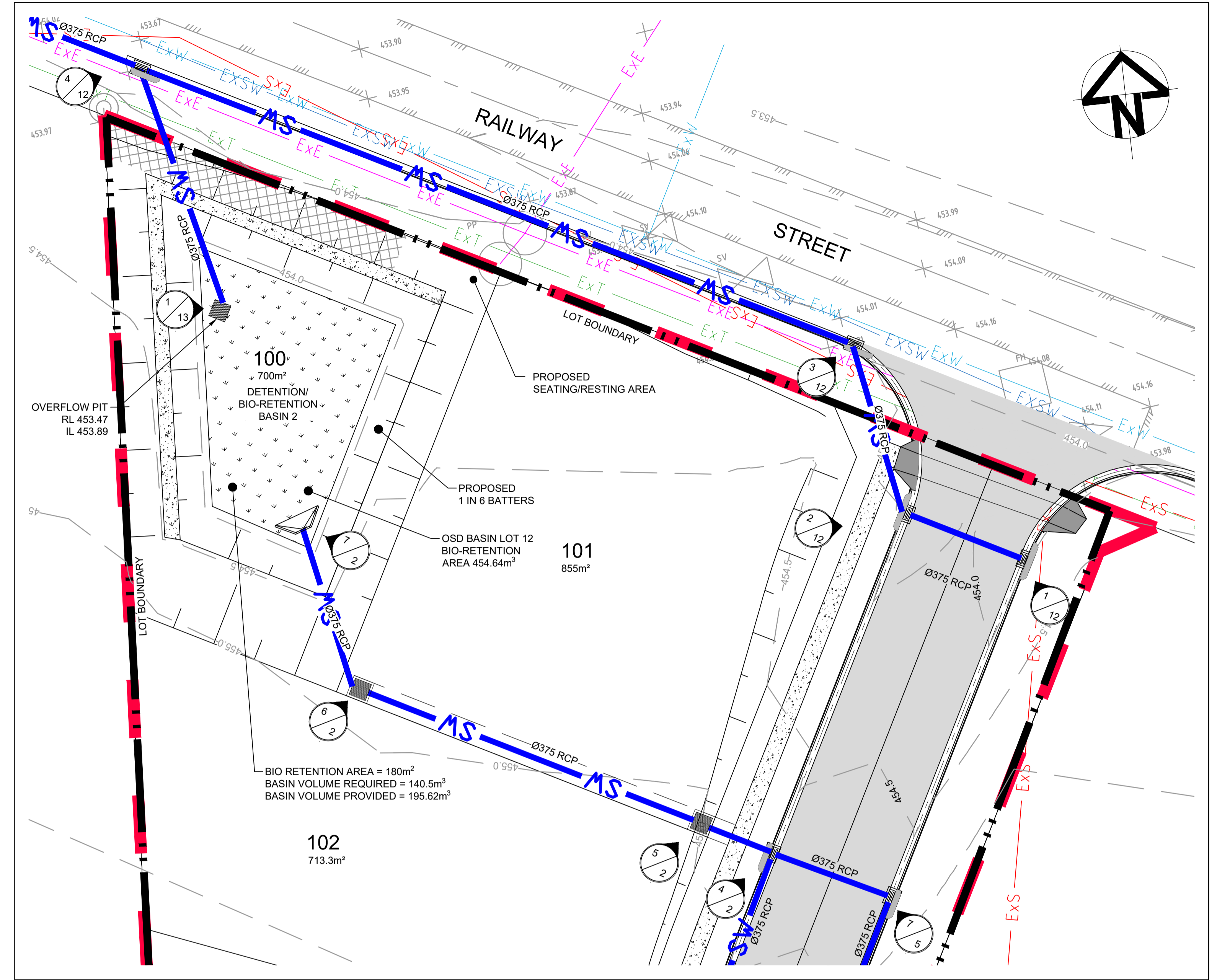
LEGEND

- LOT BOUNDARY
- PROPOSED STORMWATER
- 1000 SLOTTED uPVC PIPE @ 2m CRS WITH FLUSH POINT @ 30m CRS.
- FINISHED CONTOURS
- PROPOSED FILTER MEDIA
- PROPOSED SCOUR PROTECTION
- BASIN MAINTENANCE DRIVEWAY @ 1 in 6 MAX
- PROPOSED KERB INLET PIT
- PROPOSED SAG PIT
- INTERALLOTMENT DRAINAGE PIT



CONSTITUENT	QUANTITY (KG/100 M2 FILTER AREA)
GRANULATED POULTRY MANURE FINES	50
SUPERPHOSPHATE	2
MAGNESIUM SULPHATE	3
POTASSIUM SULPHATE	2
TRACE ELEMENT MIX	1
FERTILISER NPK (16.4.14)	4
LIME	20

