

UNE Tamworth Central

Utilities and Services Report

Prepared for: Architectus

Project No: SYD2353
Date: 28 July 2023
Revision: 01



Project: UNE Tamworth Central

Location: Roderick Street and Peel Street,
Tamworth NSW 2340

Prepared by: ADP Consulting Pty Ltd
Level 6, 33 Erskine Street
Sydney NSW 2000

Project No: SYD2353

Revision: 01

Date: 28 July 2023

Rev	Date	Comment	Author	Technical Review	Signature	Authorisation & QA	Signature
01	28.07.23	DA Submission	SY/MC/ME/AY/DB/DP/KS	Samuel Youssef	SY	James Cannam	JC

Project Team

Client / Principal University Of New England (UNE)

Architect Architectus

Services Consultant (MEP) ADP Consulting



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1. Executive Summary

This report provides a review of the existing services infrastructure surrounding and serving the site of the old Tamworth Velodrome, located on the corner of Peel St & Roderick St and bounded by the Peel River, Tamworth NSW.

The site is approx. 11,000m² area to be developed into a new University building and carpark as a first stage. Future stages include more university buildings on site. However, the extent of the later stages is not entirely defined.

This report is for the purpose of the first stage only.

In summary, the ADP desktop review has highlighted the following:

1.1 Electrical Infrastructure

- > The site is currently supplied from an Essential Energy pad mount substation. Proposed works included upgrade of existing to meet developments requirements.
- > There are no NBN, Telstra and Optus communication services located to the site. Telstra pits are adjacent to the site. Works require instatement of a NBN connection.

1.2 Water Infrastructure

- > The existing water main running adjacent to the site appear to be adequate to serve the proposed development subject to final pressure and flow enquiry.
- > ADP recommends connection into the 150mm water main along Peel St. The exact connection point is subject to the Section 307 application.
- > No gas mains are located around the site, therefore, no gas will be provided to the development.

1.3 Sewer Infrastructure

- > The existing 300mm UPVC sewer main running within the site appears to be adequate to served the proposed development.
- > ADP recommends connection into this sewer main. The exact connection point is subject to the Section 307 application.

2. Introduction

2.1 Project Description

The project involves the design and construction of a new central teaching campus building located on the site of the old Tamworth Velodrome, located on the corner of Peel St & Roderick St and bounded by the Peel River.

The proposed building will comprise of the following:

- > Ground Level: Teaching spaces and amenities,
- > First Floor: Clinical Simulation Laboratories, student open space with kitchenette, cultural spaces with meeting room and amenities,
- > Second Floor: Teaching spaces, flexible spaces, student open spaces and amenities,
- > Third Floor: Studying desks, collaboration meeting rooms, focus rooms and amenities,
- > The External area of the building will contain car parking, services plant spaces and landscaping.

The objective of this document is to define the services strategies for the proposed development.

ADP have undertaken a desktop review of the information provided from the site Dial Before You Dig (DBYD) search.

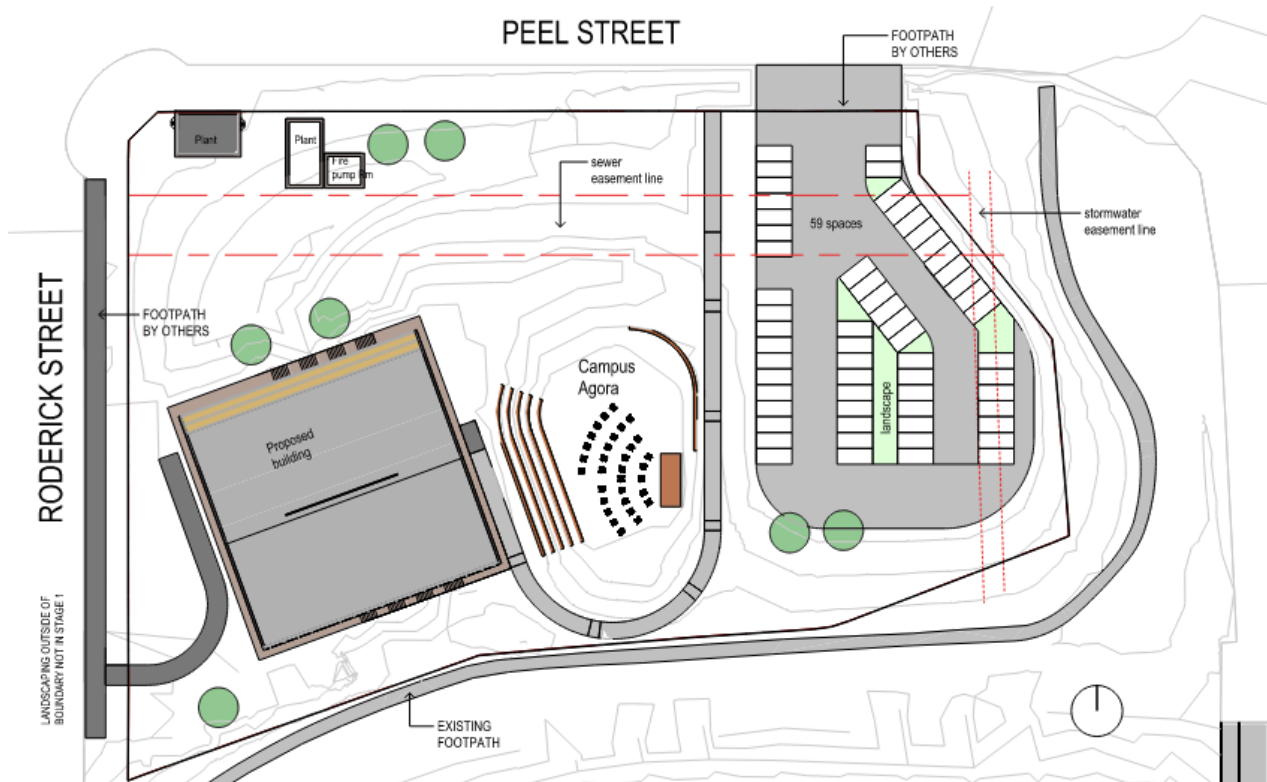
The report provides an overview of the following information relating to each service:

- > Existing infrastructure surrounding and serving the site from the following in-ground services:
 - Water & Sewer (Tamworth Regional Council)
 - Power (Ausgrid)
 - Telecommunications (Telstra, NBN and Optus)
- > Estimated new infrastructure works associated with the development. The final scope for the supply authority works will be subject to the submission of a number of Applications for Connection or Technical Enquiries.

Figure 1 Site Location



Figure 2 Proposed Development



This report reviews the existing infrastructure within the area, the capacity the infrastructure has to support this project (where known), and the outline scope of works associated with infrastructure for the site.

2.2 References

This design return brief is based upon the following information:

- > Dial Before You Dig (DBYD) information package,
- > Architectural drawings by Architectus, Received on 30th May 2023,
- > Site visit, conducted on 4th May 2023.

3. Electrical Infrastructure

3.1 Existing Infrastructure

The site is currently supplied from an Essential Energy pad mount substation 18-17158 located within the property boundary. This substation has a rating of 500kVA and is serving 18 other customers in the surrounding mixed residential/commercial area. The present load on this substation is estimated to be 409kVA.

3.2 Calculated AS3000 Electrical Maximum Demand

The proposed load of UNE Tamworth is 365A per phase, which is equivalent to 253kVA. This proposed load cannot be supplied from the existing substation as it will overload this substation. It appears that there is no other available substation in the area to divert the electrical load. The proposed maximum demand of UNE Tamworth cannot be supplied from the existing network without considerable modification.

3.3 New Works Associated with Electrical Infrastructure

Works required would include the upgrade of the existing pad mount substation at its current location to 1000kVA, subject to Essential Energy approval. This will enable UNE Tamworth to take a supply of 365A from the upgraded pad mount.

Street lighting assessment and Essential Energy Street lighting assets alternation works might be needed if local city council request further street lighting assessment on the public road in front of development frontage.

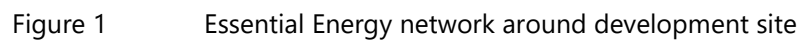


Figure 1 Essential Energy network around development site

Supply Options	Option A	Option B
Indicative costs	\$150,000*	\$250,000*

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5. Water & Sewer Infrastructure

5.1 Existing development and Infrastructure

5.1.1 Sewer

The BYDA information provided by Tamworth Regional Council indicates:

- > An existing Ø300mm UPVC (Unplasticised Polyvinylchloride) Tamworth council sewer main runs in the west direction within the boundary of the site.
 - A 5.113m deep sewer manhole is located approximately 45m and 17m from the eastern and northern boundary respectively within the site.
 - A 1.99m deep sewer manhole is located on the western boundary of the site on Roderick St.
 - 30m south of the above manhole is another sewer manhole of depth 2.31m. The sewer main then runs in a western direction

5.1.2 Potable Water

The BYDA information provided by Tamworth Regional Council indicates:

- > An existing Ø150mm DICL (Ductile Iron Cement Lined) water main runs along the northern side of Peel st.
 - It is proposed that the water connection for domestic water and fire services is made from here
- > An existing Ø150mm DICL (Ductile Iron Cement Lined) water main runs along the western side of Roderick St.

A google street view assessment indicates that there is an existing 100mm connection from the water main along Roderick St currently serving the site.

Figure 14 Water meter shown within the site boundary from Roderick St



This is consistent with the BYDA information received showing a capped off connection in this location.

The proposed connection point for the fire services for the development is on Peel St as it is road facing the main pedestrian entrance.

The size and flow of the main on Peel St is sufficient for the fire system demand required to the development according to the Pressure and Flow application received by Tamworth Regional Council. Amplification of the potable water main is not required.

Figure 14 Pressure and Flow Results – Ø150 Waterloo Road Main

Date: 6/4/2023 Time: 6.50am Water main size: 150mm		
Summary Results:	Flow & Residual Pressure Results:	
	Location (A)	Location (A)
Static Pressure 800 (KPa)	Asset No: HYD0075284	Asset No: HYD000075284
Maximum Flow During Test : 28.0 (Litres/Sec)	(Flow - Litres/second)	(Residual Pressure – Kpa)
	0	800
	5	780
	10	710
	15	600
	20	525
	25	340
	28	140

5.2 New Works Associated with Sewer & Water Infrastructure

5.2.1 Water & Sewer Infrastructure connections

The sewer connection is proposed to be via the existing 300mm UPVC Tamworth council sewer main. It is anticipated the main will be sufficient to serve the development. Should Tamworth council deem the main to be inadequate based on the loads in the existing infrastructure, an upgrade would potentially be required. It is not anticipated that this will be required.

The exact location of sewer connection is subjected to the Section 306 Notice of Requirements.

Figure 16 Proposed sewer connection (subject to Section 307 Application)