- POTENTIAL FILTER MEDIA SHALL BE ASSESSED BY A HORTICULTURALIST TO ENSURE THAT THEY ARE CAPABLE OF SUPPORTING A HEALTHY VEGETATION COMMUNITY.
- THE BIO-RETENTION FILTER MEDIA SHALL BE TESTED TO DEMONSTRATE THE COMPLIANCE WITH THE ABOVE MENTIONED REQUIREMENTS AT THE FOLLOWING FREQUENCIES:
 - FOR BIO-RETENTION SYSTEMS <500M2, ONE SAMPLE PER 500M3 OF FILTER MEDIA.
 - FOR BIO-RETENTION SYSTEMS >500M2, ONE SAMPLE PER 500M3 OF FILTER MEDIA
 - FOR THE HYDRAULIC CONDUCTIVITY TEST PLUS ONE SAMPLE PER 2000M3 OF FILTER MEDIA FOR ALL OTHER REQUIRED TESTS.
- TESTING SHALL BE UNDERTAKEN ON THE ACTUAL MATERIAL TO BE DELIVERED TO THE SITE. THE SUPPLIER AND CONTRACTOR WILL BE RESPONSIBLE FOR ENSURING THE FILTER MEDIA MEETS THE SPECIFICATIONS AND THE CORRECT MATERIAL IS DELIVERED TO THE SITE PRIOR TO INSTALLATION. THE SUPPLIER SHALL ARRANGE FOR THE FILTER MEDIA TO BE TESTED BY A CERTIFIED LABORATORY IN ACCORDANCE WITH THE ABOVE SPECIFICATIONS. ON THE BASIS OF THE TESTING, THE SOIL LABORATORY AND SUPPLIER SHALL CERTIFY THAT THE MATERIAL MEETS THESE SPECIFICATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE SUPPLIER'S CERTIFICATION, TEST RESULTS, AND SUPPLY DOCKETS TO THE DESIGNER (THROUGH THE SITE SUPERINTENDENT) FOR REVIEW AND APPROVAL.
- AN IN-SITU MEASUREMENT OF HYDRAULIC CONDUCTIVITY SHALL BE UNDERTAKEN FOLLOWING COMPLETING THE CONSTRUCTION OF THE BIO-RETENTION SYSTEM AND PRIOR TO HAND OVER OF THE SYSTEM. THIS TESTING SHALL BE ACCORDING TO PRACTICE NOTE 1: IN-SITU MEASUREMENT OF HYDRAULIC CONDUCTIVITY (HATT AND LE COSTUMER, 2008), WHICH CAN BE FOUND IN WWW.MONASH.EDU.AU/FAWB/PUBLICATIONS/INDEX.HTML.
- THE FILTER MEDIA SHALL BE LIGHTLY COMPACTED DURING INSTALLATION TO PREVENT MIGRATION OF FINE PARTICLES. A SINGLE PASS OF COMPACTING MACHINERY (VIBRATING PLATE FOR SMALL SYSTEMS AND DRUM LAWN ROLLER FOR LARGER SYSTEMS) SHALL BE USED. NO HEAVY COMPACTION OR MULTI-PASS SHALL BE MADE.
- FILTER MEDIA SHALL BE INSTALLED IN TWO LIFTS FOR DEPTHS OF OVER 500MM