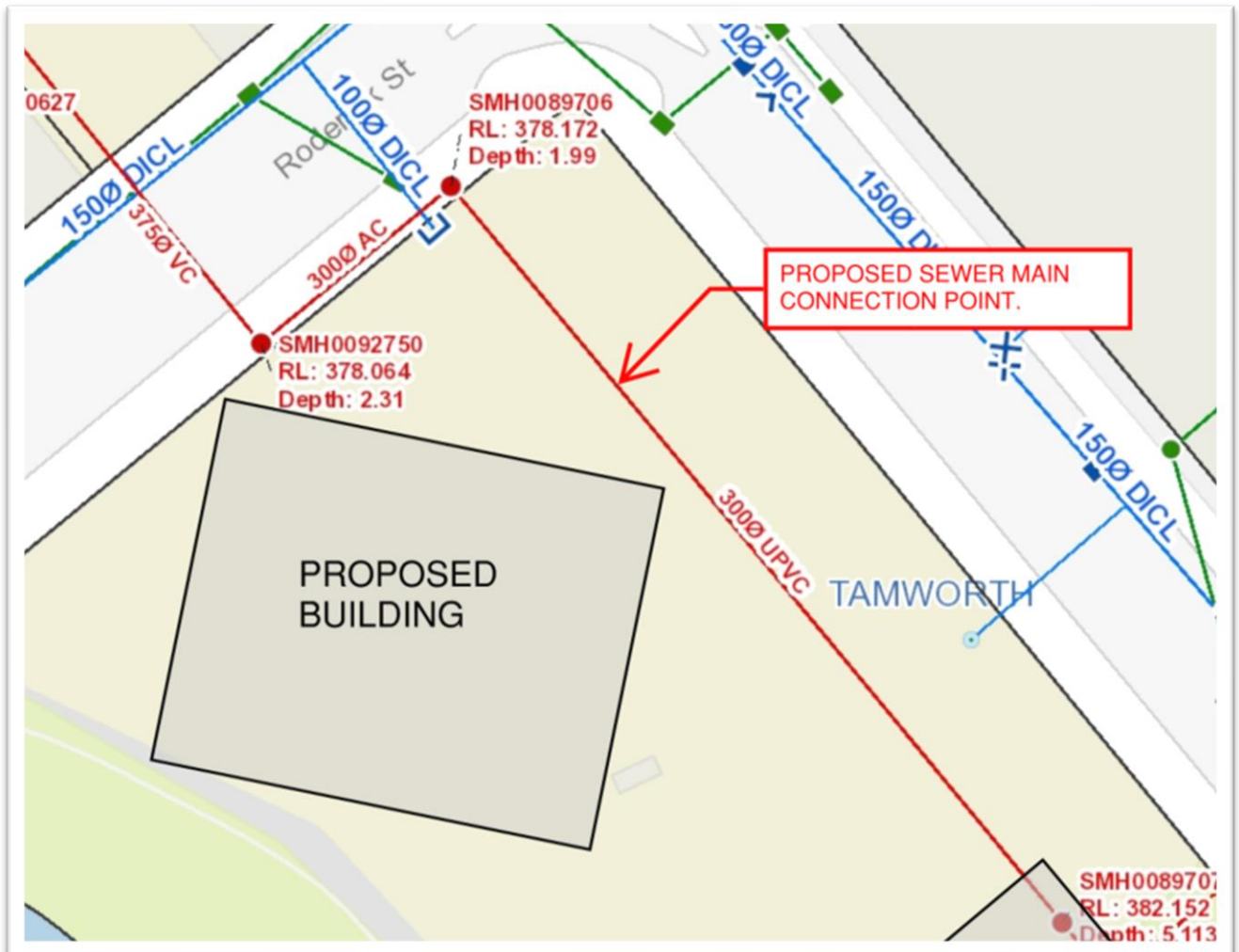
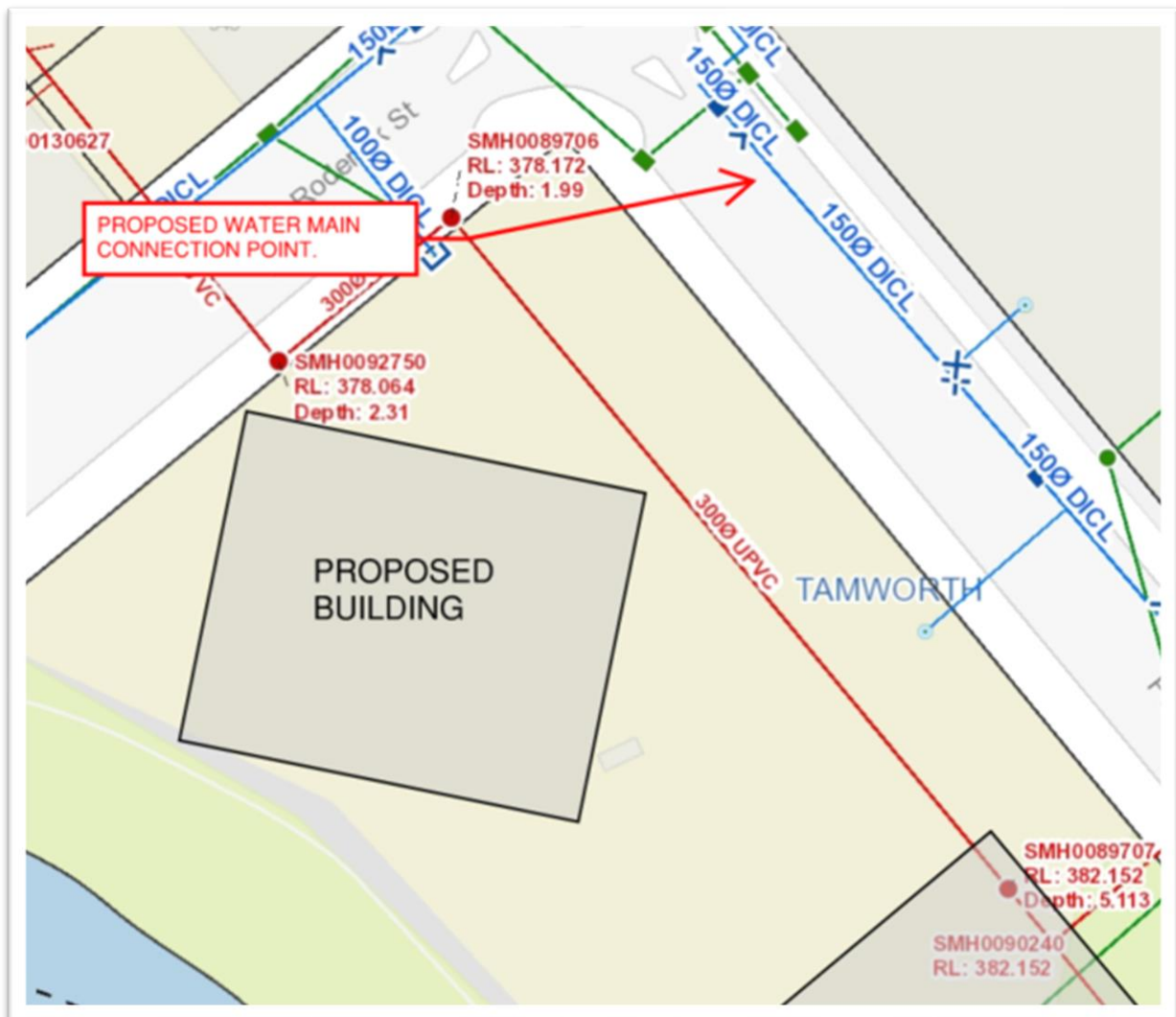


Figure 16 Proposed water connection (subject to Section 307 Application)



5.3 Risks

The following risk items will need to be confirmed during the design development phase to determine the development sewer drainage and water final demand:

- > Fixture and Loading Units for the proposed building (respective sewer drainage and water services demand for the development).
- > Excavating near an existing water main will likely affect the 'zone of influence' and trigger protection or relocation of the existing sewer mains. As there is no excavation for a basement level, it is not anticipated that any protection of Tamworth Regional Council's assets will be required
- > Exact location of sewer and water mains connections will be subject to Tamworth Regional Council's Section 307

6. Gas Infrastructure

6.1 Existing Infrastructure

There is no existing gas infrastructure. No information was received from the BYDA or from Tamworth Regional Council.

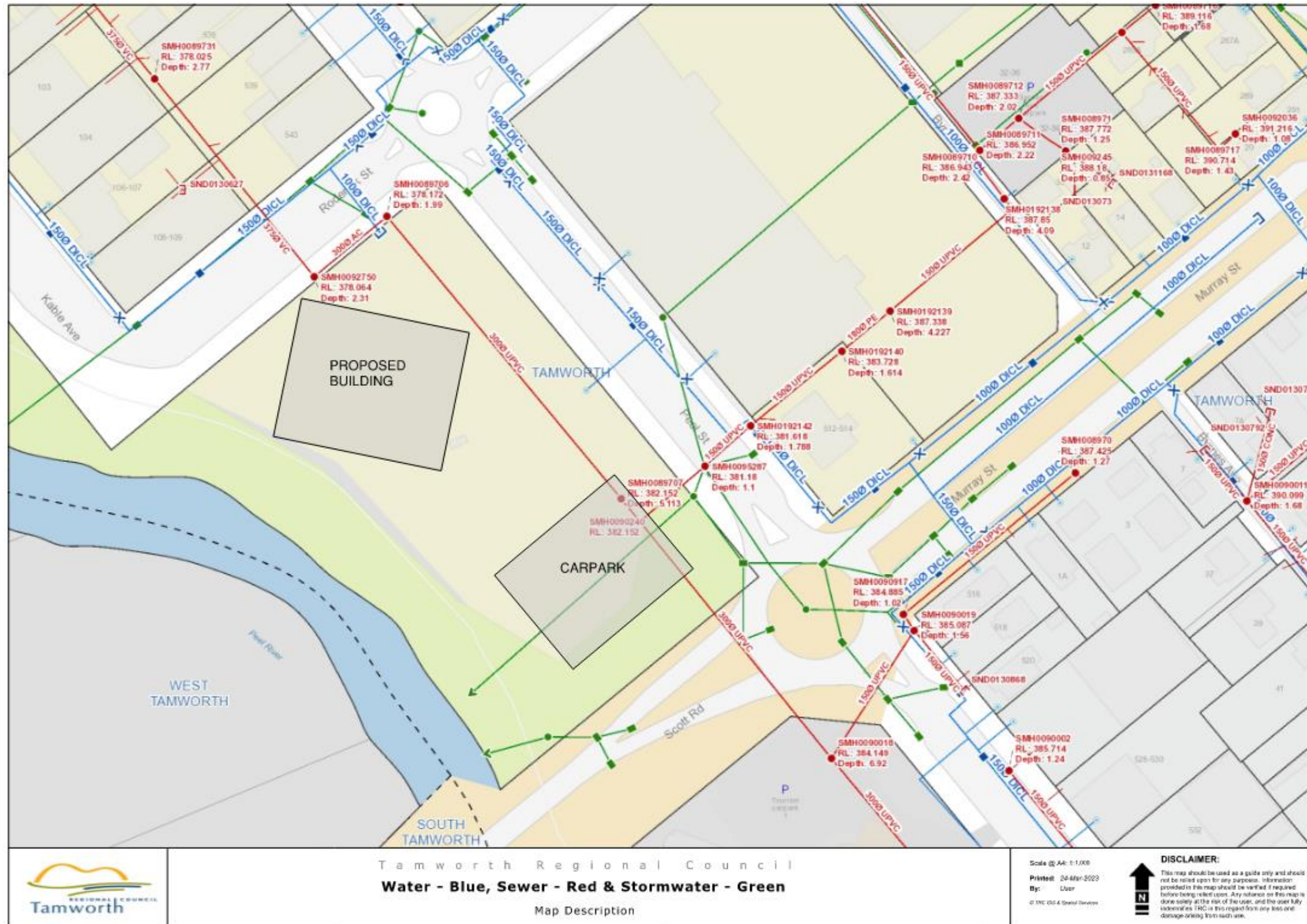
6.2 New Works Associated with Gas Infrastructure

If gas is required on site, an LPG tank will be provided where required. Otherwise, no gas provisions will be allowed for.

Appendix A

DBYD map

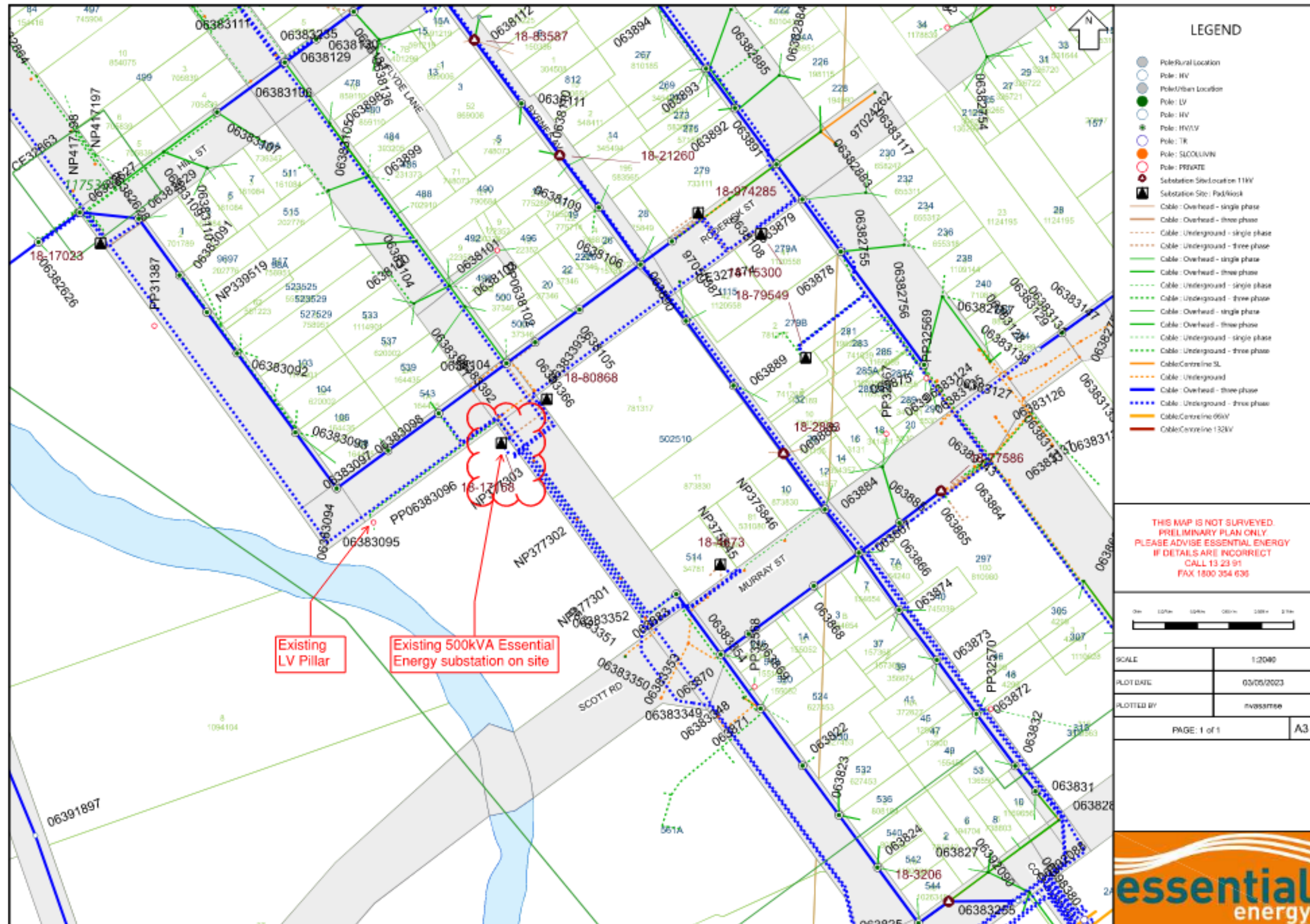
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Appendix B