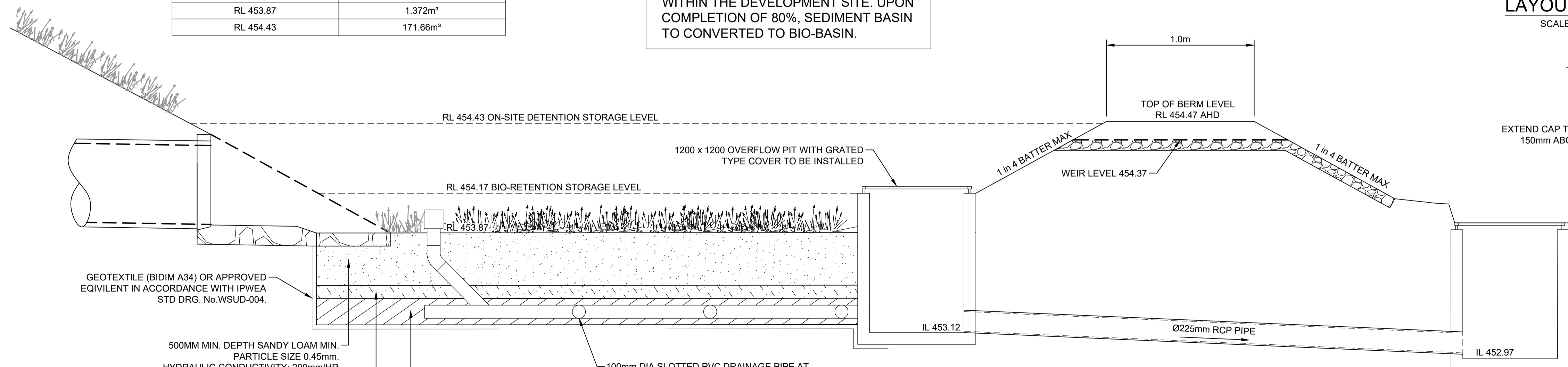


BIO-RETENTION / DETENTION BASIN 1 LAYOUT PLAN
SCALE 1:200

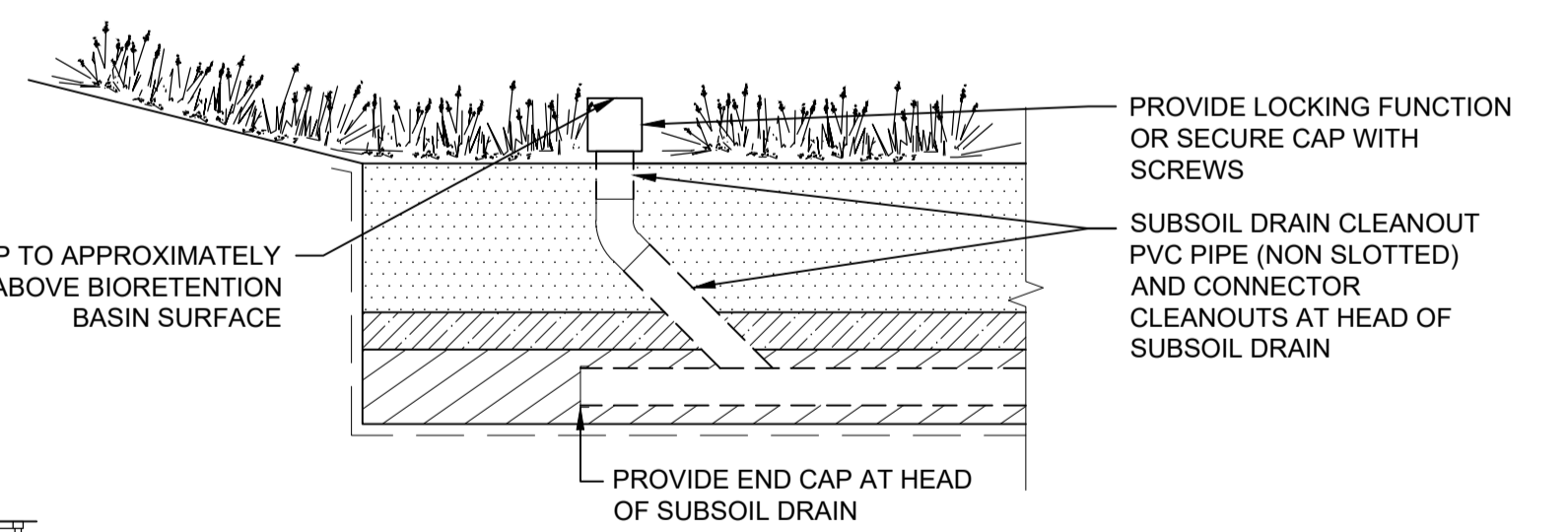
BASIN SETOUT TABLE

LEVEL (m)	STAGED VOLUME (m³)
RL 453.12	0
RL 453.87	1.372m³
RL 454.43	171.66m³

SEDIMENT BASIN NOTE :
SEDIMENT BASIN TO REMAIN UNTIL 80% OF ALL HOUSES ARE CONSTRUCTED WITHIN THE DEVELOPMENT SITE. UPON COMPLETION OF 80%, SEDIMENT BASIN TO CONVERTED TO BIO-BASIN.



TYPICAL BASIN DETAIL
N.T.S.



TYPICAL FLUSH POINT DETAIL IN BIORETENTION
SCALE 1:20

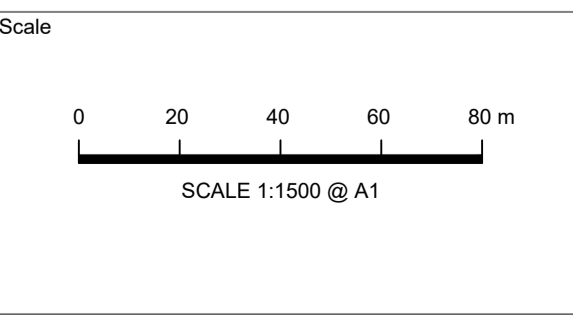
NOT FOR CONSTRUCTION

Issue	Description	Date	Design	Checked
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya in affiliation with Joe Bacha (formerly Australian Consulting Engineers)

Client: **MR. ROY AMERY**
Council: **MID-WESTERN REGIONAL COUNCIL**

Surveyor: **Premise**
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Email: info@telfordcivil.com.au
Phone: 02 7809 4931
Company: Telford Consulting Pty Ltd

Project: **1 RAILWAY STREET, GULGONG PROPOSED RESIDENTIAL SUBDIVISION CIVIL ENGINEERING PLANS DEVELOPMENT APPLICATION**

Drawing Title: **BIO-RETENTION BASIN 1 LAYOUT PLAN AND DETAILS SHEET 1 OF 2**

Scale: 1:500	A1	Project No: 2021184	Dwg. No: 500	Issue: A
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BIO-RETENTION BASIN NOTES:

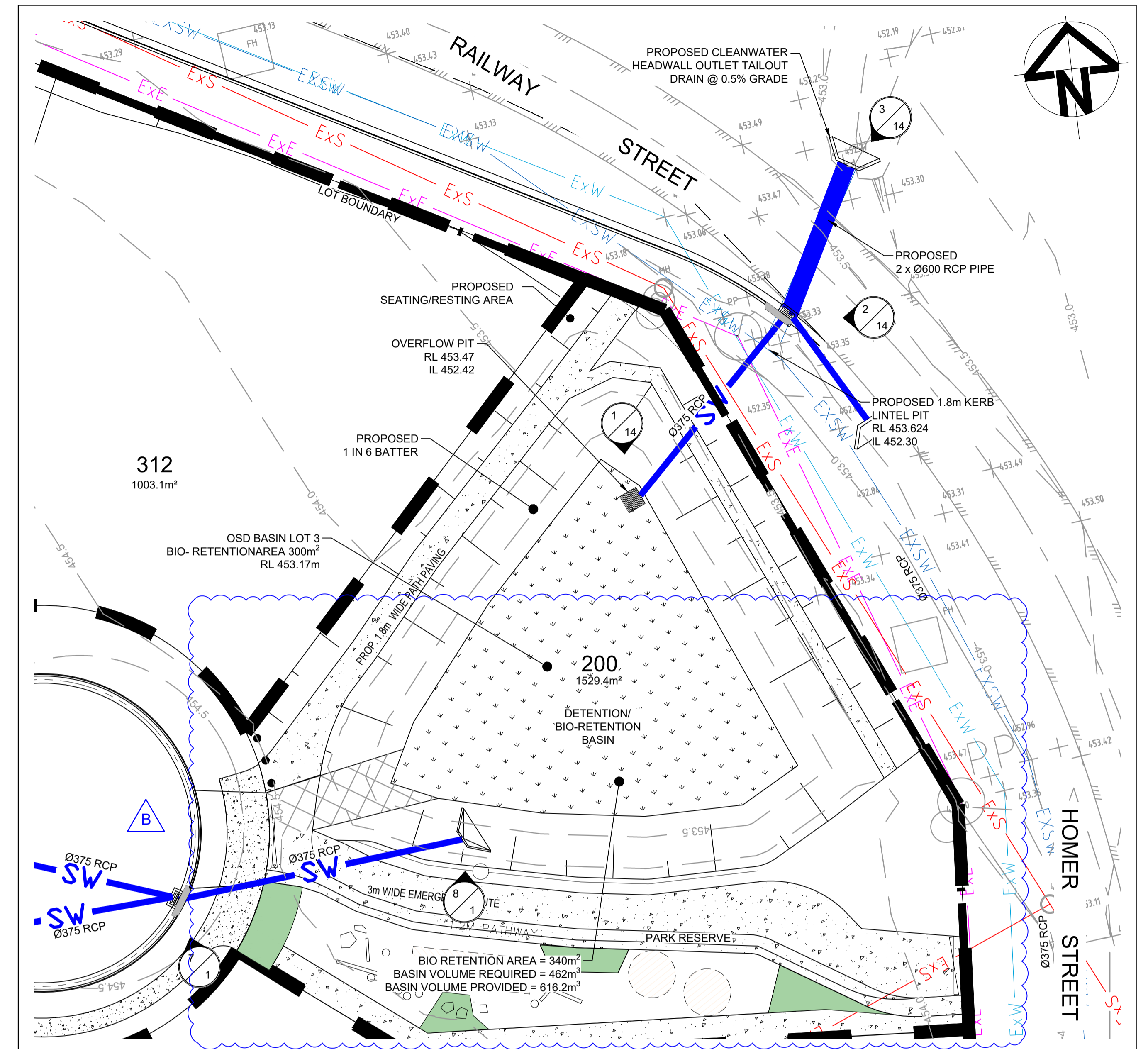
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- UNDERDRAINS SHALL BE LAID IN A MINIMUM OF 200MM DRAINAGE LAYER COMPRISED OF FINE GRAVEL (2-5MM, WITH <2% FINES AND HYDRAULIC CONDUCTIVITY OF 400MM/HR. THE DRAINAGE LAYER DEPTH MUST ENSURE AT LEAST 50MM COVER OVER THE UNDERDRAIN. BRIDGING CRITERIA SHALL BE APPLIED TO AVOID MIGRATION OF THE ON-TOP LAYER INTO THE DRAINAGE LAYER. D15 (DRAINAGE LAYER) Ø5xD85 (ON-TOP LAYER).
- WHERE INDICATED ON THE DESIGN DRAWINGS A TRANSITION LAYER SHALL BE INCLUDED. THE TRANSITION LAYER MATERIAL SHALL BE CLEAN, WELL GRADED SAND MATERIAL (TYPICALLY 1MM) CONTAINING <2% FINES. THE PARTICLE SIZE DISTRIBUTION OF THE SAND SHALL BE ASSESSED TO MEET BRIDGING CRITERIA THAT THE SMALLEST 15% OF THE SAND PARTICLES BRIDGE WITH THE LARGEST 15% OF THE FILTER MEDIA. D15 (TRANSITION LAYER) Ø5xD85 (FILTER MEDIA).
- BIO-RETENTION FILTER MEDIA SHALL COMPLY WITH THE FOLLOWING:
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 - HAVE TOTAL CLAY AND SILT MIX LESS THAN 3% (W/W) TO REDUCE THE LIKELIHOOD OF STRUCTURAL COLLAPSE OF SUCH SOILS.
 - THE FILTER MEDIA SHALL BE GRADED LOAMY SAND WITHOUT GAP IN THE PARTICLE SIZE GRADING AND THE COMPOSITION SHALL NOT BE DOMINATED BY A SMALL PARTICLE SIZE RANGE. THE FOLLOWING IS A GUIDE FOR THE FILTER MEDIA PARTICLE SIZE DISTRIBUTION:
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 - FINE SAND 10-30% (0.25-1.0MM)
 - MEDIUM TO COARSE SAND 40-60% (0.25-1.0MM)
 - COARSE SAND 7-10% (1.0-2.0MM)
 - FINE GRAVEL <3% (2.0-3.4MM)
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 - TOTAL NITROGEN (TN) CONTENT < 80MG/KG
 - ORTHOPHOSPHATE (PO4) CONTENT < 40MG/KG
 - ORGANIC MATTER AT LEAST 3% (W/W)
 - PH 5.5-7.5 (PH 1:5 IN WATER)
 - ELECTRICAL CONDUCTIVITY (EC) < 1.2DS/M
 - DISPERSIBILITY
- AN ALTERNATIVE OPTION FOR BIORETENTION FILTER MEDIA IS AN ENGINEERED FILTER MEDIA THIS IS A WASHED, WELL GRADED SAND WITH APPROPRIATE HYDRAULIC CONDUCTIVITY (SUCH AS MATERIALS USED FOR CONSTRUCTION OF GOLF GREENS). THE TOP 100MM OF THE FILTER MEDIA SHALL THAN BE AMELIORATED WITH APPROPRIATE ORGANIC MATTER, FERTILISER AND TRACE ELEMENTS AS SHOWN BELOW:

CONSTITUENT	QUANTITY (KG/100 M2 FILTER AREA)
GRANULATED POULTRY MANURE FINES	50
SUPERPHOSPHATE	2
MAGNESIUM SULPHATE	3
POTASSIUM SULPHATE	2
TRACE ELEMENT MIX	1
FERTILISER NPK (16.4.14)	4
LIME	20

- POTENTIAL FILTER MEDIA SHALL BE ASSESSED BY A HORTICULTURALIST TO ENSURE THAT THEY ARE CAPABLE OF SUPPORTING A HEALTHY VEGETATION COMMUNITY.
- THE BIO-RETENTION FILTER MEDIA SHALL BE TESTED TO DEMONSTRATE THE COMPLIANCE WITH THE ABOVE MENTIONED REQUIREMENTS AT THE FOLLOWING FREQUENCIES:
 - FOR BIO-RETENTION SYSTEMS <500M2, ONE SAMPLE PER 500M3 OF FILTER MEDIA.
 - FOR BIO-RETENTION SYSTEMS >500M2, ONE SAMPLE PER 500M3 OF FILTER MEDIA
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- AN IN-SITU MEASUREMENT OF HYDRAULIC CONDUCTIVITY SHALL BE UNDERTAKEN FOLLOWING COMPLETING THE CONSTRUCTION OF THE BIO-RETENTION SYSTEM AND PRIOR TO HAND OVER OF THE SYSTEM. THIS TESTING SHALL BE ACCORDING TO PRACTICE NOTE 1: IN-SITU MEASUREMENT OF HYDRAULIC CONDUCTIVITY (HATT AND LE COSTUMER, 2008), WHICH CAN BE FOUND IN WWW.MONASH.EDU.AU/FAWB/PUBLICATIONS/INDEX.HTML
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- FILTER MEDIA SHALL BE INSTALLED IN TWO LIFTS FOR DEPTHS OF OVER 500MM

LEGEND

- LOT BOUNDARY
- PROPOSED STORMWATER DRAINAGE
- 100Ø SLOTTED uPVC PIPE @ 2m CRS WITH FLUSH POINT @ 30m CRS.
- FINISHED CONTOURS
- PROPOSED FILTER MEDIA
- PROPOSED SCOUR PROTECTION
- BASIN MAINTENANCE DRIVEWAY @ 1 in 6 MAX
- PROPOSED KERB INLET PIT
- PROPOSED SAG PIT
- INTERALLOTMENT DRAINAGE PIT