ASPL3 Assessment

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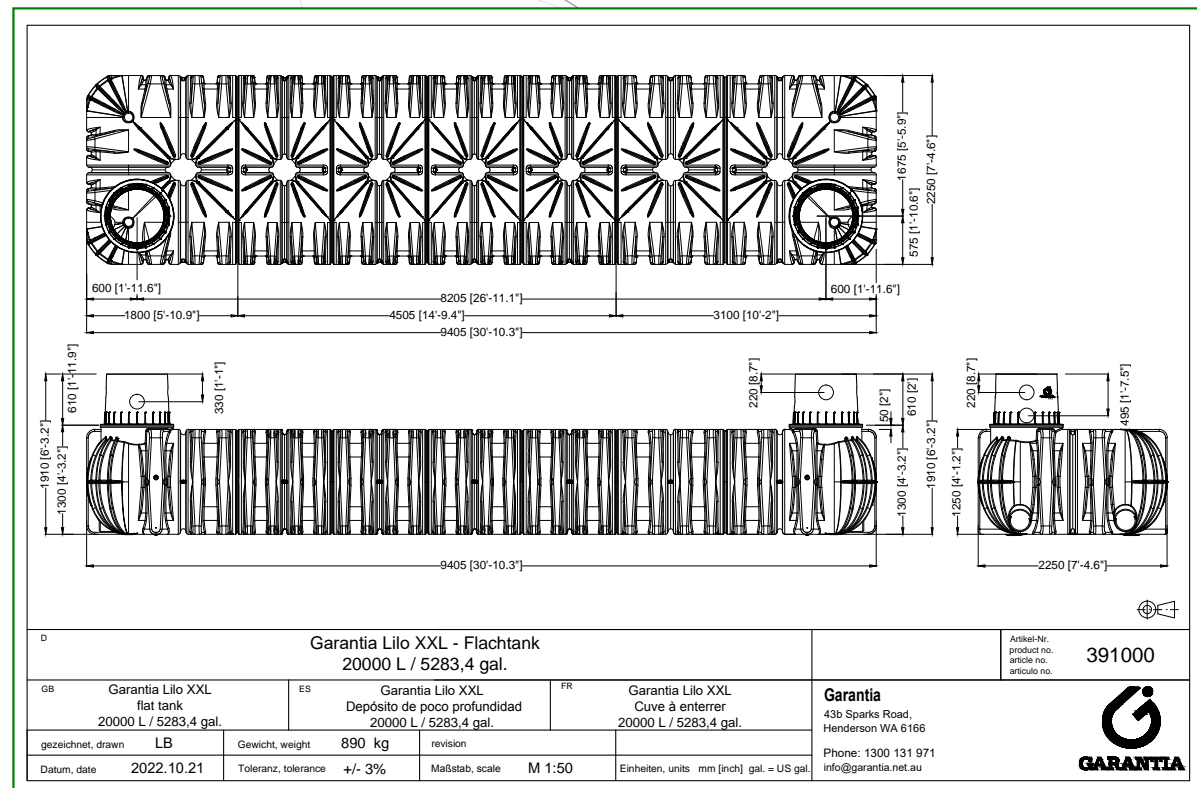
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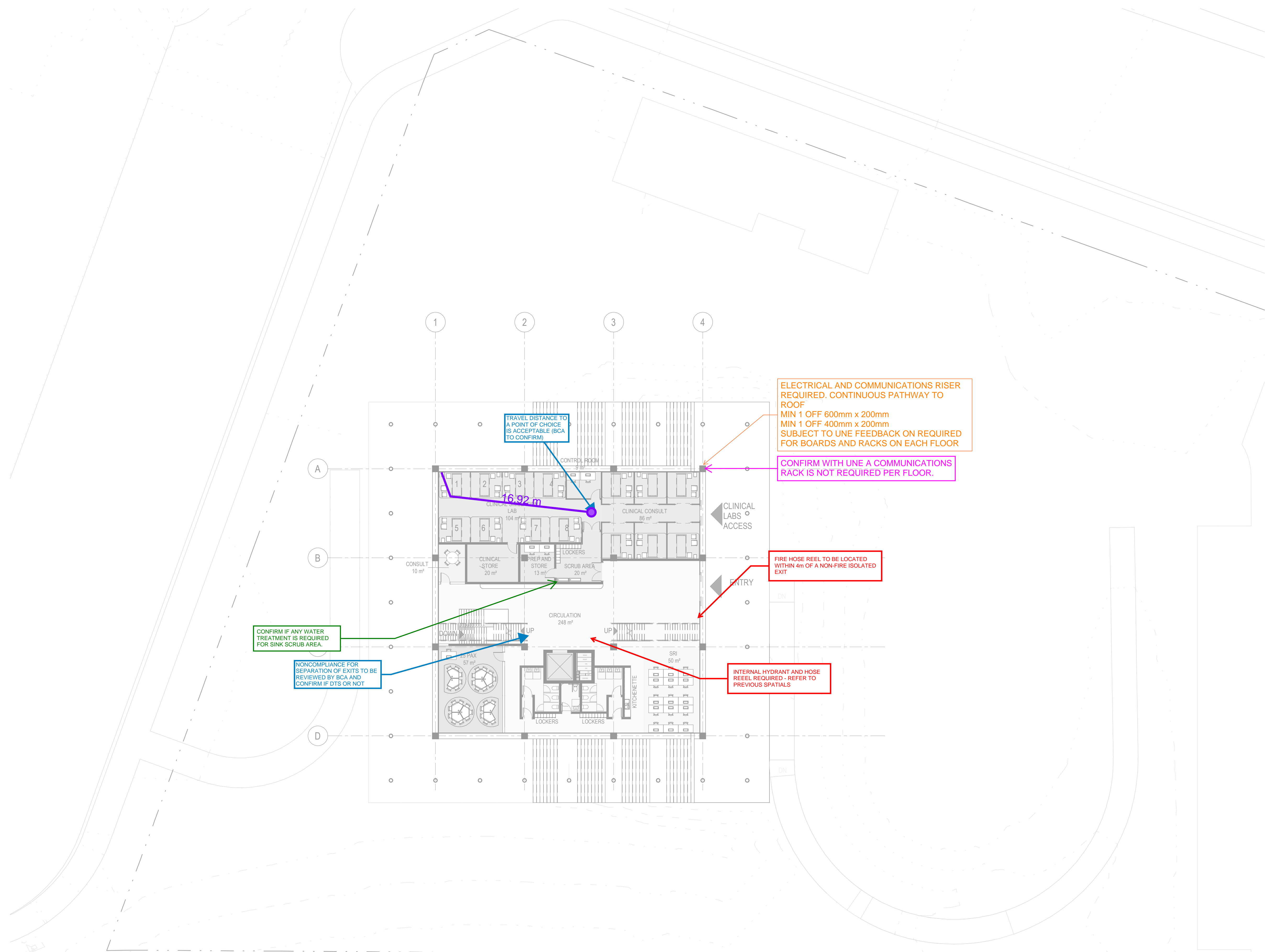
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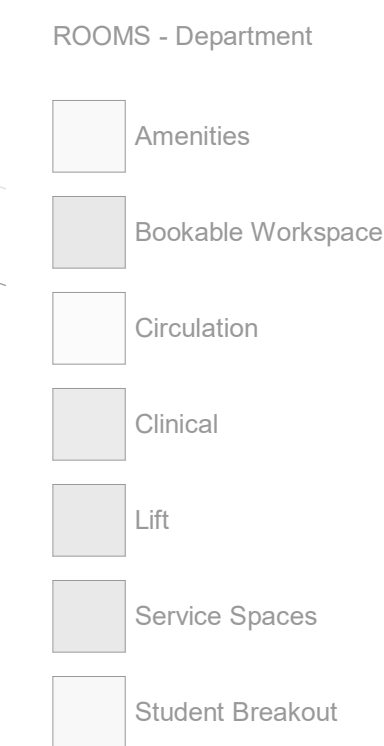
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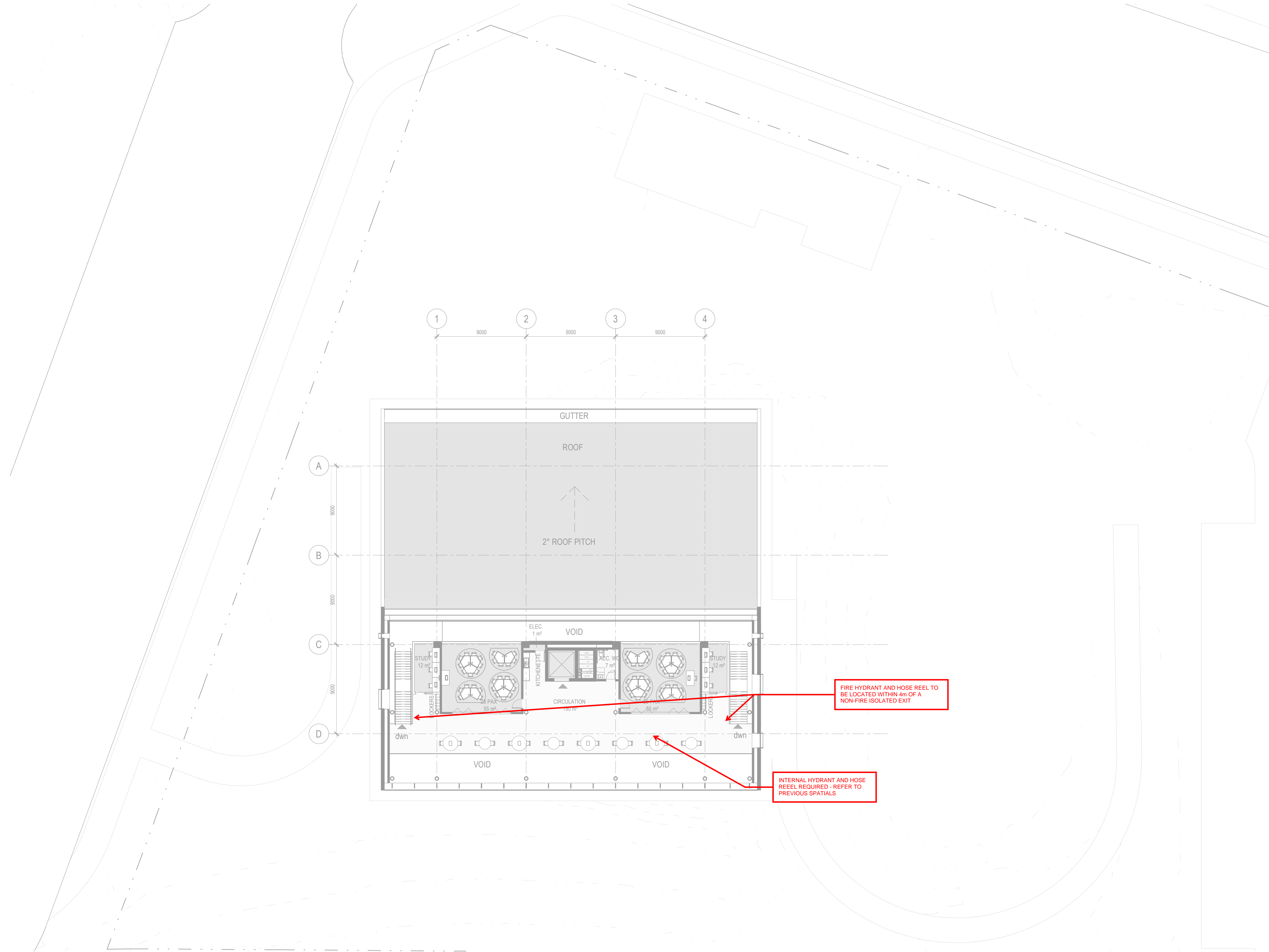
NEED TO ALLOW FOR RISER.
AND CABLE MANAGEMENT.

FIRE HYDRANT AND HOSE REEL TO
BE LOCATED WITHIN 4m OF A
NON-FIRE ISOLATED EXIT

INTERNAL HYDRANT AND HOSE REEL REQUIRED - REFER TO PREVIOUS SPATIALS

Date	28.07.23	Drawn by	VARIOUS	Building Services Engineers  ADP CONSULTING PTY LTD MELBOURNE Level 13 55 Collins St Melbourne VIC 3000 SYDNEY Level 6 33 Ekinore St Sydney NSW 2000 BRISBANE Level 15 15 Adelaide St Brisbane QLD 4000 GOLD COAST Level 13 50 Cavill Ave Surfers Paradise QLD 4202 www.adpconsulting.com.au contact@adpconsulting.com.au		
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Client: -				Job No. SYD2353	Drawing / Sketch No. S-SK-01	Rev. 02

project	The University of New England Tamworth Central Campus	
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 - Circulation
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 - Service Spaces
 - Teaching Spaces

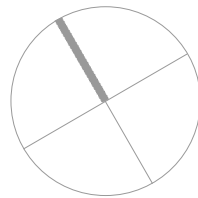
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Nominated Architect
Ray Brown, NSWARB 6359

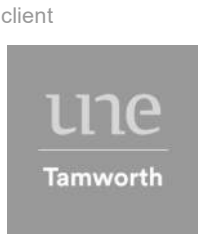
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Client: -		Job No. SYD2353	Drawing / Sketch No. S-SK-01
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project	The University of New England Tamworth Central Campus
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Civil Engineering Concept Design Report

University of New England (UNE) - Tamworth Central Campus

Prepared for Architectus/ 22 November 2023

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Rev	Date	Prepared By	Approved By	Remarks
Concept	22/11/2023	NB	NB	For Authority Approval
DRAFT	25/08/2023	JL	NB	Concept Design

1.0 Introduction

Taylor Thomson Whitting (TTW) has been engaged by Architectus to provide Civil Engineering consultancy services for the proposed works at UNE Tamworth Central Campus. The following chapters of this report were developed to form the Civil Engineering design component of Architectus' wider concept design report.

This report will address the civil engineering challenges of the site including stormwater quantity, overland flow, potential flooding, stormwater quality, pavements, soil & erosion and earthworks design. The relevant requirements of the Tamworth Regional Council's Development Control Plan (DCP) and engineering specifications will be addressed.

1.1 Reference Documents

The following documents have been reviewed and referenced in preparing this report:

- Tamworth Regional Council Development Control Plan 2010;
- Tamworth Regional Council Local Environmental Plan 2010;
- Tamworth Regional Council Engineering Design Minimum Standards for Subdivisions and Developments Version 1, March 2019;
- Tamworth Regional Council: The Six Water Sensitive Design Essentials;
- Tamworth Regional Council: Water Sensitive Design Statements;
- Tamworth Regional Council: Raingardens;
- Tamworth City-Wide Flood Investigation Volume 1 and 2 by Lyall & Associates, May 2019
- Landcom NSW Managing Urban Stormwater Soils and Construction (The "Blue Book" Vol. 1 and Vol. 2);
- NSW MUSIC Modelling Guidelines;
- NSW Floodplain Development Manual 2005;
- Australian Rainfall and Runoff 2019;

And;

- Architectural documentation by Architectus;
- Landscape documentation by Tyrell Studio;
- Geotechnical Investigation report by JK Geotechnics (Ref: 36020PNrpt) dated 28 July 2023;
- Preliminary Site Investigation report by JK Geotechnics (Ref: E36020PDrpt) dated 31 July 2023;
- Survey by Baxter Geo Consulting Pty Ltd Dated 4 February 2016;

2.0 Existing Site

The proposed site location sits within the Local Government Area (LGA) of the Tamworth Regional Council on a parcel of land legally known as Lot 73 Deposited Land (DP) 1107041. It is zoned E2 Commercial Centre under the Tamworth Regional Council LEP. The site is located at 545 Peel Street, Tamworth, NSW 2340 known as Bicentennial Park/Velodrome and is approximately 1.1 ha in area. It is surrounded by industrial/commercial buildings on Peel Street to the northeast and Roderick Street to the northwest, with Peel River adjacent to the site to the west as shown in Figure 1.



Figure 1 – Site Location (Source: Nearmaps)

As shown in the contours map in Figure 2 below, the site generally falls west towards Roderick Street from a reduced level (RL) of approximately 382m (AHD) at the eastern corner of the site boundary to an RL 379m at the western corner. The contours also show the surrounding land falling towards the site, with a low point at the Velodrome at RL377m.



Figure 2 – Site Location (Source: Department of Finance, Services and Innovation, 2017)

2.1 Existing Services

Taylor Thomson Whitting conducted a Dial Before You Dig (DBYD) enquiry as part of the concept design stage to identify known in-ground public assets that may impact the development. For further detail, refer to the relevant consultants' reports and detailed survey including service reticulation.

2.1.1 Electricity

DBYD information provided by Endeavour Energy shows a number of underground low-voltage, high-voltage. It is linked by a road crossing duct with series of 25mmØ and 150mmØ PVC and unknown cover to the opposite side of the Holloway Road.

2.1.2 Communications

DBYD information received from Telstra indicate one 50mmØ PVC conduit between two 3-pits running across Murray Street, approximately 45.5m apart.

2.2 Geotechnical Conditions

The geotechnical investigation report by JK Geotechnics (Ref. No. 36020PNrpt) have been prepared as part of this development. This civil concept design report references information from the geotechnical report relevant to the civil design.

The geotechnical consultant obtained fifteen boreholes (BH1 to BH15) at depths ranging from 6m to 15m to assess the general condition of the site. The subsurface conditions across the site were identified to have a fill depth ranging from 0.3m to 4.4m, which comprises of silty clay soil with layers of sandy fill. It is underlain by

stiff to very stiff clays of medium plasticity, which is in turn underlain by greywacke bedrock at depths of 3.15m to 9.5m.

The investigation encountered groundwater seepage at five borehole locations during the borehole drilling at 3.4m to 10.8m depth. Groundwater seepage was further identified at four borehole locations upon completion of the drilling at depths ranging from 4.9m to 9.4m. It is noted that no longer term monitoring of groundwater levels was carried out.

The geotechnical investigation recommended that a design California Bearing Ratio (CBR) of 1.5% be used for the site's external pavement design, provided that the subgrade was prepared according to their recommendations. According to the report, a weighted average design CBR of 3% could be used for a concrete pavement if a 0.4m thickness of material with a CBR of not less than 10% is placed above natural soils with a CBR of 1.5%. Once a suitable fill has been identified, a final design CBR value can be provided if needed.

For further detail, please refer to the original report by JK Geotechnics.

2.3 Contamination

The findings of the Preliminary Site Investigation (PSI) documented by JK Geotechnics (Ref: E36020PDprt) have been reviewed in preparing this report. For further information, refer to the original PSI report.

As stated in the report, all soil analysis results were below the adopted site assessment criteria (SAC). However, it is noted that the identified fill in BH9 and BH3 were confirmed to be a potential source of contamination, with traces of plastic, glass, slag and ash in some other borehole locations. Overall, the report initially concluded that contamination issues at the site were to be expected given the site's historical land use, and that the site could be made suitable through remediation processes if necessary.

The report recommends a Detailed Site Investigation (DSI) to address any additional assessment not covered by the PSI, as well as a Remediation Action Plan (RAP) if the DSI identifies the need for on-site remediation to confirm site suitability.

3.0 Proposed Architectural & Landscape Concept

The proposed architectural concept includes construction of a new four-storey school building adjacent to Roderick Street, car park with access on Peel Street, bicycle parking spaces, community lawn, and associated landscaping.

The proposed site plan is shown below in Figure 3.



Figure 3 - Proposed Site Plan (Source: Architectus & Tyrrell Studio)

4.0 Flooding

For flood related scope, refer to TTW's separate "Flood Concept Report" for details.

5.0 Stormwater

5.1 Existing Stormwater

The survey investigation provided by Baxter Geo Consulting shows the inground stormwater pipe and pit network within the proposed site. It is noted that all stormwater pits within the site drain to Roderick Street. Council's initial comments below regarding stormwater were also noted on the survey:

1. Stormwater Servicing will be dependent on the proposal design;
2. Initially, stormwater is to be directed to Roderick Street;
3. The existing stormwater infrastructure in Roderick Street may need to be upgraded;
4. Detail developed stormwater discharge across the range 1 in 5-year to 1 in 100-year to predeveloped natural flows, or to the capacity of the receiving stormwater infrastructure, whichever is less;
5. Roderick Street and to a lesser extent of Peel Street receive significant overland flows during storm events which will need to be considered with regard to potential site access and any basement levels.

Figure 7 below shows the stormwater network in green colour as identified in the survey investigation.



Figure 4 – 100-year Overland Flow (Source: Council Correspondence-Appendix B)

5.2 Proposed Stormwater

The proposed stormwater design is to be in accordance with the relevant Australian Standards, and Australian Rainfall and Runoff 2019 (ARR 2019), Tamworth Regional Council's DCP 2010, and Tamworth Regional Council's Engineering Design Minimum Standards for Subdivision & Developments 2019.

Civil engineering concept design drawings has been prepared and included in Appendix A which nominates indicative proposed stormwater pit and pipe network, subsoil drainage, as well proposed pavement profiles. The assumed impervious areas and catchment sizes are subject to adjustment following the development of the landscape design. The pervious and impervious areas that were allowed for are to be further developed during the schematic design phase.

5.3 Stormwater Quantity

Council's Engineering Design Standards specifies that stormwater must be controlled to protect properties and infrastructures from flooding and limit the stormwater runoff by providing retention/detention basins. However, a Council correspondence confirmed that stormwater detention is not required for the site. Additionally, the general stormwater and flooding freeboard requirements for the site have been confirmed. Refer to Appendix B for Council's correspondence.

5.4 Stormwater Quality

The proposed development will ensure the implementation of appropriate water quality treatment for stormwater runoff to reduce the discharge of pollutants from paved and other impermeable surfaces into waterways and council drainage systems.

The Tamworth Regional Council's Water Sensitive Design Statement Fact Sheet stipulates that the stormwater discharge must meet the following standards shown in Figure 8 below.

Site Characteristics		Lots over 2,000 m ² in size	Lots less than 2,000 m ² in size
Target Reduction Loads *	Gross Pollutants	90%	90%
	Total Suspended Solids	Neutral or Beneficial Effect on Water Quality – meaning loads of pollutants from future development must be equivalent to or less than that from the existing land use prior to development	80%
	Total Phosphorus		65%
	Total Nitrogen		45%
* Based on increased pollution generated from development without treatment			

Figure 5 – Stormwater Quality Targets (Source: Tamworth Regional Council's Fact Sheet)

Some sites, however, that are part of a Council-approved Stormwater Strategy or Water Sensitive Design Statement, may be required to meet different stormwater quality targets. Council has been contacted to confirm whether the proposed site is included in this, and we are still waiting for their response to this date. Refer to Appendix B for Council's correspondence.

The Water Sensitive Urban Design (WSUD) for the stormwater runoff on site can be treated by a combination of rainwater reuse tank, pit-insert filter baskets and swales. Stormwater quality reduction targets and maintenance of treatment measures can also be met through a combination of the following treatment options;

- *Constructed Wetlands (preferred over bioretention basins and ponds)*
- *Operation and Maintenance Plan*
- *Trash racks (preferred over GPTs)*
- *Ocean Protect StormFilter Cartridges (or equivalent)*
- *Ocean Protect Oceanguard Pit Inserts (or equivalent)*
- *Rainwater reuse tanks*
- *Swales, bioretention swales and buffer strips*
- *Bioretention basins*
- *Raingardens*

5.4.1 MUSIC Modelling

The proposed stormwater quality treatment train will be modelled using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to ensure pollutant load target reductions are met during continued site operation.

MUSIC simulates the performance of a group of stormwater management measures, configured in series or in parallel to form a "treatment train" against historic rainfall event data sets. It is the industry standard water quality modelling software developed by the MUSIC development team of the Cooperative Research Centre for Catchment Hydrology (CRCCH). The MUSIC user manual suggests that the time-step should not exceed the time of concentration of the smallest sub-catchment however due consideration must also be made regarding the shortest detention time of nodes within the treatment train.

Since Tamworth Regional Council does not have an available MUSIC link, the 6-minute rainfall data from the closest rainfall station, Tamworth Airport Station no. 055054 will be adopted for the modelling.

5.5 Operations and Maintenance

Regular maintenance of stormwater infrastructure, particularly stormwater quality treatment devices will be required to ensure they function as intended for the design life. Access roads will need to be assessed to ensure maintenance vehicles such as vacuum trucks are able to access the stormwater quality devices.

Any proposed water quality tank will need to be designed with an adequate number of access hatches in accordance with Australian Standards and the local Council requirements.

5.6 Erosion and Sediment Control

An erosion and sediment control plan (ESCP) is to be implemented during the construction stage to mitigate soil erosion and control the discharge of stormwater laden with sediment, nutrients and other pollutants to adjoining properties, bushland, roadways or receiving water bodies. Stormwater controls on site are detailed in ESCPs which will be in accordance with regulatory authority guidelines including Landcom NSW's Managing Urban Stormwater, Soils and Construction ("Blue Book").

The disturbance of the site during construction must be controlled through erosion prevention and sediment control measures. A sediment basin will be required at the lowest point of the site to capture runoff from the construction site. A silt fence will prevent silt and waste being washed into neighbouring sites and streets. It can be integrated with safety fencing. A catch drain with hay bales will be utilised to carry and treat site runoff which will then be captured by a sedimentation basin that will be installed at the low point of site excavation. At the point of entry to site, cattle grids are required to ensure that vehicles and machinery leave the site with clean wheels. Pits will have silt protection installed to prevent silt from entering the stormwater system during construction.

Refer to Appendix A for details of the erosion and sediment control plan for the development site.

6.0 Ground and Water Conditions

As per the Geotechnical investigation report by JK Geotechnics, the proposed building floor levels, carpark, landscaping and all external levels are above the inferred groundwater table and is not expected to cause significant quantities of groundwater seepage. The investigation encountered groundwater seepage during the borehole drilling at approximately at RL371m to RL372.5m. Groundwater seepage was further identified upon completion of the drilling at approximate levels of RL370.5m to RL372.5m. It is noted that no longer term monitoring of groundwater levels was carried out.

Refer to Figure 9 below for location and depths of groundwater observed on site. For further details, refer to JK Geotechnics' original report.

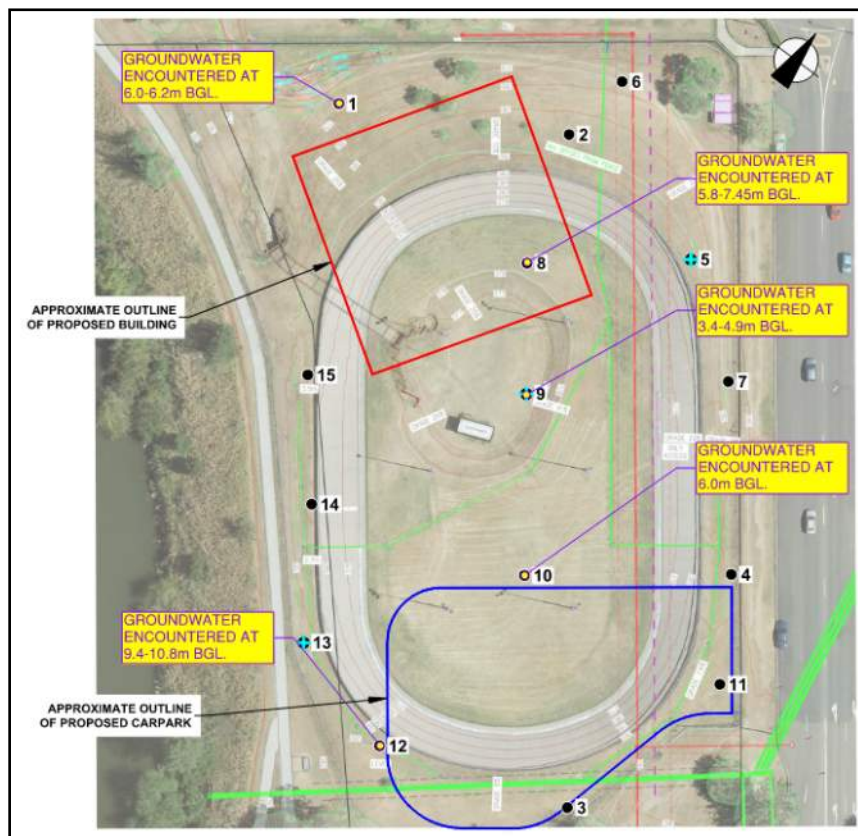


Figure 6 – Borehole Location and Groundwater Depths

7.0 Surface Impact Assessment

The proposed development will have little impact on the existing surface water conditions as the design intends to match the existing drainage scenario and reduce the flows. The proposed stormwater system and overland flow paths will reduce flows from the site which will only further protect the downstream ecology. Further, the introduction of water quality treatments will protect the receiving bodies from the pollutants introduced by increased impervious surfaces.

As such, the proposed drainage design will not adversely impact downstream ecosystems, nor impact existing hydrological systems.

8.0 Project Risks

The following risks in relation to the school development have been identified as outstanding in the concept stage and are subject to further investigation and advice:

- The water quality requirements discussed in this report have been determined from review of Council's DCP, consultation with Council, other supporting. This will be developed upon confirmation with Council, and as the architectural and landscape design progresses to ensure that the areas are accurate, and the required water quality measures be adjusted accordingly.

9.0 Preparation for Schematic Design Phase

9.1 Intended Focus for Schematic Design Phase

The following list highlights the civil focus as the project goes into concept and schematic design phase:

- Design development of water quality and stormwater management including development of preliminary MUSIC modelling.
- Design development of bulk earthworks cut and fill, stormwater drainage network, external levels, and grading.
- Civil design and documentation for submission via the proposed planning pathway.

10.0 Conclusion

This report provides a summary of the civil engineering and stormwater management requirements to inform the concept design phase for the new UNE- Tamworth Central Campus development. Stormwater is required to comply with Tamworth Regional Council requirements including provision of erosion and sediment control and stormwater quality treatment.