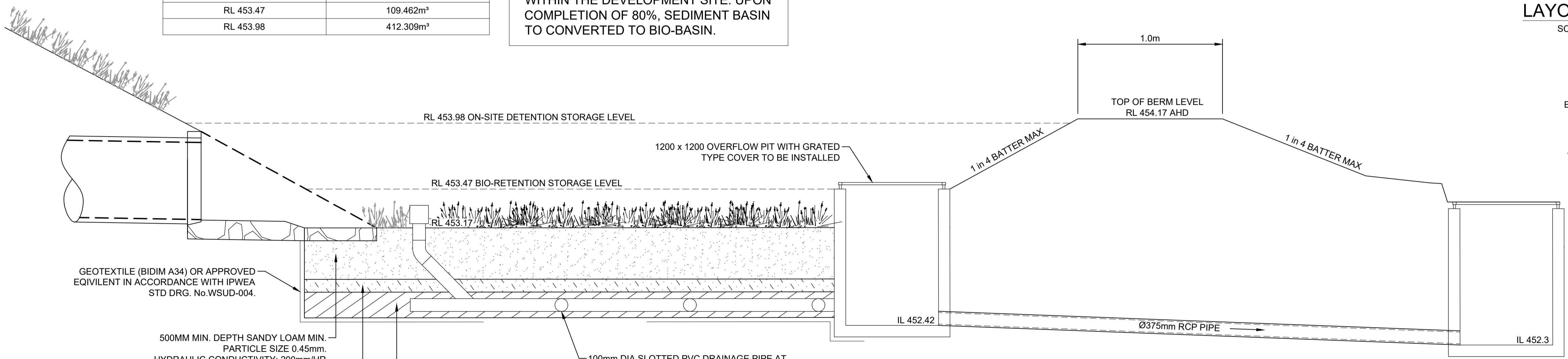


BIO-RETENTION / DETENTION BASIN 2 LAYOUT PLAN
SCALE 1:200

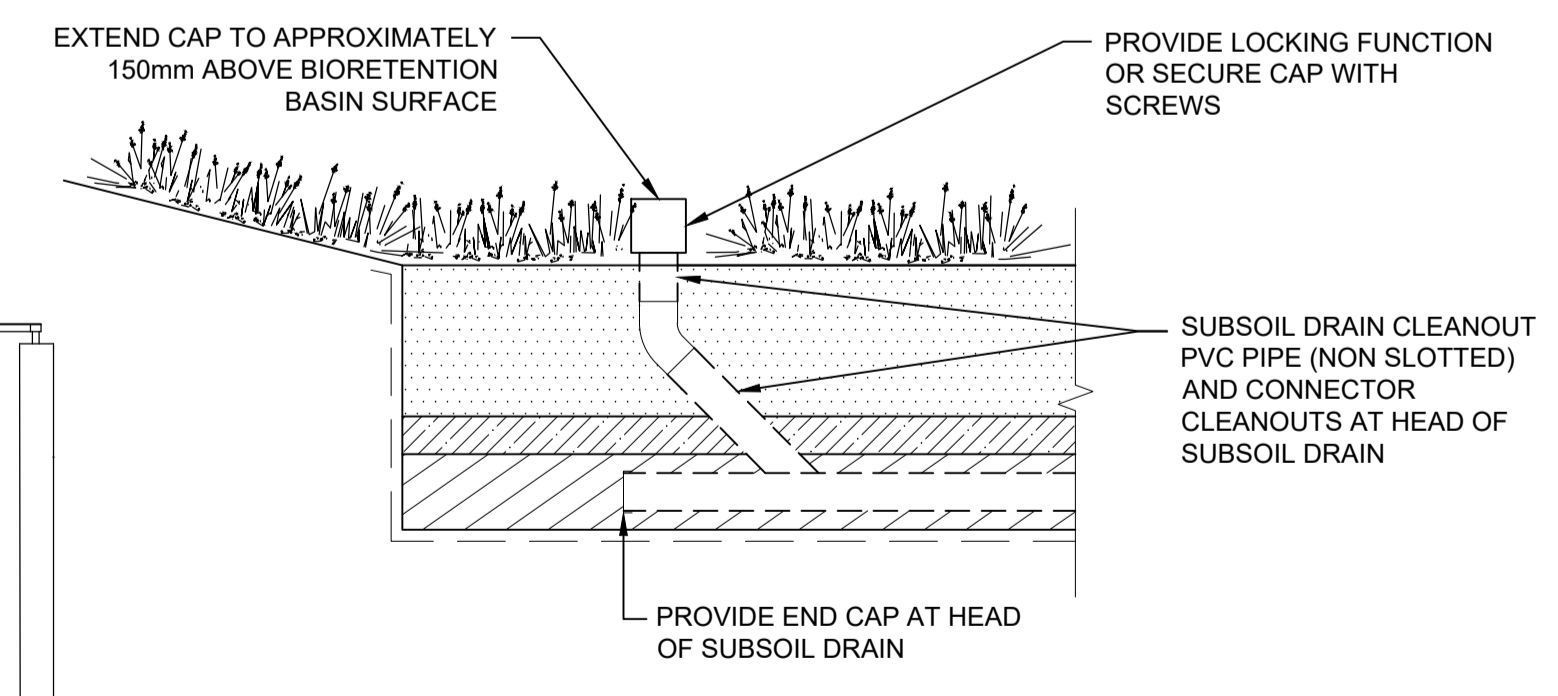
BASIN SETOUT TABLE

LEVEL (m)	STAGED VOLUME (m³)
RL 452.42	0
RL 453.47	109.462m³
RL 453.98	412.309m³

SEDIMENT BASIN NOTE :
SEDIMENT BASIN TO REMAIN UNTIL 80% OF ALL HOUSES ARE CONSTRUCTED WITHIN THE DEVELOPMENT SITE. UPON COMPLETION OF 80%, SEDIMENT BASIN TO CONVERTED TO BIO-BASIN.



TYPICAL BASIN DETAIL
N.T.S.



TYPICAL FLUSH POINT DETAIL IN BIORETENTION
SCALE N.T.S.

NOT FOR CONSTRUCTION

Issue	Description	Date	Design	Checked
B	ISSUE FOR DEVELOPMENT APPLICATION	28/02/2022	P.B.T.	J.A.B.
A	ISSUE FOR DEVELOPMENT APPLICATION	15/02/2022	P.B.T.	J.A.B.