Prepared by
TTW (NSW) PTY LTD



JEMA LOPEZ
Civil Engineer

Authorised By
TTW (NSW) PTY LTD



NEMESIO BIASON JR.
Associate Director

P:\2022\2218\221823\Reports\TTW\Civil\231122\231122 Civil Engineering Concept Design Report.docx

Appendix A

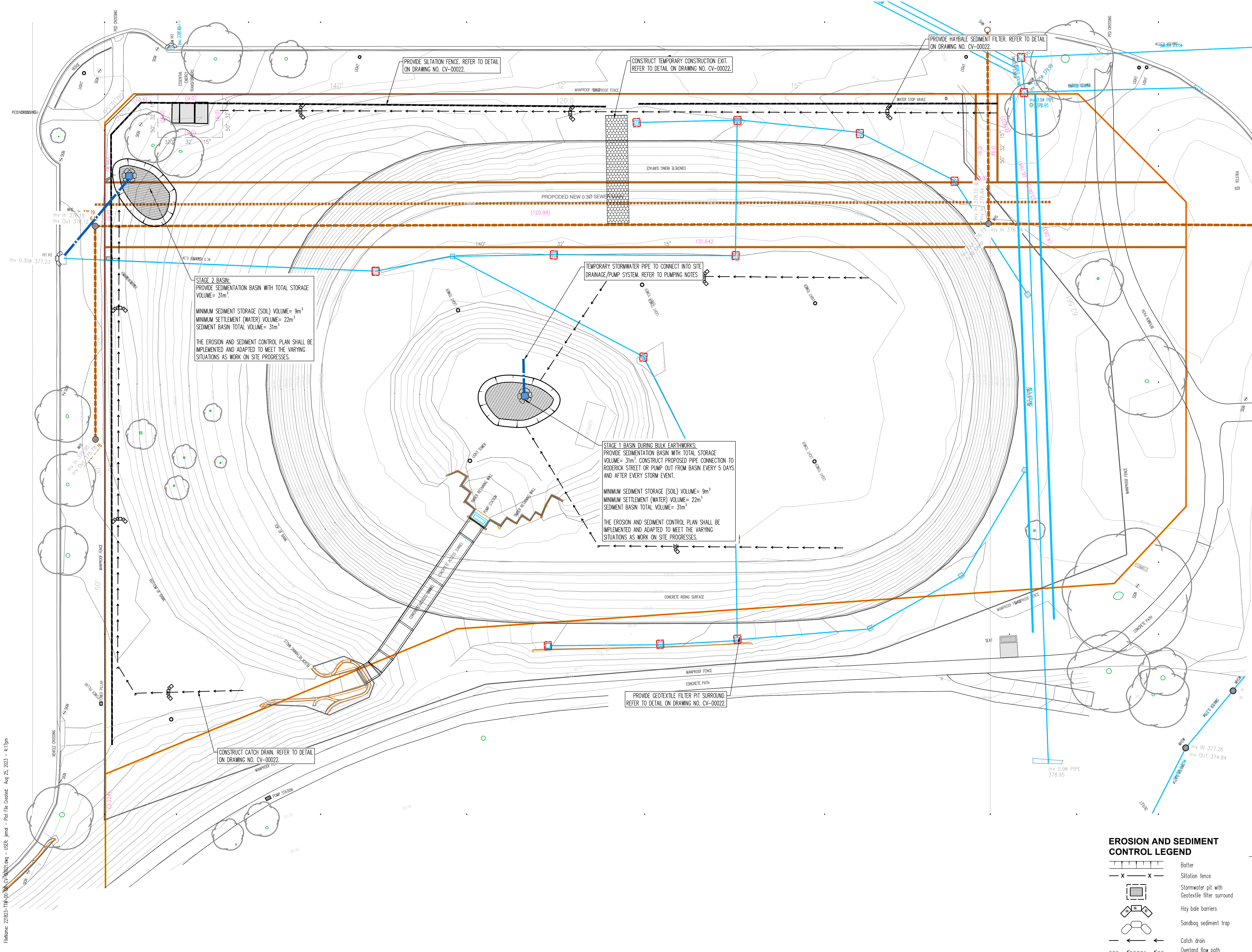
Civil Engineering Drawings



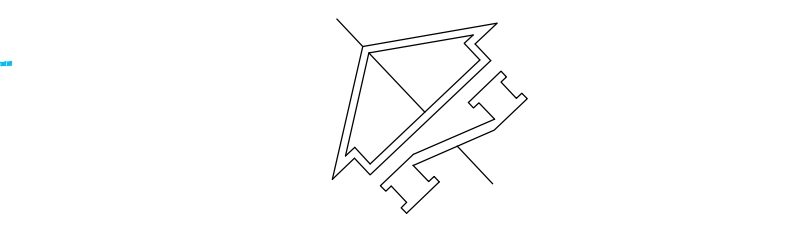
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221823-TTW-00-DR-CV-00001	GENERAL NOTES SHEET
221823-TTW-00-DR-CV-00021	SEDIMENT AND EROSION CONTROL PLAN
221823-TTW-00-DR-CV-00022	SEDIMENT AND EROSION CONTROL DETAILS
221823-TTW-00-DR-CV-00031	BULK EARTHWORKS PLAN
221823-TTW-00-DR-CV-00035	BULK EARTHWORKS SECTIONS SHEET 1
221823-TTW-00-DR-CV-00036	BULK EARTHWORKS SECTIONS SHEET 2
221823-TTW-00-DR-CV-00041	SITWORKS AND STORMWATER PLAN SHEET 1
221823-TTW-00-DR-CV-00101	DETAILS SHEET 1
221823-TTW-00-DR-CV-00102	DETAIL S SHEET 2

[illegible]

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EROSION AND SEDIMENT CONTROL NOTES

- All work shall be generally carried out in accordance with:
(A) Local authority requirements,
(B) EPA - Pollution control manual for urban stormwater,
(C) LANDCOM NSW - Managing Urban Stormwater: Soils and Construction ("Blue Book").
- Erosion and sediment control **drawings and notes** are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities. The erosion and sediment control plan shall be implemented and adapted to meet the varying situations as work on site progresses.
- Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
- When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
- Minimise the area of site being disturbed at any one time.
- Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
- All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
- Control water from upstream of the site such that it does not enter the disturbed site.
- All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
- All vehicles leaving the site shall be cleaned and inspected before leaving.
- Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
- Clean out all erosion and sediment control devices after each storm event.
- In case of forecast wet weather, contractor to secure and stabilise all equipment and ensure soil and water control measure are in place.
- Contractor to review and refer to geotechnical report prepared by JK Geotechnics (REF: 36020PNRp1) for ground investigations and provide measures accordingly.

- Sequence Of Works**
- Prior to commencement of excavation the following soil management devices must be installed.
 - Construct silt fences below the site and across all potential runoff sites.
 - Construct temporary construction entry/exit and divert runoff to suitable control systems.
 - Construct measures to divert upstream flows into existing stormwater system.
 - Construct sedimentation traps/basin including outlet control and overflow.
 - Construct turf lined swales.
 - Provide sandbag sediment traps upstream of existing pits.
 - Construct geotextile filter pit surround around all proposed pits as they are constructed.
 - On completion of pavement provide sand bag kerb inlet sediment traps around pits.
 - Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

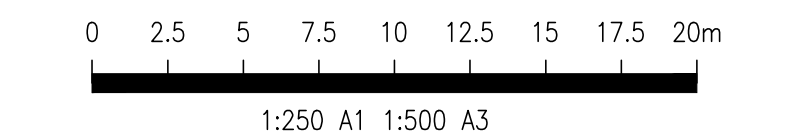
- Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:
- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
 - If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system. This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

EROSION AND SEDIMENT CONTROL PUMP OUT NOTES

Any accumulated water contaminated with sediment, from a sediment basin or excavation pit, is to be flocculated or filtered in order to lower the suspended solid load to less than 50mg per litre gypsum gas or other approved flocculant should be applied within 24 hours of the end of the storm event. The gypsum must be spread evenly over the entire water surface. Pumping is not to occur for at least 36 hours and preferably 48 hours after application. Clean water is to be discharged to the water table via a hole bail sediment filter in a way that does not pick up sediment that has dropped to the bottom.
Note: gypsum is a hydrated form of calcium sulphate and is available at many swimming pool shops and hardware stores.

EROSION AND SEDIMENT CONTROL LEGEND

- Batter
- Siltation fence
- Stormwater pit with Geotextile filter surround
- Hay bale barriers
- Sandbag sediment trap
- Catch drain
- Overland flow path



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P1 ISSUE FOR INFORMATION				NB SS 25.08.23												TAMWORTH				SEDIMENT AND EROSION CONTROL PLAN				Job No				Drawing No				Revision			
Rev Description				Eng Draft Date				Rev Description				Eng Draft Date												221823-TTW-00-DR-CV-00021				P1							
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Project

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Sheet Subject

SEDIMENT AND EROSION CONTROL PLAN

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Job No

221823-TTW-00-DR-CV-00021

Drawing No

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Revision

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TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20

HAY BALE SEDIMENT FILTER

SANDBAG KERB INLET SEDIMENT TRAP

SANDBAG KERB SEDIMENT TRAP

TEMPORARY CONSTRUCTION EXIT

SILTATION FENCE DETAIL

SCALE 1: 20

NOTE
ENDS OF SILTATION FENCE TO RETURNED
UP SLOPE TO PREVENT RUNOFF

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TAMWORTH

SEDIMENT AND EROSION CONTROL PLAN

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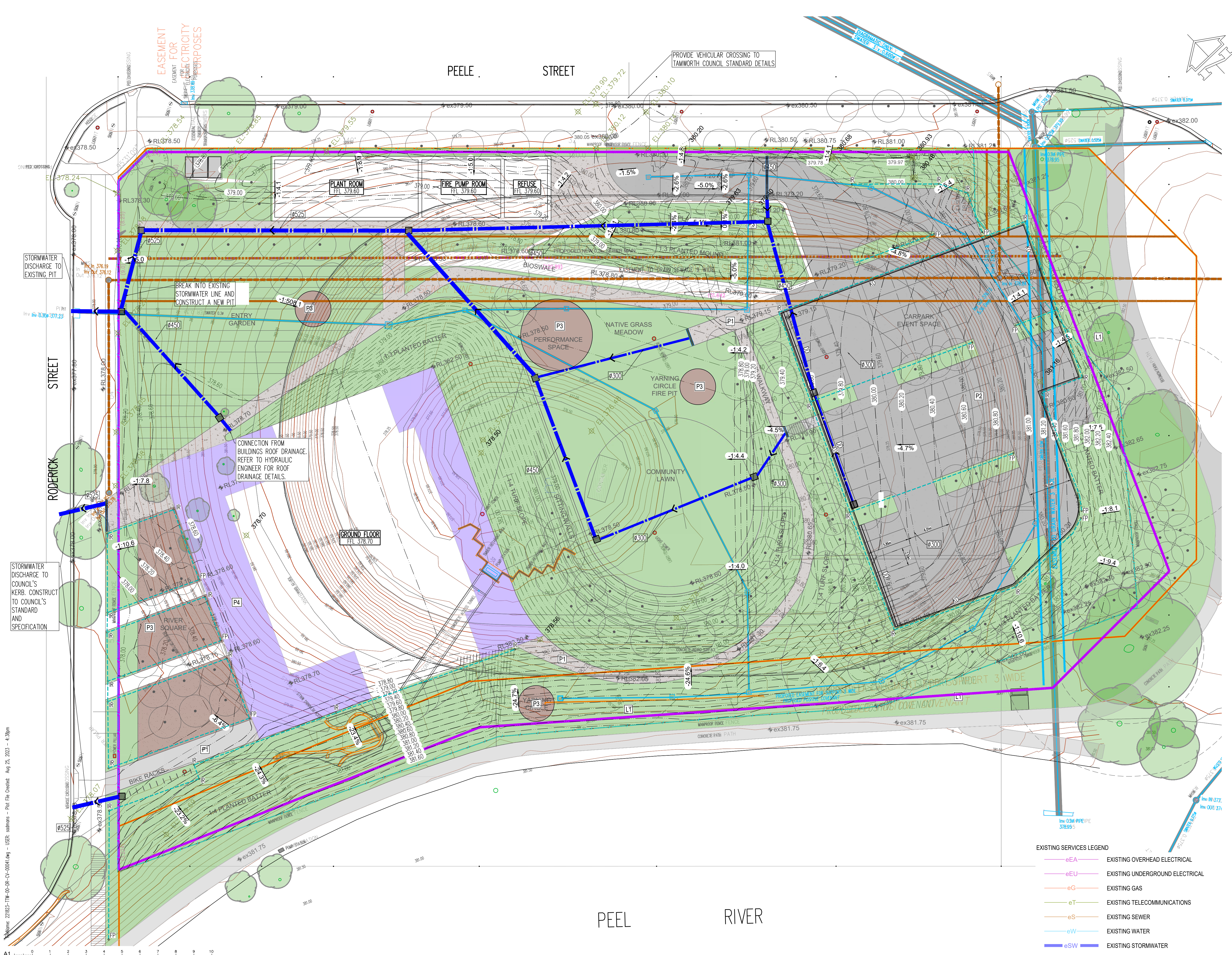
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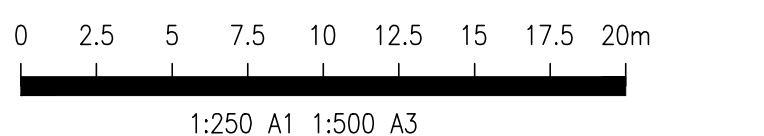
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- EXTENT OF WORKS
- × F22.20 FINISHED SURFACE LEVEL
- 22.50 MAJOR FINISHED SURFACE CONTOUR 0.5m INTERVAL
- 22.10 MINOR FINISHED SURFACE CONTOUR 0.1m INTERVAL
- KG KERB AND GUTTER
- KO KERB ONLY
- FK FLUSH KERB
- DD DISH DRAIN
- VC VEHICULAR CROSSING
- PEDESTRIAN KERB RAMP
- TAPER KERB TO ZERO HEIGHT OVER 1.0m
- STORMWATER PIPE, FLOW DIRECTION
- STORMWATER PIPE, FLOW DIRECTION
- u/L 10.00 Ø600 2' 1.25% Q=345L/s d/L 9.65 UPSTREAM PIPE INVERT LEVEL PIPE SIZE AND STRENGTH CLASS PIPE GRADIENT PEAK DESIGN FLOW DOWNSTREAM PIPE INVERT LEVEL
- JUNCTION PIT
- GRADED INLET PIT
- HAUNCHED GRADED INLET PIT
- SAG KERB INLET PIT
- ON-GRADE KERB INLET PIT
- GROSS POLLUTANT TRAP
- D01-2 DRAINAGE LINE AND PIT NUMBER
- GD# GRATED DRAIN
- SUBSOIL DRAINAGE LINE, Ø100mm U.N.O.
- FP FLUSHING POINT
- IR INTERMEDIATE RISER
- DP DOWNPIPE
- GRASS CATCH DRAIN
- OVERLAND FLOW PATH
- RWA# BLOCKWORK RETAINING WALL
- BATTER SLOPE