Certification By Dr. Michel Chaaya in affiliation with Joe Bacha (formerly Australian Consulting Engineers)

Client: **MR. ROY AMERY**
Council: **MID-WESTERN REGIONAL COUNCIL**

Surveyor: **Premise**
DUBBO OFFICE
1ST FLOOR
62 WINGEWARRA STREET
DUBBO, NSW 2830
PH: (02) 6887 4500
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Scale: 0 4 8 12m
SCALE 1:200 @ A1

TELFORD CIVIL
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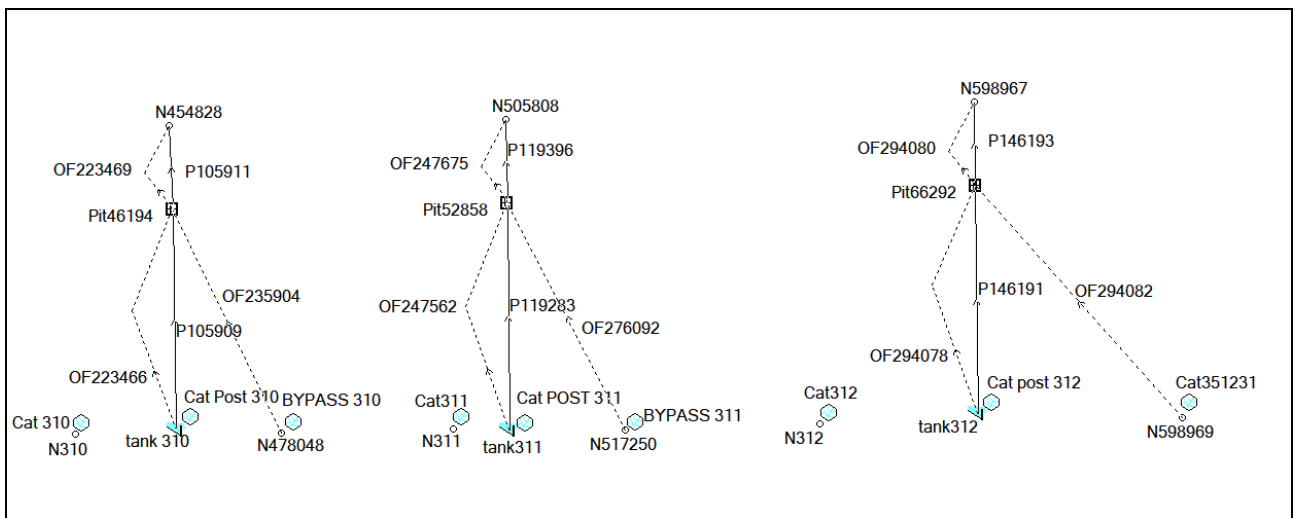
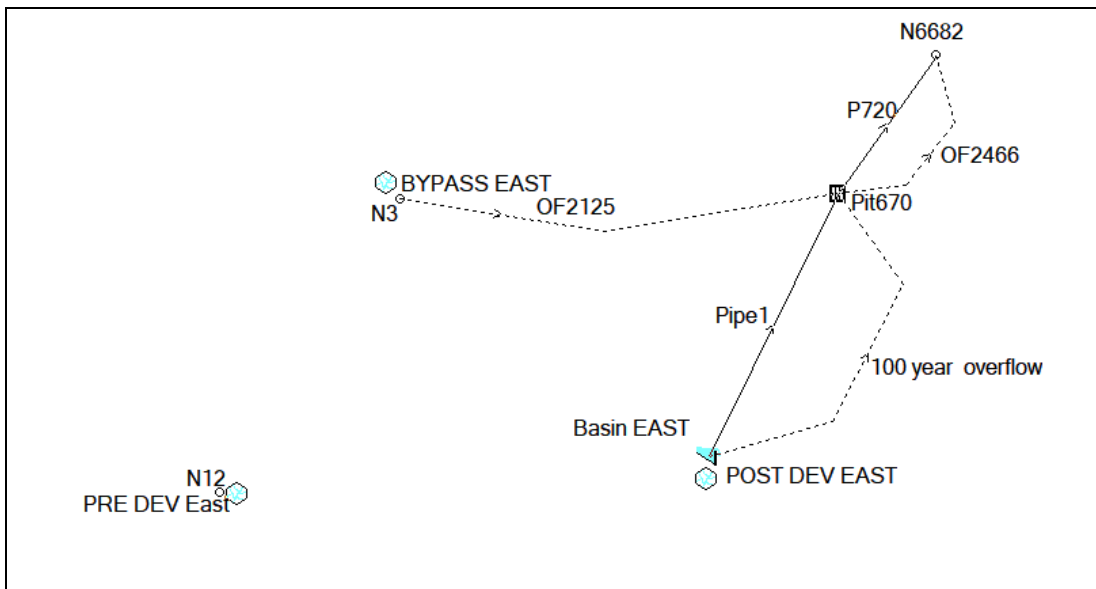
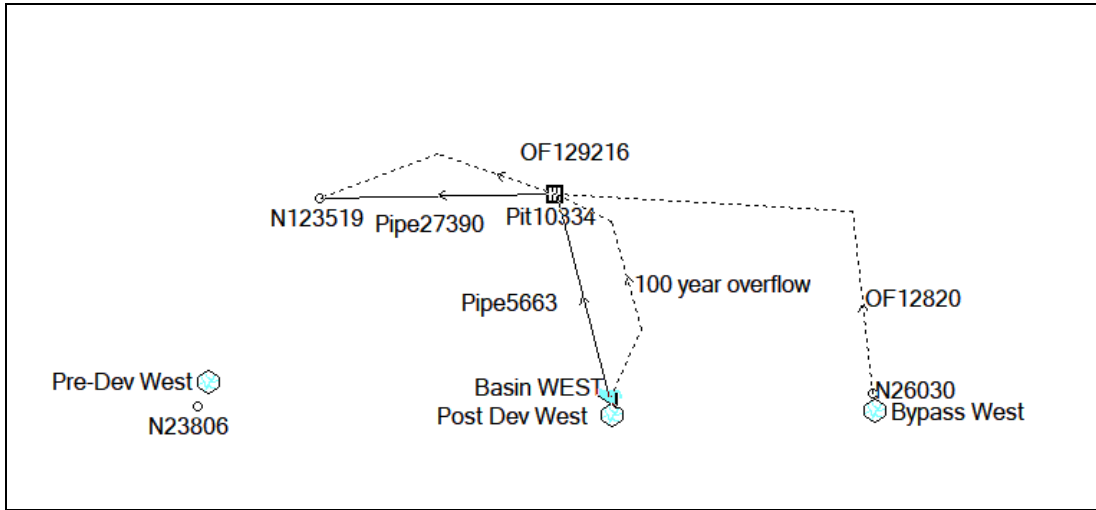
Project: **1 RAILWAY STREET, GULGONG PROPOSED RESIDENTIAL SUBDIVISION CIVIL ENGINEERING PLANS DEVELOPMENT APPLICATION**