- PAVEMENTS
- Asphaltic concrete shall conform to AS2150 and the Civil specification
 - Pavement based on geotechnical report by JK Geotechnics (REF: 36020PNRPT)
 - Compaction rate to Civil specification
- PAVEMENT TYPE 1 : CONCRETE PEDESTRIAN PAVEMENT**
120mm THICKNESS CONCRETE (f_c=32MPa) WITH SL92 FABRIC (50 TOP COVER WITH JOINTS ON 100mm COMPACTED THICKNESS FINE CRUSHED ROCK (DGB20) ON COMPACTED SUBGRADE
- PAVEMENT TYPE 2 : CONCRETE ROAD PAVEMENT**
170mm THICKNESS CONCRETE (f_c=32MPa) WITH SL92 FABRIC (50 TOP COVER WITH JOINTS ON 150mm COMPACTED THICKNESS 5% CEMENT STABILISED FINE CRUSHED ROCK (DGB20) ON COMPACTED SUBGRADE
- PAVEMENT TYPE 3 : DECO GRAVEL PAVING/SAND/RIVER GRAVEL PAVING**
150mm THICKNESS COMPACTED GRAVEL /SAND TO LANDSCAPE ARCHITECT'S FINISH AND SPECIFICATION
- PAVEMENT TYPE 4**
STRUCTURAL SLAB AND BASECOURSE (REFER TO STRUCTURAL PLANS FOR DETAILS) ON COMPACTED SUBGRADE COMPACTION RATE TO CIVIL SPECIFICATION
- L1**
REFER TO LANDSCAPE ARCHITECT'S DOCUMENTATION FOR DETAILS



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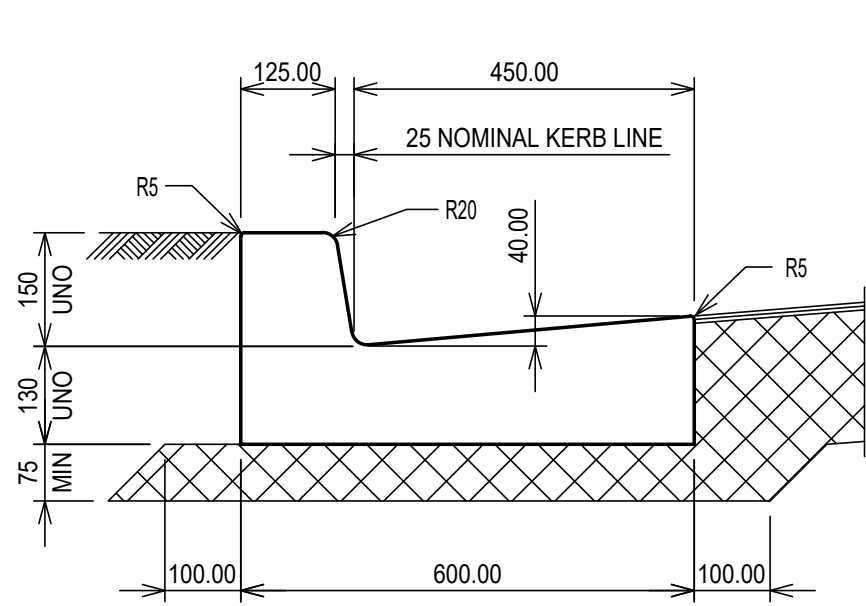
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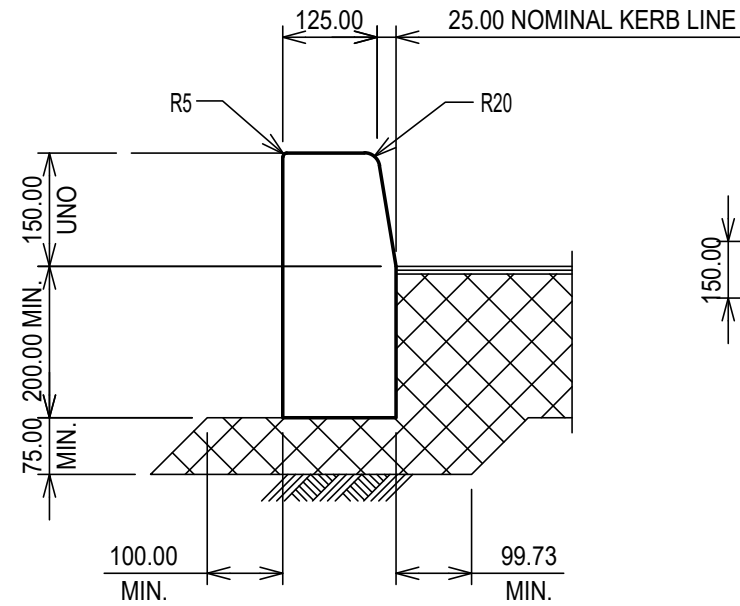
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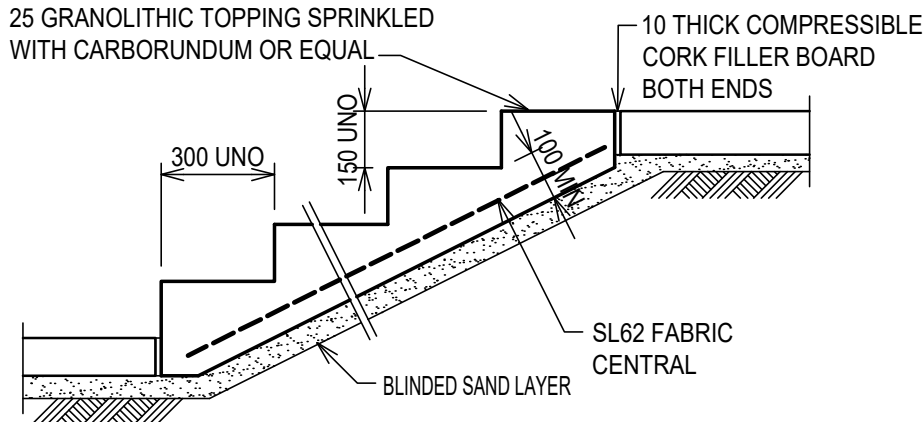
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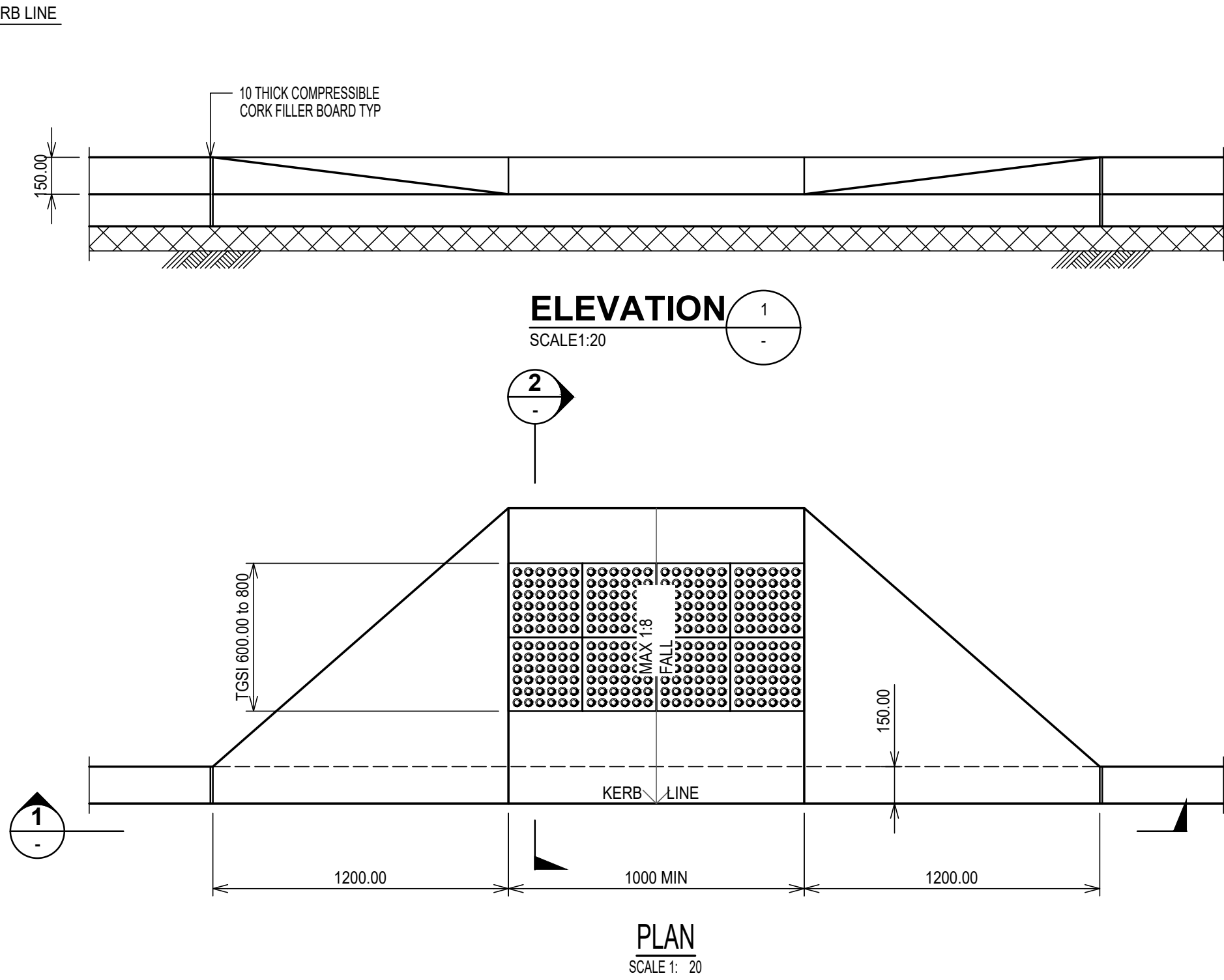
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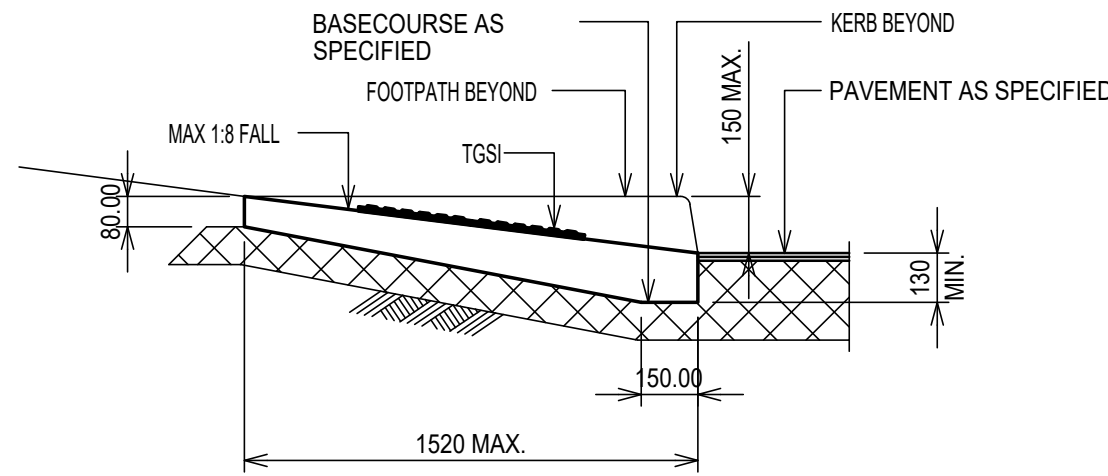
KERB ONLY (KO)
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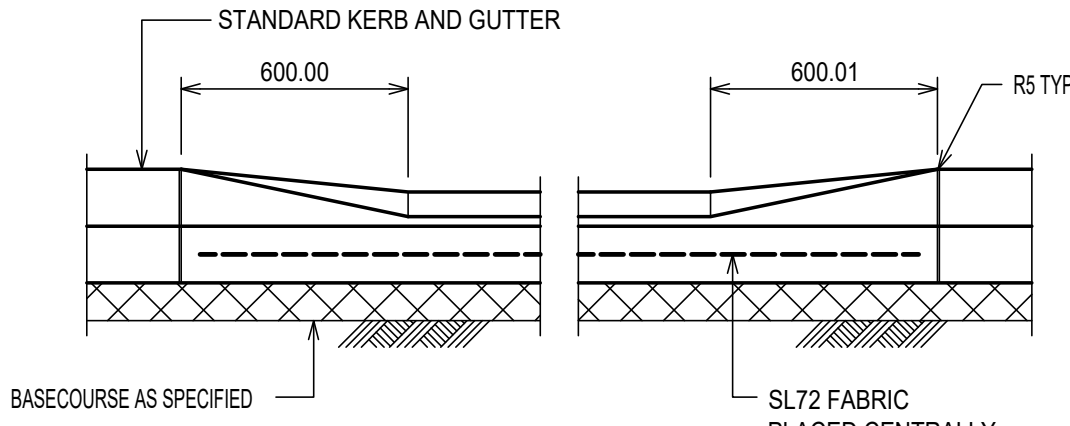
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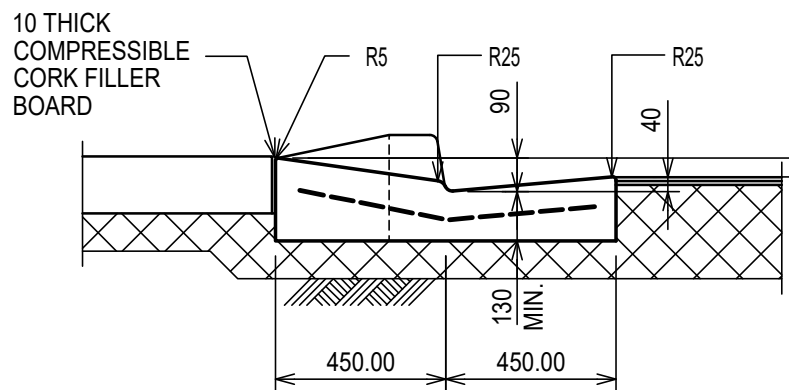
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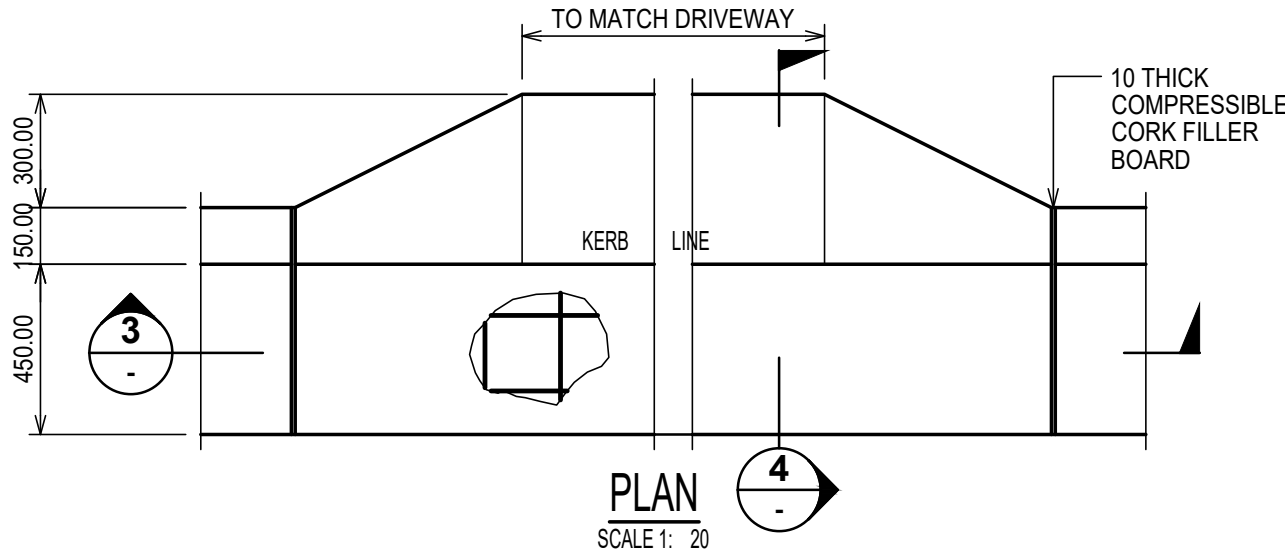
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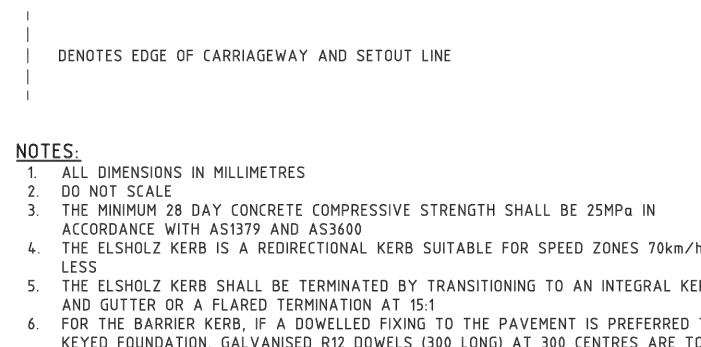
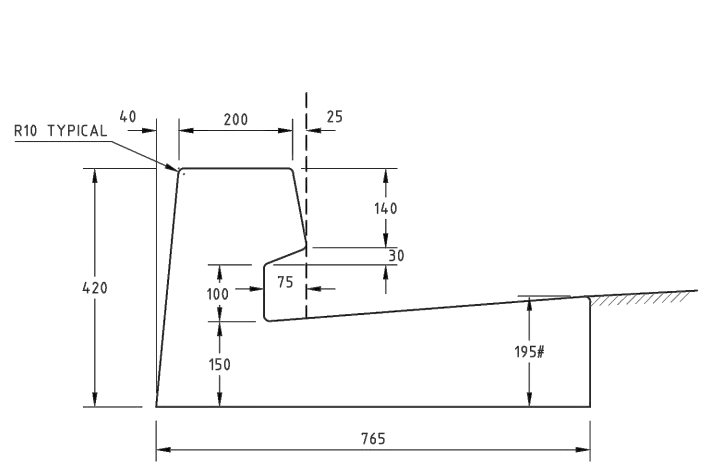
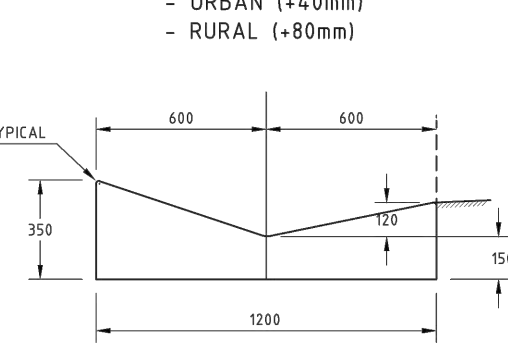
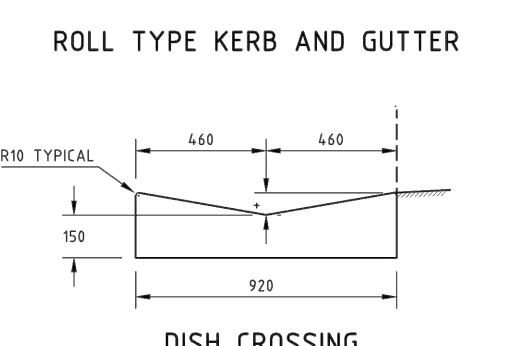
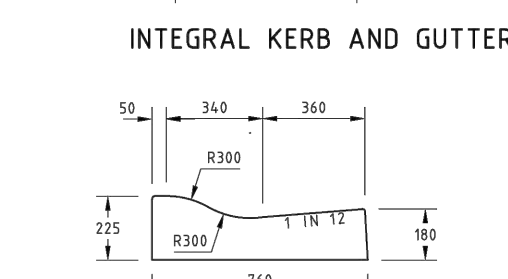
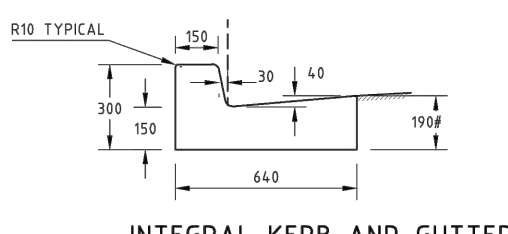
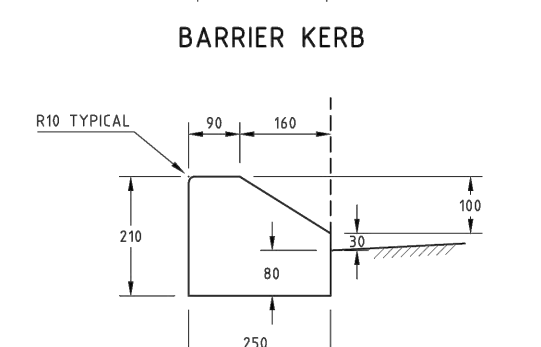
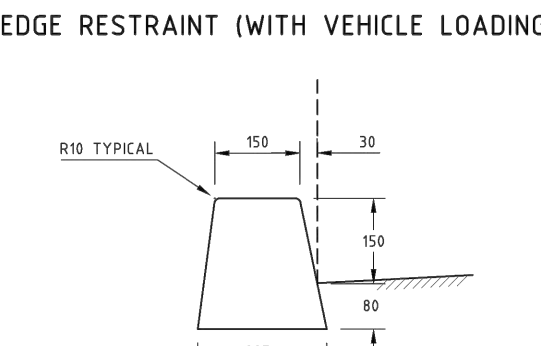
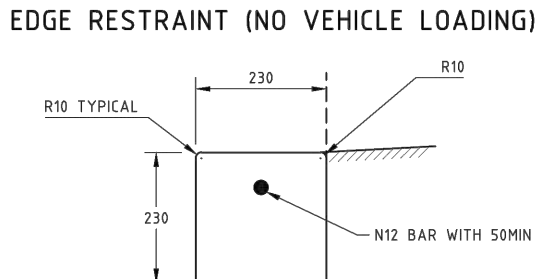
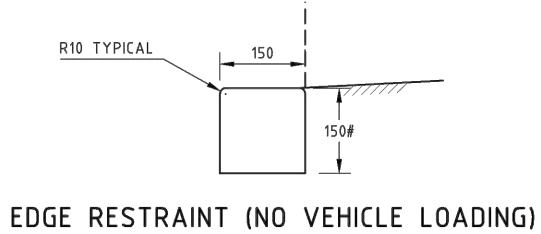
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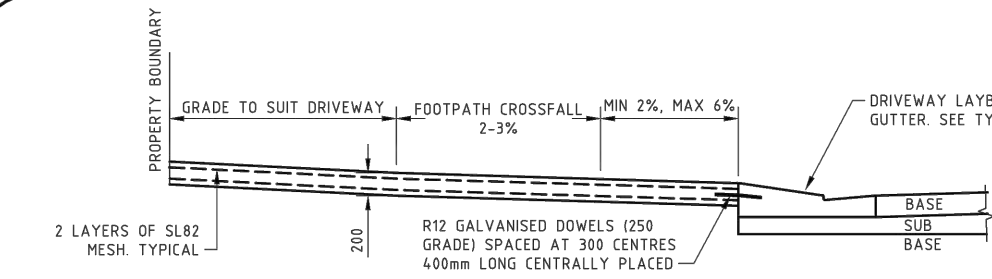
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VEHICULAR CROSSING
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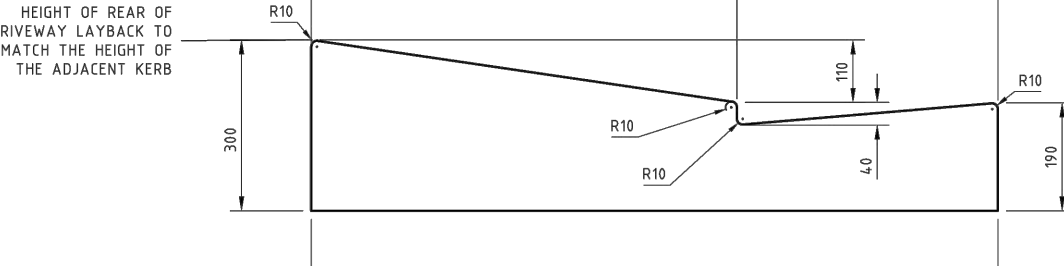


- NOTES:**
1. ALL DIMENSIONS IN MILLIMETRES
 2. DO NOT SCALE
 3. THE MINIMUM 28 DAY CONCRETE COMPRESSIVE STRENGTH SHALL BE 25MPa IN ACCORDANCE WITH AS1379 AND AS3600
 4. THE ELSHOLZ KERB IS A REDIRECTIONAL KERB SUITABLE FOR SPEED ZONES 70km/h OR LESS
 5. THE ELSHOLZ KERB SHALL BE TERMINATED BY TRANSITIONING TO AN INTEGRAL KERB AND GUTTER OR A FLARED TERMINATION AT 151
 6. FOR THE BARRIER KERB, IF A DOWELLED FIXING TO THE PAVEMENT IS PREFERRED TO A KEYED FOUNDATION, GALVANISED R12 DOWELS (300 LONG) AT 300 CENTRES ARE TO BE ADOPTED (2000 EMBEDMENT)
 7. DIMENSION MAY BE INCREASED TO SUIT THE DEPTH OF PAVEMENT BASE LAYER

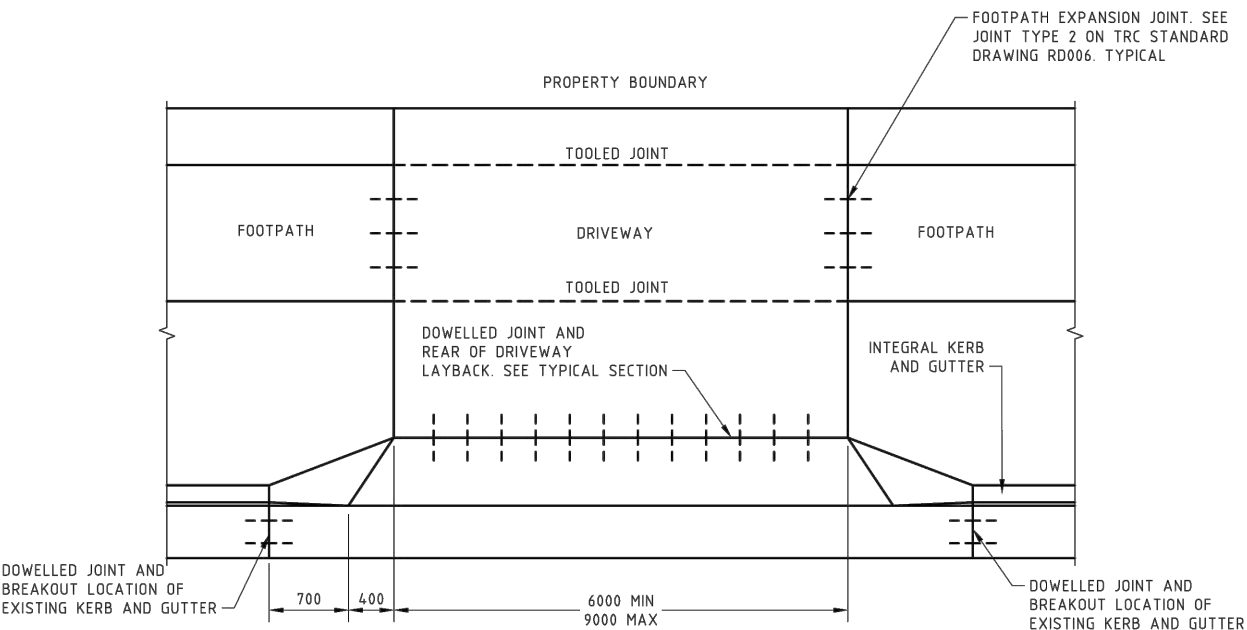


NOTE:
WHERE THE DRIVEWAY GEOMETRY CANNOT MEET THE ABOVE REQUIREMENTS, ALTERNATIVE PROPOSALS MAY BE ACCEPTED BY TRC'S AUTHORISED REPRESENTATIVE PROVIDED THEY SATISFY VERTICAL CLEARANCE REQUIREMENTS OF AS 2896.1 AND IT CAN BE DEMONSTRATED THAT THE MAJOR DRAINAGE SYSTEM IS NOT COMPROMISED