Drawing Title: **BIO-RETENTION BASIN 2 LAYOUT PLAN AND DETAILS SHEET 2 OF 2**

Scale: A1
Project No: 2021184
Dwg. No: 501
Issue: B

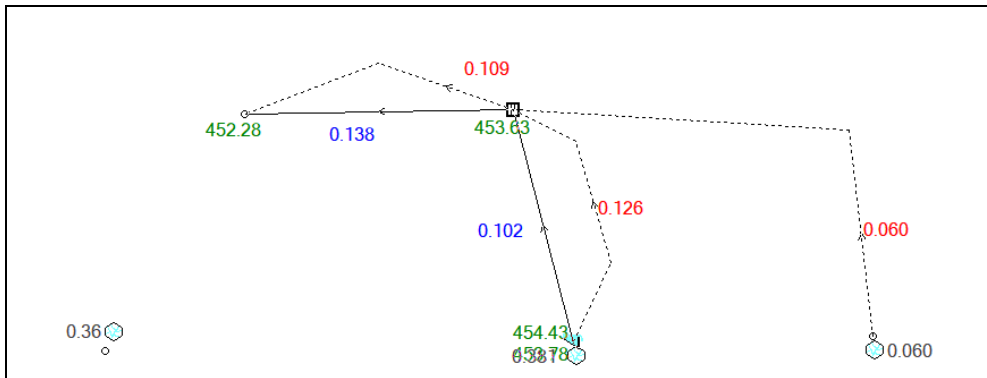
Appendix C DRAINS MODEL DATA

Drains Model Layout

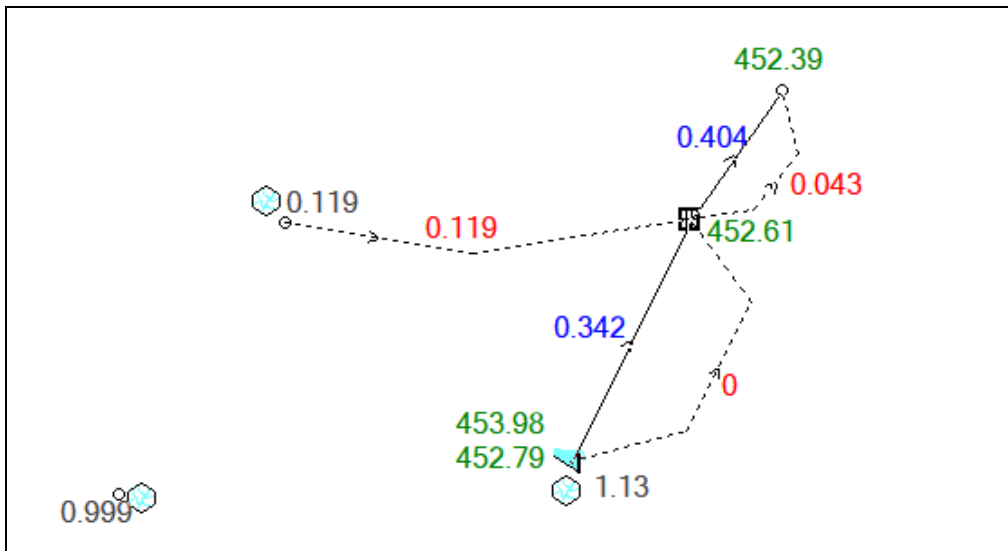


Drains Model Results (100 Year)

Basin West



Basin East



OSD-Tanks