TYPICAL SECTION THROUGH DRIVEWAY LAYBACK



**TYPICAL SECTION
DRIVEWAY LAYBACK KERB AND GUTTER**



INDUSTRIAL DRIVEWAY LAYBACK

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETRES
 2. FOR ALL DETAIL OF INTEGRAL KERB AND GUTTER SEE TRC STANDARD DRAWING RD003
 3. THE MINIMUM 28 DAY CONCRETE COMPRESSIVE STRENGTH SHALL BE 32MPa IN ACCORDANCE WITH AS1379 AND AS3600
 4. NOMINAL COVER TO REINFORCEMENT SHALL BE 40mm
 5. ALL EDGES TO BE SHAPED WITH AN EDGING TOOL (25mm RADIUS)
 6. A TOOLED JOINT SHALL BE PROVIDED AT DRIVEWAY CHANGES IN GRADE
 7. DOWELS AT THE REAR OF THE DRIVEWAY LAYBACK AND EXISTING KERB AND GUTTER LOCATIONS MAY BE EXCLUDED IF THE DRIVEWAY IS CAST INTEGRAL WITH THE KERB AND GUTTER
 8. THE GRADIENT OF DOMESTIC DRIVEWAYS SHALL BE DESIGNED IN ACCORDANCE WITH CLAUSE 2.6 OF AS 2896.1 FOR BPP VEHICLES

**TAMWORTH REGIONAL COUNCIL
REGIONAL SERVICES DIRECTORATE**

**DRIVEWAYS -
INDUSTRIAL**

**REVISION: 1
ISSUE DATE: MARCH 2019
DRAWING NUMBER: RD009**



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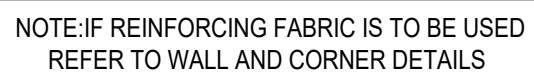
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DETAILS SHEET 1

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Authorised
NB



SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND
FITTINGS MAY BE USED



SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND
FITTINGS MAY BE USED

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Sheet Subject

DETAILS SHEET 2

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221823-TTW-00-DR-CV-00102 P1

Plot File Created: Aug 25, 2023 - 4:00pm

Appendix B

Council Correspondence

Jema Lopez

From: Jema Lopez
Sent: Wednesday, 28 June 2023 4:32 PM
To: Pugh, Aidan; Brake, Steve
Subject: RE: Prince of Wales Park Flooding and Stormwater Requirements

Good afternoon Aidan, Steve,

I hope you both have been well.

I was wondering if there have been any updates to the below regarding the WSUD requirements for the site?

Thank you and regards,



Jema Lopez | Civil Engineer

+61 426 053 329 | +61 2 9067 5017 | jema.lopez@ttw.com.au

TTW Engineers | Sydney

Read our latest news [here](#)

From: Jema Lopez
Sent: Friday, May 12, 2023 12:40 PM
To: Pugh, Aidan <a.pugh@tamworth.nsw.gov.au>; Brake, Steve <s.brake@tamworth.nsw.gov.au>
Cc: Nemesio Biason Jr <Nemesio.BiasonJr@ttw.com.au>
Subject: RE: Prince of Wales Park Flooding and Stormwater Requirements

Hi Aidan,

Thank you for the confirmation and for providing the additional information below.
We will await advice in relation to the WSUD requirements for the site.

Best regards,



Jema Lopez | Civil Engineer

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TTW Engineers | Sydney

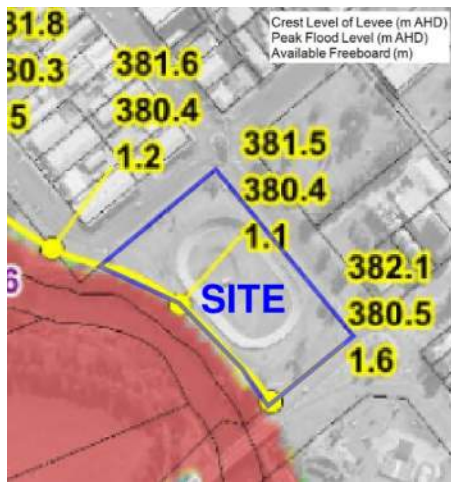
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From: Pugh, Aidan <a.pugh@tamworth.nsw.gov.au>
Sent: Thursday, May 11, 2023 12:21 PM
To: Jema Lopez <jema.lopez@ttw.com.au>; Brake, Steve <s.brake@tamworth.nsw.gov.au>
Cc: Nemesio Biason Jr <nemesio.biasonJr@ttw.com.au>
Subject: RE: Prince of Wales Park Flooding and Stormwater Requirements

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

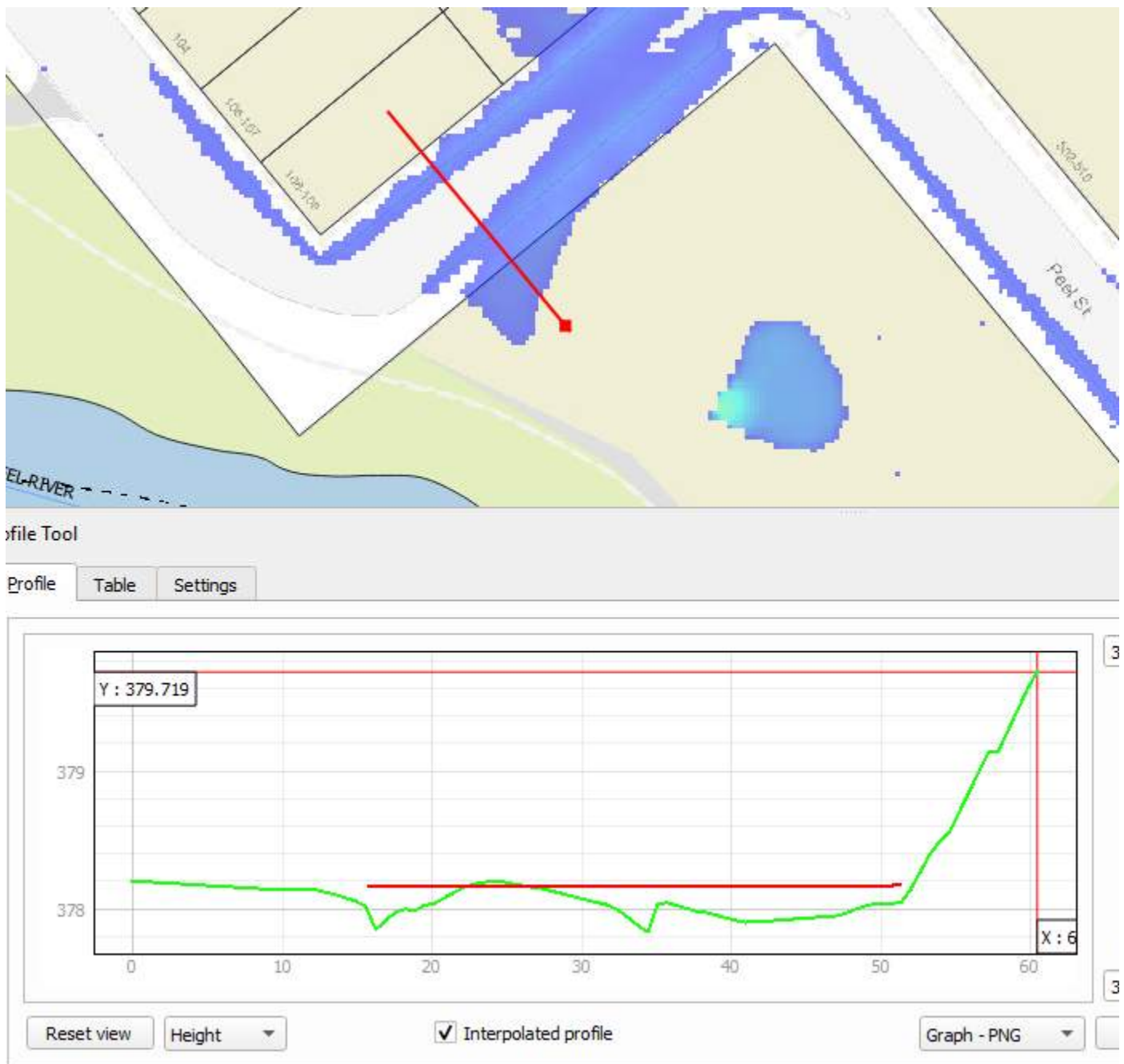
Hi Jema,

The Old Velodrome Site is protected by the Tamworth CBD levee along Peel River as shown below:



Council does not consider this location to be within the Flood Planning Area as defined in the LEP so the flood related development controls in the LEP do not apply.

This site has been identified in Council's draft Flood Risk Management Plan (currently on public exhibition) as being effected by overland flow. See the 1%AEP overland flow map below. During a development application you should consider the flows entering the site from Roderick Street especially considering that the current extent is limited by the velodrome embankment. I have also included a cross section through the LiDAR surface (green) and 1% flood surface (red) below.



Stormwater detention is not required at this site.

I will have to pass you on to our Development area to provide feedback on the WSUD requires. @Steve – are you able to comment on the status of the WSUD DCP amendment? Or pass Jema’s last question on to someone who can?

Cheers,

Aidan Pugh

Stormwater Engineer

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PO Box 555 Tamworth NSW 2340

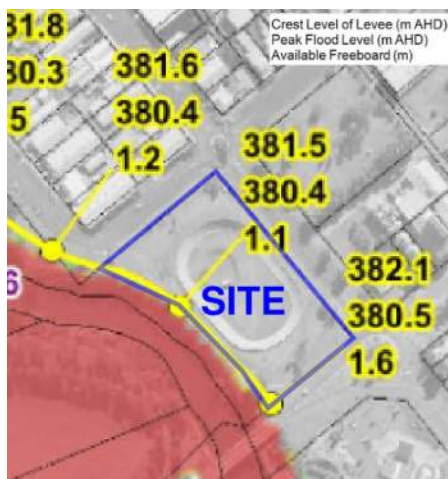
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From: Jema Lopez <jema.lopez@ttw.com.au>
Sent: Thursday, 11 May 2023 11:48 AM
To: Pugh, Aidan <a.pugh@tamworth.nsw.gov.au>
Cc: Nemesio Biason Jr <nemesio.biasonJr@ttw.com.au>
Subject: Prince of Wales Park Flooding and Stormwater Requirements

Good day Aidan,

Thank you for your time on the phone. As per our discussion, could you please confirm the following items for a proposed school campus at the Prince of Wales Park on the corner of Peel Street and Roderick Street in Tamworth?

- The Prince of Wales Park is protected by a levee approximately 1.1-1.6m west along Peel River as shown below.



- The proposed development does not initially require any freeboard, however will need to comply with the flood planning level as specified in Tamworth Regional LEP 2010 which is 1:100 ARI flood level plus 0.5m freeboard.

The flood planning level adopted in the Tamworth Regional Local Environmental Plan 2010 is defined as the level of a 1 : 100 ARI (average recurrent interval) flood event plus 0.5 metres freeboard.

Additionally, I am seeking to confirm the stormwater requirements for a proposed development.

- On-Site Detention (OSD) is to be designed in accordance with Council's *Engineering Design Minimum Standards for Subdivisions & Developments (V1, March 2019)* Chapter 3.10.3.4 shown below, which is to match the existing undeveloped peak discharge up to and including the 100-year ARI storm event.

3.10.3.4 DESIGN CRITERIA

All retention/detention structures are to be designed utilising:

- Hydrographs produced by an acceptable method of unit graph theory or mathematical modelling; and
- Flood routing through the structure.

Retention/detention structures shall be designed to maintain the existing undeveloped discharges for the range of storm durations and frequencies from 1 year ARI events up to and including 100 year ARI events.

The methods described in Section 3.6.3 of these Standards may be used to calculate peak flows.

Retention/detention structures with downstream established areas and no clear and safe overland flow paths shall be designed for the peak 100 year ARI storm with consideration of the sensitivity of the design given to 200 year ARI events.

The peak storm duration with retention/detention structures is to be confirmed by the *Developer's Representative*. The critical duration is likely to be longer than without retention/detention. A graph showing the range of peak flood levels in the structure and peak discharges from the structure are to be provided for all storm events examined. Consideration must be given to areas downstream to ensure that changes in timing of peak flows at the confluence of downstream reaches is not adversely impacted by construction of the structure.

A sensitivity analysis must be undertaken for a range of variables (catchment roughness, link lags etc.) to determine how sensitive the design is to minor changes in these variables.

Rainwater tanks either installed or intended to be installed as part of the development shall not be used in retention/detention basin design calculations. The volume of storage in pits and pipes in the minor system is also to be ignored.

- A Water Sensitive Design Statement (WSDS) is to be provided and the development must comply with Council's *Fact Sheet: Water Sensitive Design Statements* shown below. It was also noted on the fact sheet that some sites are part of Council-approved Stormwater Strategy or WSDS may be required to meet different stormwater quality targets that what is shown below. Could you please confirm what target reduction loads should be adopted for the site?

Requirements of a Water Sensitive Design Statement			
A Water Sensitive Design Statement is supported by figures and diagrams which demonstrate how the development satisfies the objectives of the Development Control Plan and the Water Sensitive Design performance criteria as outlined in quality and quantity targets.			
Stormwater Quality Targets – Subdivision			
Site Characteristics		Lots over 2,000 m ² in size	Lots less than 2,000 m ² in size
Target Reduction Loads *	Gross Pollutants	90%	90%
	Total Suspended Solids	Neutral or Beneficial Effect on Water Quality – meaning loads of pollutants from future development must be equivalent to or less than that from the existing land use prior to development	80%
	Total Phosphorus		65%
	Total Nitrogen		45%

* Based on increased pollution generated from development without treatment

Stormwater Quantity Targets

Stormwater Quantity	Flow rates (for environmental and infrastructure protection)
Target	Retention/detention structures shall be designed to maintain the existing undeveloped discharges for the range of storm durations and frequencies from 5 year ARI events up to and including 100-year ARI events. Retention/detention structures with downstream established areas and no clear and safe overland flow paths shall be designed for the peak 100-year ARI storm with consideration of the sensitivity of the design given to 200-year ARI events.
Intent	Reduce the likelihood of increased rates of bed and bank erosion and damage to benthic habitat in waterways. Ensure that the development does not result in increased stormwater flows that exceed the capacity of the external stormwater drainage infrastructure and/or exacerbate overland flow problems.

Thank you and please let me know if I have missed any flooding/stormwater-related requirements, or misinterpreted any of the above.

Best regards,



Jema Lopez | Civil Engineer

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